



Chapter 2: Review and Authorization of Bridge Removal Work Plans

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2-1 Introduction

This chapter covers Structure Construction (SC) policy with respect to the bridge removal work plan review process. Subsequent chapters cover specific review guidelines, procedures, and explanations where necessary to ensure uniform and impartial contract administration. As noted in Chapter 1, *Introduction*, review and authorization of the Contractor's bridge removal work plan is delegated to SC's Structure Representative in responsible charge of structure work at the project site. While the actual review of the bridge removal work plan may be performed by a qualified member (authorized reviewer) of the Structure Representative's staff, the Structure Representative is expected to give their personal attention to the review while it is in progress and provide concurrence before the drawings are authorized.

The contract requirement for submission of the bridge removal work plan should be discussed with the Contractor at the preconstruction conference, with emphasis on the need for a complete submittal before the review period begins. If the bridge removal work is subcontracted, strongly encourage the prime contractor to have the bridge removal subcontractor attend the preconstruction conference as they should be considered "key personnel" per the *Contract Specifications* Section 8-1.03, *Prosecution and Progress – Preconstruction Conference*. The Contractor should be reminded that bridge removal must not begin until the plan is authorized. The Contractor must submit a separate bridge removal work plan for each structure.

2-2 Design Calculations and Shop Drawing

A bridge removal work plan is required for all bridge removal. If a bridge removal work plan includes superstructure removal, a protective cover, temporary bracing, temporary support, or temporary shoring, the Contractor must furnish design calculations signed by a California registered civil (or structural) engineer. The [Contract Specifications](#) require the design calculations to show the stresses and deflections in load-supporting members. In the specification context, the term "load-supporting members" will be construed as meaning the design-controlling members. The [contract documents](#) requires that protective covers, temporary bracing, temporary supports, and temporary shoring be designed and constructed in accordance with *Contract Specifications*, Section 48, *Temporary Structures*, and Section 60-2.02, *Existing Structures – Structure Removal – Bridge Removal*. The [Falsework Manual](#) is an essential tool in the administration of Section 48, *Temporary Structures*, although loading requirements may differ when compared to bridge removal.

The design calculations furnished by the Contractor are for information only; they are not for review and authorization. Likewise, any required design or construction details which may be shown in the form of sketches on calculation sheets must be included in

the bridge removal work plan as well; otherwise, the plan is incomplete. Bridge removal work plans are not to be authorized in any case where it is necessary to refer to calculation sheets for information needed to complete the independent design review, or where information shown only on the calculation sheets will be needed for construction. In most cases, it is unnecessary to refer to the Contractor's calculations during the design review. However, in the event a load-supporting member is overstressed or is otherwise determined to be inadequate, reference to the calculations may reveal the reason for the design deficiency.

2-3 Bridge Removal Work Plan Review

2-3.01 Initial Review

Immediately upon receipt of the first submittal of a bridge removal work plan, the authorized reviewer will perform an initial review of the documents received. The purpose of the initial review is to ascertain whether the plan and all required supporting data are included in the submittal. Determining whether the submittal is complete involves a certain degree of subjectivity, and the authorized reviewer will be expected to exercise judgment when making this determination. The basic requisite is that the plan contains enough information to enable the authorized reviewer to verify that the design meets the contract requirements. The initial review is not a contractual requirement but is the practice of SC to identify incomplete or deficient submittals early in the review process.

The bridge removal work plan should include the following:

1. Details of removal activities
2. Methods and removal sequence, including staging of removal activities and equipment locations
3. Temporary support shoring or bracing, including details for stability during all stages of removal
4. Locations where work is performed over traffic, utilities, or railroad property
5. Locations and types of protective covers
6. Protection of people, property, utilities, and improvements
7. Methods for preventing material, equipment, debris from falling onto traffic, railroad property, or other protected area

The initial review is to be completed within two working days following the receipt of the bridge removal work plan. The purpose of this is to assure a timely notice to the Contractor in the event the work plan is not complete. Since the only purpose of the initial review is to discover omissions that would prevent completion of a subsequent design check, neither calculations nor an evaluation of design details is required; thus, completion within two working days is reasonable.

