

Bolted Steel Beam Strengthening Plates JHA

Worked instructional example

Work and worksite

A qualified crew will fit predrilled, engineer-specified strengthening plates to an existing building beam under its released temporary-support and load-transfer condition. Required holes are independently accepted. Work covers plate handling, fit-up, staged connection completion and engineered load-transfer handover; drilling, welding and uncontrolled loaded-connection changes are excluded. This fictional learning example describes planned controls; it records no actual inspection or work authorization.

- Current retrofit design identifies the beam, accepted existing condition, temporary support, loading limits and connection sequence. Applicable engineering hold points govern existing-fastener disturbance and support release.
- Predrilled plates, holes and bolt assemblies are independently accepted. Current connection requirements establish joint type, surface preparation, installation and inspection evidence; no universal torque or pretension rule applies.
- This is partial coverage of structural retrofit 238120-29. New-frame bolting, drilling, hot work, beam removal and unreviewed changes to material, holes, supports or the existing load path require separate analyses.

Questions before work

- Which engineered support and load-transfer condition releases this existing beam for the exact plate connection sequence?
- What actual plate, hole and bolt records establish accepted fit-up and the specified installation and inspection method?
- Who controls existing-fastener disturbance and the final support-release hold point, including any unexpected beam movement?

Task Hazard Control

1 Release the identified retrofit stage

Hazard: Disturbing an existing connection without the designed load-transfer condition can destabilize the beam or surrounding structure.

Control: Retrofit lead identifies the beam and obtains current design, accepted condition and actual temporary-support release evidence. Confirm stage-specific loading limits and hold points. Resolve changes or missing records with the responsible engineer before existing-connection disturbance or fit-up.

Verification: Lead matches the beam and intended stage to the actual support, load and connection-release documents.

Reasoning: A visible support does not establish that it carries the load required by the retrofit design.

2 Prepare plate handling and protected access

Hazard: An inadequately restrained plate, improvised lifting point or exposed work position can cause crush injuries or a fall.

Control: Use released protected access and the plate-handling method for actual weight, geometry and space. Confirm designated attachment and restraint before movement. Close drop and movement areas around and below the connection; coordinate neighboring work to preserve supports and handling arrangements.

Verification: Handling lead verifies the accepted access, plate identity, restraint and clear receiving positions.

Reasoning: Small plate dimensions do not remove the need to control its weight and changing support.

3 Verify components and fit the first plate

Hazard: Wrong components, unaccepted holes or forced alignment can introduce a defective connection or unexpectedly load the existing beam.

Control: Check plate identity, accepted holes, bolt assemblies and mating surfaces against the design. Restrain the plate under the released method during alignment. Keep hands clear; refer mismatch rather than drifting, enlarging holes or removing existing fasteners outside the engineered sequence.

Verification: Connection lead checks fit-up findings at the prescribed stage before allowing further connection work.

Reasoning: A connection that fits only through unapproved force has not demonstrated conformity with the design.

Complete the work and hand over

4 Complete the staged plate connections

Hazard: An out-of-sequence fastener change or unsupported plate can alter the temporary load path and trap nearby workers.

Control: Trained crew follows the actual staged installation sequence while retaining the required supports and plate restraints. Disturb an existing fastener only at its engineer-defined release point. Install specified assemblies using the accepted joint procedure and required verification; keep hands clear of powered-tool reaction and movement points.

Verification: Connection lead confirms each specified hold point and records the required assembly and installation findings.

Reasoning: Tightening new bolts is only one part of maintaining the designed retrofit load path.

5 Obtain connection and loadtransfer disposition

Hazard: Missing bolts, unresolved fit-up or an assumed inspection result can transfer load through an incomplete strengthening assembly.

Control: Assigned reviewer completes required plate/connection checks and records findings. Refer discrepancies or changed beam/support behavior to the responsible engineer. Retain loading and support restrictions until required connection acceptance and engineered load-transfer direction are obtained.

Verification: Retrofit lead checks recorded findings and the applicable engineering disposition before requesting support release.

Reasoning: Completing the visible bolt pattern does not establish acceptance of the strengthened member or temporary load transfer.

6 Complete the released handover

Hazard: Premature support removal or uncommunicated loading limits can undo the stable retrofit condition after the crew leaves.

Control: Only the assigned crew follows the actual engineer-released support-transfer or removal method. Preserve any supports not released for this stage and protect the work area during the transition. Record actual resulting conditions and remaining defects; hand over the beam's accepted service or construction-load restrictions to the receiving lead.

Verification: Retrofit lead records the release basis, actual transition findings and the receiving person's remaining restrictions.

Reasoning: Connection acceptance, temporary-support release and return to service are accountable decisions rather than one assumed finish.

Pause and reassess

- The actual beam, support condition, load restrictions or required engineering release differs from the current retrofit design.
- Plate fit, holes, bolt assemblies or mating surfaces do not match the accepted details, or beam/support movement is unexpected.
- An existing fastener must be disturbed outside the sequence, required inspection evidence is unavailable, or access and plate restraint cannot be maintained.

Improve the controls

Needs improvement: Use the new-frame bolting sequence on this beam.

More useful: Match the existing load path and temporary support to the retrofit engineer's staged plate connection and hold points.

Needs improvement: All bolts are tight; remove the supports.

More useful: Obtain actual connection findings and the engineer's applicable load-transfer release before assigned personnel follow the support-removal method.

Decisions that change the analysis

Does this repeat magnetic drilling or ordinary structural bolting?

No. Magnetic drilling ends before connection installation; new-frame bolting excludes loaded-existing-connection changes. This operation installs a designed strengthening assembly while preserving and then transferring a specific load path. Accepted holes and engineering direction are prerequisites supplied by the actual project.

What must the crew record for actual use?

Record the existing beam and design revisions, accepted condition and holes, plate and bolt identities, temporary support and loading basis, staged fastener permissions, joint installation and verification method, assigned hold-point roles and actual fit-up and inspection findings. Retain engineering dispositions, actual support-transfer results and remaining load limits; do not invent torque settings or sign an engineering release from this draft.

Training needs

- Retrofit briefing on the engineered load path, support restrictions, plate sequence and hold points; recognize movement or mismatch requiring engineering direction.
- Plate-handling and joint-installation instruction on hands-clear positioning, specified assembly verification and recorded findings without assumed torque values.

Confirm applicable qualifications and actual training evidence for the people assigned. Related toolbox talks support discussion; they do not establish competence.

References and adaptation

RCSC 2020 Specification for Structural Joints Using High-Strength Bolts
<https://www.boltcouncil.org/files/2020RCSCSpecification.pdf>

AISC Design of Strengthening for Existing Steel Members: scope and reference standards
<https://learning.aisc.org/local/catalog/view/product.php?productid=2058>

OSHA 1926.754 Structural stability during steel assembly
<https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.754>

References reviewed October 9, 2026. Use actual equipment and product instructions, project design and site requirements. This original draft supplies no fabricated inspection, signature or approval.