

Appendix B: Bridge Removal Work Plan Review

This appendix has been developed to assist field personnel responsible for the administration and review of the bridge removal work plan. It is intended to address common issues and the quality assurance measures to be employed when reviewing demolition operations. The review and processing of a removal work plan needs to be thorough and well documented.

The following information is a general outline and is not to be taken as an all-inclusive list for bridge removal review. Safety is the priority; if something does not look appropriate, do not compromise safety. If further assistance is needed, consult the Bridge Construction Engineer or contact the Structure Construction (SC) Falsework Engineer. The information presented is based on the requirements described in the *Contract Specifications*, Section 60-2.02, *Existing Structures – Structure Removal – Bridge Removal*; however, the *Special Provisions* may modify these requirements.

B-1 Prior to Plan Submittal

Submittals involving bridge removal are often lacking required information. Thorough consideration, pre-planning, and early communication with the bridge removal contractor can minimize delays with authorization and ensure a quality bridge removal work plan is submitted. Begin communication before the bridge removal work plan is submitted. Though not required by the contract, a pre-submittal meeting or phone call would help to ensure the Contractor understands all that is expected in the submittal. Topics to consider include the following:

1. Recommend that the Contractor investigates the as-built condition of the structure and determines if any special conditions exist, e.g. column pins and deck hinges may need to be restrained during bridge removal operations. A site visit and/or a meeting with the local bridge maintenance supervisor may be helpful when discussing as-built conditions. The Resident Engineer's Pending File will include the as-built project plans for the structure to be removed. If the as-built project plans are not included, obtain them from [BIRIS](#).
 - a. *Contract Specifications*, Section 2-1.06B, *Bidding – Bid Documents – Supplemental Project Information*, directs the Contractor to request the as-built project plans from Structures Maintenance and Investigations (SM&I). Due to current confidentiality standards, SC staff are not to give out as-built project plans to the Contractor.

2. A complete bridge removal work plan must be submitted to receive an expeditious authorization. Some items worth reminding the Contractor include:
 - a. If protective covers are required or superstructure removal is performed, the bridge removal work plan must include substantiating calculations and be signed by an engineer who is registered as a civil engineer in the State of California.
 - b. The review time is 20 days unless modified by the *Special Provisions*.
 - c. The plan must detail the procedures and sequence for removing portions of the bridge(s), including all features necessary to remove the bridge(s) in a safe and controlled manner.
 - d. Where calculations are required, the calculations must demonstrate the stability of the structure at each stage of removal.
 - e. Before removing portions of monolithic concrete elements, make a 1-inch deep saw cut along the limits of removal on elements that will be visible in the completed work.
 - f. If the Contractor is removing a portion of a bridge (e.g., barrier rail only, edge of deck for a widening), the removal operations must be performed without damage to any portion of the structure that is to remain in place. In such cases, tools with a manufacturer's rated striking energy in excess of 1,200-foot pounds per blow must not be used for breaking or removing concrete, which is attached to, or supported by, the bridge.
 - i. If work is performed over or adjacent to a railroad, review the additional requirements contained in [Chapter 2](#), *Review and Authorization of Bridge Removal Work Plans*. Last minute modifications to the submittal will cause a delay in the authorization.

B-2 Initial Review

When the bridge removal work plan is submitted, perform an initial review to verify that the submittal is complete and contains all information necessary for SC staff to perform the review. This is useful for complicated submittals where review time is a factor. The plan must be suitable for the site conditions present and must provide information clearly outlining the removal procedures proposed by the Contractor. The following are some basic items to check for in your initial review:

1. When protective covers are required or superstructure removal is performed, verify calculations are provided and the bridge removal work plan is prepared by an engineer who is registered as a civil engineer in the State of California.
2. Verify calculations for vertical shoring, restraining systems for columns, and deck hinges are included when these elements are included in the bridge removal work plan.

3. Ensure that descriptive information including the removal methods, staging, and sequence of removal is included.
4. Verify that equipment lists, axle loadings, and proposed equipment placement locations are included.
5. Verify timeline, milestones, and contingency plans are included when traffic closures, potential safety problems, or construction windows are of concern.
6. Verify information providing for the protection of existing utilities and non-highway facilities is included, as required in the *Contract Specifications*, Section 5-1.36, *Control of Work – Property and Facility Preservation*.
7. If bridge removal is intended over and/or adjacent to railroad tracks, ensure the additional requirements described in Chapter 2 are included.

B-3 Review

1. Verify the safe work areas for the Contractor's personnel and Caltrans personnel are shown on the bridge removal work plan. Verify the protection of public traffic and private property is adequate, including the safe routing of public traffic during demolition operations.
2. Review the equipment described is adequate to perform the removal work. Review the location of the demolition equipment and the method in which the equipment will be used to remove the structure.
3. Verify the calculations are adequate to demonstrate the stability of the structure during all stages of the removal operations. Evaluate the stability of the structure under live loads during bridge removal per *Contract Specifications*, Section 5-1.37B, *Control of Work – Maintenance and Protection – Load Limits*. This is critical when a portion of the structure is to remain standing with equipment on the structure.
4. Verify a freely falling mass or a falling mass attached to a cable, rope, or chain is not to be used for breaking or removing concrete attached to or supported by the bridge.
5. Verify concrete attached to or supported by the bridge is not to be demolished within 30 feet horizontally of any area open to the public unless adequate protective shields are in place. Verify any necessary debris shields needed to protect the surrounding area, structural elements, and falsework are detailed and shown on the bridge removal work plan.
6. Evaluate the potential for damage due to demolition debris falling on the roadway section, adjacent structure, supporting falsework, protective cover, or structural elements supporting the structure being removed. If debris buildup is anticipated, these loads should be considered in addition to the equipment loads.

7. Verify dust control and hazardous material provisions are adequately addressed.
8. If traffic closures are involved, verify operational timelines are reasonably within the traffic closure windows. Verify progress is monitored against planned progress milestones, and a reasonable contingency plan is provided should the work fall behind planned progress.
9. Verify the location of temporary handrailing and barrier railing for bridge decks is adequate for staged bridge removal for the protection of construction staff and the traveling public.

B-4 External Agency Requirements

Often bridge removal involves external agencies. Some of the coordination efforts that must take place are identified below:

1. The Contractor must comply with all local sound, water, noise, and air pollution control requirements.
2. The Contractor must coordinate with other entities per *Contract Specifications*, Section 5-1.20A, *Control of Work – Coordination with Other Entities – General*. One typical example may include obtaining a disposal permit for disposal of material outside the highway right-of-way.
3. A Cal/OSHA permit is required for demolition of any structure over 36 feet.
4. If bridge removal is performed over or adjacent to railroad tracks, a railroad agency review of the bridge removal work plan is required. Notify the agency through the SC Falsework Engineer well in advance of the work, especially if the demolition work is a critical path item on the project schedule. Information regarding working with railroads can be found in the following locations:
 - a. *Contract Specifications*, Section 5-1.20C, *Control of Work – Coordination with Other Entities – Railroad Relations*.
 - b. Section of the project specific *Information Handout*, titled *Railroad Relations and Insurance Requirements*.
 - c. Chapter 2, *Review and Authorization of Bridge Removal Work Plans*. The procedure for authorizing these plans is identical to that used for falsework plans. The instructions can be found in the [Falsework Manual](#), Chapter 2, *Review of Shop Drawings*, Section 2-4.02B, *Review Procedure when Railroad Company is Involved*.