



DEMOLITION AND STRUCTURAL REMOVAL

Engineering Survey, Controlled Sequence and Structural Stability

POLICY STANDARD

No demolition or structural removal shall begin until a competent-person engineering survey is documented, utilities and hazardous materials are addressed, and an approved sequence controls stability, loads, member release, exclusion zones and emergency response.

PHEIFER BROTHERS CONSTRUCTION CO., INC.

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Table of Contents

SECTION	TOPIC	PAGE
1	Purpose, Scope and Responsibilities	3
2	Engineering Survey and Existing-Condition Assessment	4
3	Demolition Plan, Sequence and Design Control	5
4	Utilities, Hazardous Materials and Environmental Controls	6
5	Site Control, Access, Falls and Falling Objects	7
6	Deck, Concrete and Substructure Removal	8
7	Steel Girders, Members, Cutting and Rigging	9
8	Mechanical Demolition, Equipment and Load Control	10
9	Debris Handling, Chutes, Storage and Housekeeping	11
10	Continuing Inspection, Changes and Stop Work	12
11	Emergency Response, Training and Records	13
12	Demolition Readiness and Daily Inspection Checklist	14
13	Test Your Knowledge	15

USE OF THIS POLICY

This policy establishes minimum company expectations and is not all-inclusive. The approved demolition plan, engineering survey, lift/traffic/environmental plans, OSHA standards and any more protective project requirement also apply.

Primary Regulatory References

- 29 CFR 1926 Subpart T, 1926.850-1926.860 - Demolition
- 29 CFR 1926 Subparts R and CC - Steel erection/removal and cranes/derricks
- 29 CFR 1926 Subparts M, P and V - Fall protection, excavations and electrical power
- 29 CFR 1926.62, 1926.1101 and 1926.1153 - Lead, asbestos and silica
- 29 CFR 1926.106 - Working over or near water

1. Purpose, Scope and Responsibilities

Purpose and Scope

- Protect employees, subcontractors, the public and property during removal of bridge decks, parapets, sidewalks, beams/girders, diaphragms, bearings, piers, abutments, retaining walls, culverts, buildings and related structural components.
- Applies to manual, saw/chipping, torch, crane-assisted and mechanical demolition. Explosives are prohibited unless separately authorized by executive management under a site-specific blasting program and applicable law.

Management / Project Management

- Provide competent/qualified/RPE resources, current drawings/records, hazardous-material assessment, equipment, exposure controls, schedule and emergency capability.
- Approve the project demolition plan and changes; coordinate owner/WisDOT, utility, traffic, railroad/waterway and environmental requirements.

Competent Person

- Complete the engineering survey before employees start; conduct continuing inspections as work progresses; identify existing/predictable hazards and take prompt corrective measures.
- Remove employees from weakened/unstable areas until corrected by shoring, bracing or other effective means.

Qualified Person / RPE

- Develop/review structural sequence, temporary supports, load/capacity determinations, unusual lifts and field changes within required credentials/authority.
- State assumptions, hold points, allowable loads, cut/release sequence and inspection criteria.

Foreman

- Conduct daily plan/JHA, verify controls/roles/permits, maintain exclusion zones and stop work for deviation or instability.

Employees

- Follow the approved sequence, inspect assigned equipment/PPE, report cracks/movement/unknown conditions and use stop-work authority without retaliation.

2. Engineering Survey and Existing-Condition Assessment

OSHA Requirement

- Before demolition, a competent person shall survey the structure to determine framing, floors/walls and possibility of unplanned collapse. Check adjacent structures where employees may be exposed.
- Maintain written evidence that the survey was performed. A cursory walk-through or unsigned checklist is not sufficient for complex bridge work.

Survey Inputs

- Review as-built/rehabilitation plans, inspection reports, load ratings, repair history, fire/flood/impact records, utilities, geotechnical information and known hazardous-material surveys.
- Field-verify dimensions, member sizes/connections, deck thickness, reinforcement/post-tensioning, deterioration/section loss, cracks/spalls, bearing condition, scour/settlement and temporary repairs.
- Identify hidden/unknown load paths, composite action, continuity, diaphragms/cross-frames, bracing, utilities/conduits, attachments and components that stabilize others.