2-3.02 Review

[Appendix B](#), *Bridge Removal Work Plan Review*, includes a comprehensive list of items that are to be considered and/or investigated during the review of the bridge removal work plan. Prior to authorization of the bridge removal work plan, the reminder list should be reviewed to verify that no requirement has been overlooked. The importance of having a complete plan and thorough review cannot be overemphasized when it comes to bridge removal as the effort invested in preparation and review of the bridge removal work plan pays dividends when field work commences.

2-3.02A Procedure when Railroad Company is not Involved

Except for work that is adjacent to or over a railroad, the bridge removal work plan may be authorized when the Structure Representative is satisfied that the bridge removal work plan meets all contract requirements. Authorization should follow the procedure discussed in section 2-3.03, *Engineering Analysis*, of this manual. Each sheet must be signed by the Structure Representative or authorized reviewer. One set of the authorized bridge removal work plans will be returned to the Contractor, with a cover letter signed by the Structure Representative.

2-3.02B Procedure when Railroad Company Approval is Required

In order to expedite the review process of the bridge removal work plan by railroad companies, it is advisable that the drawings submitted by the Contractor adhere to the requirements of the guidelines produced by the associated railroad. The two main railroad demolition guidelines are listed below:

- Union Pacific Railroad (UPRR): *Guidelines for Preparation of a Bridge Demolition and Removal Plan for Structures Over Railroad*
- Burlington Northern Santa Fe Railway (BNSF): *Guidelines for Preparation of Bridge Demolition & Removal Plan Over the BNSF Railway*

The *Special Provisions* will also list any clearance requirements that need to be maintained. Horizontal measurements are taken from the centerline of the railroad tracks and vertical measurements are taken from the top of the high rail. If there are no clearances included in your contract documents, then refer to BNSF-UPRR Std. Dwg. No. 711000, *Temporary Clearance Envelope*, found in the [BNSF/UPRR Guidelines for Railroad Grade Separation Projects](#). Also review the railroad agreement included in the *Information Handout* for project specific information.

Where there is a conflict between the *Contract Specifications* and the guidelines issued by the railroad, the *Contract Specifications* prevail. However, any conflict should be discussed with the SC Falsework Engineer as soon as it is discovered so it can be resolved.

2-3.02B(1) Railroad Requirements

Some common requirements are often overlooked and have resulted in submittals being returned by the railroad. The bridge removal work plan must state that all removal will comply with the latest railroad demolition guidelines. The bridge removal work plan must note how the Contractor will gain access to the site, particularly if they must cross the railroad tracks. Track protection details are shown in the aforementioned guidelines, and details must be included in the demolition plans.

The bridge removal work plan must note if there are any existing drainage facilities, including drainage ditches, or access roads being affected by the Contractor's operations. If there are no existing drainage facilities or access roads, the drawings must note this fact. Railroad personnel who are unfamiliar with the site often review the bridge removal work plan.

The above railroad requirements must be discussed at the preconstruction conference with the Contractor. Remind the Contractor that authorization of bridge removal work plan over and/or adjacent to railroad tracks will be contingent upon the railroad authorizing the plans.

2-3.02B(2) Distribution of Bridge Removal Work Plan

The Structure Representative will review the bridge removal work plan and if necessary, return them to the Contractor for correction. After the Structure Representative is satisfied that the bridge removal work plan meets the specification requirements, send the following items to the SC Falsework Engineer via the sc.office.associates@dot.ca.gov email address:

1. The Contractor's bridge removal work plan.
2. The Contractor's calculations tabbed to show key elements affecting the bridge removal over and adjacent to the railroad company's tracks.
3. The Structure Representative's calculations tabbed to show key elements affecting the bridge removal over and adjacent to the railroad company's tracks.
4. Manufacturer's data relative to all manufactured devices.