Damaged Structures

- If employees work within a structure damaged by fire, flood, explosion, impact or other cause, shore or brace walls/floors as required before exposure.
- Treat severe corrosion, collision damage, undermining, failed bearings and unstable debris as potential collapse conditions pending qualified evaluation.

Adjacent Exposure

- Evaluate live bridge portions, nearby buildings, retaining walls, utilities, rail lines, roadways, waterways, temporary works, slopes/excavations and public property.
- Determine vibration, falling material, crane/equipment reaction, undermining and movement effects.

Survey Deliverable

- Document structure/components, condition, photos/measurements, hazards, recommended sequence/supports, load restrictions, exclusion zones, required testing and unresolved items.
- Escalate technical uncertainty to qualified person/RPE before plan approval.

3. Demolition Plan, Sequence and Design Control

Site-Specific Plan

- Identify exact limits, sequence, equipment/methods, temporary supports/bracing, access, loads, lifts, cuts, drop zones, debris path, hazardous-material controls and emergency actions.
- Include current drawings/sketches showing member identification, cut/pick points, crane setup, support/release stages and areas prohibited to personnel.
- Define hold points requiring competent/qualified/RPE inspection or owner approval before continuing.

Structural Stability

- Maintain a stable load path at every stage. Do not remove a deck, diaphragm, cross-frame, bearing, bracing, wall, column or fill that stabilizes remaining construction unless replacement support is installed/approved.
- Consider locked-in force, prestress/post-tensioning, bearing restraint, composite action, temperature, wind, unbalanced dead load, equipment/debris and crane reactions.
- For conventional building demolition where applicable, exterior walls/floors proceed top-down under 1926.850(j). Bridge removal follows an engineered sequence appropriate to the structure.

Removal Sequence

- Plan setup and temporary supports; isolate utilities; remove nonstructural attachments; control deck/parapet; expose/verify members/connections; rig/support; cut/release; lower/remove; stabilize remaining work.
- Steel construction subject to 1926.858 is dismantled column length by column length and tier by tier; do not overstress a member being dismembered.

Design / Field Changes

- No unapproved change to cut line, pick point, weight, equipment, support, bracing, sequence, access or drop method.
- Submit field condition/change with measurements/photos to responsible qualified person/RPE. Issue/document disposition and rebrief affected employees.

Readiness Hold Point

- Do not start until survey, plan, utility/hazmat controls, permits, capacity checks, competent person, emergency resources and exclusion zones are verified.

4. Utilities, Hazardous Materials and Environmental Controls

Utility Control

- Before demolition, shut off, cap or otherwise control electric, gas, water, steam, sewer and other service lines outside the structure/work line; notify involved utility companies in advance.
- If service must remain, temporarily relocate/protect it as necessary. Verify zero-energy/clearance through authorized testing and lockout/tagout procedures.
- Locate embedded conduit, post-tensioning, drain lines and private/unknown utilities before sawing, drilling or breaking. Stop for any unmarked/unknown line.

Pipes, Tanks and Equipment

- Determine whether hazardous chemicals, gases, explosives, flammables or dangerous substances were used/stored. Test, purge and eliminate the hazard before demolition where suspected/apparent.
- Do not torch/cut sealed, hollow or contaminated components until cleaned, vented and authorized.

Hazardous Materials

- Assess lead coatings, asbestos, silica-containing concrete/masonry, hexavalent chromium/cadmium coatings, PCBs, mercury, bird/bat waste, mold and contaminated soil/sediment before disturbance.
- Implement substance-specific exposure assessment, regulated areas, engineering controls, respiratory/PPE, hygiene/decon, medical surveillance and waste requirements.
- Bridge torch cutting/grinding on old coatings is treated conservatively until representative data establish controls.

Environmental

- Prevent debris, slurry, abrasive, paint chips, oil/fuel and concrete from entering water, storm drains, wetlands or public areas.
- Use approved containment, turbidity/sediment controls, catch platforms/barges and waste characterization/disposal.
- Stop and report a release, containment breach or unexpected material.

Air / Noise

- Use wet methods/local exhaust/HEPA where compatible, monitor exposure as required and control dust migration/visibility. Provide hearing protection and community controls.

5. Site Control, Access, Falls and Falling Objects

Exclusion / Collapse Zones

- Establish zones based on structure height/geometry, potential collapse, rolling/falling/flying material, equipment swing, suspended loads and ricochet - not convenience alone.
- Use substantial barriers, signs and controlled access. Assign spotters/attendants when visibility, public traffic or multiple access points require them.
- No employee below or inside an adversely affected zone during cutting, dropping, pulling or mechanical demolition unless specifically required and protected by the plan.

Public / Traffic / Waterway

- Coordinate temporary traffic control, protective shielding, lane closures, railroad flagging and navigation restrictions as applicable.
- Prevent construction vehicles/debris from intruding into live traffic. Maintain emergency access and protect bridge users from falling material/dust.

Access

- Use designated stairs, ladders, ramps, scaffolds/aerial lifts and walkways. Inspect as demolition changes support and paths.
- Close/barricade unsafe access. Employee entrances to affected multistory structures require OSHA-compliant overhead protection where applicable.
- Keep routes away from unsupported edges, drop openings, suspended loads and equipment travel.

Falls / Openings

- Install guardrails/covers/PFAS before exposure. Protect wall openings to approximately 42 inches where fall hazard exists; secure floor/opening covers for imposed loads.
- Plan anchors and rescue so demolition will not remove/cut/overload them. Protect against sharp edges, swing fall and falling into water.

Falling Objects

- Use toe boards, screens, catch platforms, canopies, controlled drops and exclusion zones. Secure tools/materials at elevation.
- Remove/secure loose glass, concrete, rebar, attachments and fragments before work below/adjacent.

Work Over Water

- Use PFDs, ring buoys/skiff and recovery/rescue controls under the Working Over Water Policy.

6. Deck, Concrete and Substructure Removal

Deck / Slab Planning

- Verify deck thickness, reinforcement, diaphragms, composite connection, stay-in-place forms, utilities and load distribution before saw cutting/chipping/lifting.
- Lay out cut limits, weights and rigging points. Account for water/slurry, attachments and irregular section; do not rely solely on plan dimensions.
- Prevent saw cuts/core holes from severing critical reinforcement, tendons, utilities, girders/flanges or temporary supports.

Equipment and Debris Loads

- Do not place mechanical equipment on floors/decks unless sufficient strength for imposed load is established. Include machine, attachment, impact, reach, track/outrigger reaction and debris.
- Use curbs/stop logs at openings to prevent equipment overrun. Maintain posted travel, position, load and debris limits.
- Remove debris frequently; do not allow piles to overload deck, unbalance spans or conceal openings/edges.

Concrete Breaking / Sawing

- Establish exclusion for flying material, silica, noise, hose/cable and falling sections. Use guards, water/HEPA controls and secure footing.
- Control pressurized hoses and electrical/GFCI. Shut down/isolate before blade, bit or tool service.
- Do not work below a section being cut/released. Use positive support/rigging before completing cuts.

Piers / Abutments / Walls

- Determine stability, soil/fill pressure, reinforcement and connection to remaining structure. Install bracing/shoring and excavation protection before undermining/cutting.
- Control toppling/pulling direction; affected steel is cut free as required before pulling walls. Keep personnel/equipment outside fall/collapse path.

Post-Tensioning / Stored Energy

- Treat unknown tendons/anchors as energized. Qualified/RPE plan required before exposure, cutting or release.

Verification

- Inspect remaining concrete, reinforcement, girders and temporary supports after each stage.

7. Steel Girders, Members, Cutting and Rigging

Member Release Plan

- Identify member, weight/center of gravity, connections, load/stored force, support/rigging, cut/bolt-release order, tagline/control method, landing and remaining-structure stability.
- Rig and take controlled load before final release. Verify crane response/weight and stop for unexpected load, movement, binding or deformation.
- Do not overstress the member or remaining structure. Never assume a corroded member carries design load or weighs the theoretical amount.

Connections and Stored Force

- Inspect bolts/rivets/welds, pack rust, bearing restraint, diaphragms/cross-frames, jacking effects and members in tension/compression/torsion.
- Use remote/controlled release where possible. Position employees outside pinch, snapback, line-of-fire and fall paths.
- Do not torch the final connection while standing on/under an unsupported member.