Note: The Structure Representative must not stamp the bridge removal plans "Authorized" until SC Falsework Engineer has notified them that the railroad has reviewed and authorized the plans.

2-3.02B(3) Railroad Review and Authorization

After the SC Falsework Engineer receives the bridge removal work plan, a cursory review of the plan is performed to verify the submittal is complete. An incomplete or

unsatisfactory submittal will be returned to the Structure Representative for correction. Upon confirming that the plans and calculations are complete and satisfactory, the information will be forwarded to the railroad for their review and acceptance.

Please note that all correspondence with the railroad regarding the status of submittals under their review must be directed to the SC Falsework Engineer. Under no circumstances should the Structure Representative contact the railroad directly.

When the railroad review is complete and determines the plans to be acceptable, the railroad notifies the SC Falsework Engineer, who will advise the Structure Representative to proceed with authorization of the bridge removal work. The Structure Representative will then stamp the plans “authorized” with the date of authorization and return to the Contractor along with the engineering analysis report. Assuming proper notification has been made to the railroad that their horizontal and vertical clearances will be impaired and that a flagger is required, the Contractor may begin removal work. Keep in mind that a flagger is required even when clearances are not impaired, such as working in the railroad right of way or when something can fall into the railroad right of way. Note that the Contractor **must not begin** any removal within the railroad right-of-way until the authorized plans have been issued to the Contractor.

2-3.03 Engineering Analysis

The bridge removal work plan is authorized pursuant to *Contract Specifications*, Section 5-1.23, *Control of Work – Submittals*. The *Contract Specification’s* review time for bridge removal work plans is 20 days. Although this is the case for the majority of bridge removal work plans, check the *Special Provisions* if there is railroad involvement or other factors that may necessitate a longer review period.

SC’s practice is to perform an independent engineering analysis on bridge removal work plans that are required to be stamped and signed by a California registered civil engineer. The independent review can be a simple review or a complex analysis with assistance from the bridge design engineer, bridge construction engineer, or the SC Falsework Engineer.

Upon completing the engineering analysis of the bridge removal work plan, the Structure Representative or authorized reviewer is to present the findings in an engineering analysis report (similar to the temporary structure analysis report used for falsework). The report is to be stamped and signed in accordance with the Professionals Engineers Act (Business and Professions Code), Section 6735. This is in addition to any temporary structures used as part of the overall bridge removal work plan that would require their own engineering analysis report as detailed in the *Falsework Manual*.

The engineering analysis report is an engineering document and therefore must be stamped and signed by a civil engineer registered in the State of California in responsible charge of the independent engineering analysis.

The engineering analysis report is to be completed for authorized and rejected submitted bridge removal work plans. The report is to contain a brief chronological record of the pertinent dates related to the submission, review, rejection (if applicable) and authorization of the plan, including the number of review days. The Structure Representative is to transmit the report to the Contractor through the project's normal transmittal process. An example of the bridge removal analysis report is provided in Section 2-3.04, *Sample Engineering Analysis Report*.

When the bridge removal work plan cannot be authorized, complete the engineering analysis report and list the reason(s) that the bridge removal work plan is rejected. Elaboration is unnecessary and corrective measures should not be suggested. Prior to sending the report to the Contractor, contact the bridge removal work plan engineer of record by phone or in person to discuss the reason(s) for rejecting the submittal. Document this discussion in the chronological record and the daily report.

When the bridge removal work plan is authorized, complete an engineering analysis report. The report must include the following paragraphs:

1. "The bridge removal work plan for <identify specific location> of the <bridge name and number> is found acceptable based on an independent engineering analysis and is authorized to the extent provided in the *Contract Specifications*, Section 5-1.23, *Control of Work – Submittals*."
2. "Your attention is directed to your responsibilities pursuant to *Contract Specifications*, Sections 5-1.23, *Control of Work – Submittals*, 7-1.04, *Legal Relations and Responsibility to the Public – Public Safety*, and 60-2.02, *Existing Structures – Structure Removal – Bridge Removal*, and to the applicable requirements of the *Construction Safety Orders*."
3. "You are reminded that bridge removal must conform with the authorized bridge removal work plan."
4. If protective covers, temporary supports, temporary bracing or temporary shoring is included in the bridge removal work plan then also include the following paragraph:

"The materials used must be of the quality necessary to sustain the stresses required by the design, and the workmanship must be of such quality that the temporary structure will support the loads imposed."