Cranes / Rigging

- Follow the Crane and Rigging policies: qualified operators, inspections, ground/setup, capacity, power-line clearance, qualified riggers/signal persons and controlled load path.
- Use engineered/approved pick points and below-the-hook devices. Account for sling angles, sharp edges, heat, unequal loading and member instability.
- No employees under suspended loads; limit those inside the controlled zone to essential assigned personnel.

Hot Work

- Use hot-work permit, fire watch/extinguisher, coating assessment/respiratory controls, cylinder safety and protection of combustibles/traffic/waterways.
- Vent/drain hollow members where safe and evaluate sealed/contaminated components. Control molten metal/slag below.

Steel-Erection Interface

- Structural steel removal performed as part of repair/alteration may be subject to Subpart R as well as demolition/other standards. Project plan identifies governing requirements.

Landing / Securing

- Land on stable dunnage/support; block against rolling/tipping and release rigging only when stable.

8. Mechanical Demolition, Equipment and Load Control

Equipment Selection

- Use equipment/attachments rated and suitable for reach, material, terrain and method. Verify manufacturer limits and protective guarding/cab/FOPS as applicable.
- Inspect machine, attachment/pins/couplers, hydraulics, alarms/cameras, cab protection, tracks/tires and fire extinguisher before use.

Operating Surface

- Verify deck/floor/ground/temporary work capacity and stability, including voids, utilities, soft shoulders, edges, slope and vibration effects.
- Use mats/cribbing and approved setup. Maintain stop logs/barriers near edges where operator view is limited.

Mechanical Demolition Zone

- During balling/clamming, no workers in any area adversely affected. At other times, allow only personnel necessary for the operation.
- For demolition balls, comply with 1926.859 capacity/line/connection requirements; this method requires specific management/qualified planning and is not routine company practice.
- Maintain separation from structure collapse, falling debris, attachment swing, counterweight and blind areas. Use dedicated spotter as plan requires.

Operating Method

- Work from a stable direction/height and prevent undercutting or pulling material onto equipment/crew. Do not work beneath unsupported overhangs.
- Keep boom/loadline as short as practicable for applicable balling; avoid side loading and shock loading cranes/equipment.
- Stop for unexpected cracking, movement, settlement, leaning, hydraulic defect, visibility loss or unauthorized entry.

Utilities / Fire

- Maintain clearance from energized systems and use verified utility isolation. Control sparks, hot material, fuel and dust; inspect for hidden fire after work.

Parking / Shutdown

- Lower attachments, isolate energy, secure equipment outside collapse/load zone and protect incomplete work at shift end.

9. Debris Handling, Chutes, Storage and Housekeeping

Controlled Removal

- Plan debris type, size, path, landing area, equipment, containment, load limits and removal frequency before work.
- Do not throw/drop material outside approved controlled openings/chutes/drop zones. Keep employees/public out below.

Openings and Drops

- Where debris is dropped through floor holes without chutes, completely enclose landing area with barricades at least 42 inches high and at least 6 feet back from projected opening edge; post falling-material warnings at each level.
- Do not remove debris from the lower area while dropping continues above. Guard/cover other openings and secure covers for imposed loads.
- Provide curbs/stop logs to prevent equipment from running into openings.

Chutes

- Design/install/use chutes and gates under 1926.852; fully enclose material chutes when required and guard/control openings.
- Do not enter a chute or clear blockage until dropping stops, energy/material is isolated and a safe method is authorized.

Storage / Load Limits

- Waste/debris stored on any floor/deck shall not exceed allowable load. Distribute loads and maintain structure stability.
- Block off storage spaces receiving dumped material except necessary removal openings; keep openings closed when material is not being removed.
- Do not remove beams/members that brace walls until equivalent support is installed.

Handling

- Use mechanical means where feasible; protect from sharp rebar/metal, nails, silica/lead dust and unstable piles.
- Bend/cut/guard protrusions and stack salvaged members on stable dunnage with load securement.

Housekeeping / Waste

- Maintain clear access, fire lanes and emergency routes. Use wet/HEPA methods as required; no uncontrolled dry sweeping/compressed-air dispersal.
- Characterize, label, containerize and dispose/recycle material under project/environmental requirements.