A sample engineering analysis report is provided below and can be used as a template.

2-3.04 Sample Engineering Analysis Report

Engineering Analysis Report

<Insert Date>

Project Information

Contract Number
Dist-Co-Rte-PM
Bridge Name
Bridge Number

Type of structure reviewed: <Insert partial, complete, or component of bridge removal>

Chronology

Plans were received: <date>
Plans rejected: <date>
Revision No. 1 received: <date>
Revision No. 1 rejected: <date>
Revision No. n received: <date>
Revision No. n rejected: <date>
Plans authorized: <date>
Elapsed review time: <calendar days>

Introduction

This report presents the results of an independent engineering analysis of the bridge removal work plan for <bridge name, bridge number, and specific location (in cases of partial or stage removal)>.

Discussion

Authorization – No exceptions were found.

Rejection – This portion of the report describes specific deficiencies found with the bridge removal work plan that would be cause for rejection.

For clarity, redline clouds may be made on the bridge removal work plan and then described here.

Conclusion

Authorization (the paragraphs below must be included):

“The bridge removal work plan for <identify specific location> of the <bridge name and number> is found acceptable based on an independent engineering analysis and is authorized to the extent provided in the *Standard Specifications*, Section 5-1.23, *Control of Work – Submittals*.”

“Your attention is directed to your responsibilities pursuant to *Standard Specifications*, Sections 5-1.23, *Control of Work – Submittals*, 7-1.04, *Legal Relations and Responsibility to the Public – Public Safety*, and 60-2.02, *Existing Structures – Structure Removal – Bridge Removal*, and to the applicable requirements of the *Construction Safety Orders*.”

“You are reminded that bridge removal must conform with the authorized bridge removal work plan.”

If protective covers, temporary supports, temporary bracing or temporary shoring is included in the bridge removal work plan then also include the following paragraph:

“The materials used must be of the quality necessary to sustain the stresses required by the design, and the workmanship must be of such quality that the temporary structure will support the loads imposed.”

Rejection:

The bridge removal work plan for <identify specific location> of the <bridge name and number>, is rejected based on an independent engineering analysis. The deficiencies are listed above.

If you have any questions regarding this report, please contact <insert Structure Representative or authorized reviewer’s name> at (XXX) XXX-XXXX or <insert email address>.

(Signature of reviewer)

Loren N. Bridge, P.E.
Structure Representative
Structure Construction



2-4 Safety and Cal/OSHA Requirements

All construction safety standards apply to bridge removal work. Bridge removal work includes additional safety concerns that often result from various unknowns.

Cal/OSHA regulations contain many safety requirements for demolition (bridge removal) projects, and it is not the intent of this section to cover all the Cal/OSHA regulations but rather remind the Structure Representative and those involved with bridge removal of these requirements. However, there are a couple of Cal/OSHA requirements to note prior to commencing bridge removal activities, found in the California Code of Regulations, Title 8, Division 1, *Department of Industrial Relations*:

Chapter 3.2 *Cal/OSHA Regulations, Article 2, § 341, Permit Requirements*

Under §341 (d)(3) To conduct the demolition or dismantling of any building or structure more than 36 feet in height, the Project Administrator must hold a Project Permit and all other employers directly engaging in demolition or dismantling activity must hold an Annual Permit.

Obtaining the permit required pursuant to this Article is the Contractor's responsibility.

Although the Structure Representative has neither the authority nor the duty to enforce this Article, as a matter of policy, verification that the Contractor has a valid permit will be done before the bridge removal work plan is authorized in any case where a permit is required. The date of verification should be noted in the project diary.

Furthermore, the *Construction Safety Orders* (subchapter 4 of Chapter 4, *Division of Industrial Safety*), Article 31, *Demolition*, § 1734, *Supervision*, requires:

- a. Demolition work shall at all times be under the immediate supervision of a qualified person with the authority to secure maximum safety for employees engaged in demolition work.
- b. (1) Prior to permitting employees to start demolitions operations, a qualified person shall make a survey of the structure to determine the condition of the framing, floors, and walls, and the possibility of an unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked.

(2) The survey shall be in written form, kept on the job-site and made available to the Division upon request. The written survey shall be maintained for the duration of the demolition project.

These requirements should be discussed with the Contractor at the preconstruction conference. The supervision requirement by Cal/OSHA is a separate requirement from

the requirement in the *Contract Specifications* for the engineer signing the bridge removal work plan to be present during bridge removal activities.

Bridge removal requires attention to fall hazards and possible hazards of working over water. All elevated work is subject to gravity and the stored energy in an elevated mass. Personnel fall hazard protection and falling debris control requires planning and is addressed in the authorized bridge removal work plans and supporting documents. The bridge removal site is frequently changing, noisy, sometimes dusty, and often congested with equipment working at a fast pace. Competent supervision is essential to safely accomplishing the construction goals.

At sites where emergency access is not obvious, emergency response personnel should be invited to the site for a visit prior to bridge removal in order to minimize response times in the event of a future emergency.

Some key safety references:

1. Authorized bridge removal work plan, protective cover plan, temporary supports, etc.
2. Contractor's Injury and Illness Prevention Program (IIPP)
3. Code of Safe Practices (COSP)
4. Permits
5. Respirator protection, heat illness prevention program, fall protection plan, safety data sheets, certifications
6. Cal/OSHA Construction Safety Orders
7. Lead compliance plan
8. Stormwater pollution prevention plan

On-site hazard warning and posters:

1. Cal/OSHA poster
2. Emergency phone numbers
3. Controlled access zones
4. Lead and asbestos warning posters

In summary, the Cal/OSHA regulations, authorized bridge removal work plan, competent supervision, clear communication, and preparation are all key elements to a safe bridge removal work site.

2-5 Design Revisions to Authorized Plans

Design revisions to the authorized plans may occur for many reasons including the following: the Contractor decides to change a particular means or method, something is identified prior to bridge removal that was not known before, an unplanned event occurs, or the removal activities deviate from the authorized work plan.

If an unplanned event occurs or the removal activities deviate from the authorized work plan, the Contractor must immediately stop work and submit procedures to correct or remedy this occurrence. Any proposed revision must be signed by an engineer who is registered as a civil engineer in the State, as prescribed in the *Contract Specifications*, Section 60-2.02, *Existing Structures – Structure Removal – Bridge Removal*.

The *Contract Specifications* address the possibility of the Contractor submitting a revised plan after the original removal plan has been reviewed and authorized. The Structure Representative is allowed sufficient time for a review, not to exceed the time originally allowed. In cases far in advance of the bridge removal work commencing or with significant changes to the bridge removal work plan before the work starts, the amount of review time may be similar to what was originally allowed. In cases where an unplanned event occurs or the removal activities deviate from the authorized work plan, it is of utmost importance to prioritize the review so that the Contractor can proceed with the bridge removal.

Administratively, and as defined in *Contract Specifications*, Section 5-1.23B, *Control of Work – Submittals – Action Submittals*, any revision to an authorized bridge removal work plan will be viewed as a new submittal, and as such will be reviewed pursuant to the applicable specification requirements.

The Contractor must show the revision number on the revised bridge removal work plan, uniquely number each revised detail, and describe and date the revisions in a legend. The revision is to be identified with an inverted triangle or revision cloud. A complete submittal must be provided with each revision to the bridge removal work plan. Refer to *Contract Specifications*, Section 5-1.23B(2), *Control of Work – Submittals – Action Submittals – Shop Drawings*.