10. Continuing Inspection, Changes and Stop Work

Continuing Inspection

- A competent person shall make continuing inspections as demolition progresses for hazards from weakened/deteriorated floors/walls or loosened material.
- Inspect before each shift/phase and after cuts/releases, load/debris changes, equipment impact, weather/wind, fire, flood, vibration, settlement or observed movement.
- Document significant findings, restrictions, corrections and required technical escalation.

Inspection Focus

- Cracks, deflection, leaning, connection/member distress, falling/loose material, corrosion, temporary supports/bracing, bearings, deck/ground, access/openings and exclusion zones.
- Utilities/energy, hazardous-material containment, dust/fumes, fire watch, equipment/rigging, traffic/public/waterway protection and emergency access.

Immediate Stop-Work Triggers

- Unexpected movement, cracking, sound, deformation or load; unstable/unsupported member; actual weight/reaction differs from plan.
- Unknown utility, material, tendon, void or connection; unapproved cut/sequence/equipment/support change.
- Person/equipment enters exclusion/drop/suspended-load zone; loss of traffic/waterway containment; severe weather or visibility issue.
- Required competent/qualified person, permit, inspection, rescue or exposure control unavailable/ineffective.

Response

- Stop and stabilize/lower/isolate when safe; evacuate/control access; notify foreman/competent person.
- Obtain qualified/RPE/utility/environmental input, revise controlled plan, reinspect and rebrief before restart.

No Unauthorized Correction

- Do not improvise braces, add crane force, cut binding members, change pick points or overload equipment to force progress.

Handoff

- Communicate remaining instability, supports, open cuts, loads/debris, permits, utilities and restrictions to the next shift/crew.

11. Emergency Response, Training and Records

Site-Specific Emergency Plan

- Plan for collapse/entrapment, fall, water rescue, traffic intrusion, utility strike/electrocution, fire/explosion, hazardous release and severe weather.
- List exact address/GPS/access, 911 caller, responder guide, muster/accountability, hospital, shutdown contacts and controlling-contractor/subcontractor coordination.
- Identify specialized collapse/rope/water/confined-space rescue resources and realistic response time before work.

Emergency Actions

- Stop, warn/evacuate, account for personnel and call 911 for collapse, serious injury, fire, energized contact, uncontrolled release or immediate danger.
- Do not enter an unstable collapse zone or move critical debris/equipment for rescue unless trained, equipped and assigned under qualified incident command.
- Preserve the scene and structural evidence unless movement is required to prevent greater harm. Only authorized personnel release/restart work.

Training

- Train employees before assignment on survey/plan, sequence, collapse/drop zones, access/falls, utilities/hazmat, equipment/rigging, warning signs, stop-work and emergency actions.
- Provide role-specific competency/qualification for competent persons, operators, riggers/signal persons, hot work, lead/silica/asbestos, fall protection and rescue.
- Conduct pre-task briefing before each phase/member removal. Toolbox talks do not replace required training.

Records

- Maintain engineering survey evidence, current plan/revisions, calculations/approvals, utility/hazmat documentation, inspections, JHAs/permits, lift/rigging records, training, exposure/environmental data, incidents and corrective actions.
- Preserve records under contract/company schedule and after incident/regulatory/litigation hold.

Program Review / Enforcement

- Review at least annually and after incident/change. Printed copies are uncontrolled unless formally issued.
- Unauthorized cuts, entry into restricted zones, bypassed supports/controls or continuing after stop condition is subject to corrective action.

12. Demolition Readiness and Daily Inspection Checklist

VERIFY	EXPECTATION
Survey / plan	Written engineering survey and current approved sequence/revisions onsite
Structure	Existing conditions, load path, adjacent structures and temporary supports match plan
Utilities / energy	Lines located, shut off/capped/controlled; retained services protected; LOTO verified
Hazardous materials	Assessment, exposure controls, regulated areas, decon and waste controls ready
Roles / permits	Competent/qualified persons, operators, riggers/signalers and permits confirmed
Access / falls	Designated access, guardrails/covers/PFAS, anchors and rescue serviceable
Zones / public	Collapse/drop/swing/load zones controlled; traffic/rail/waterway/public protected
Equipment / capacity	Inspected; ground/deck/load limits, crane setup and rigging verified
Cuts / releases	Member ID, weight, CG, support/pick, cut order and landing confirmed
Debris	Drop/chute/storage plan, allowable load, removal and housekeeping controlled
Weather / environment	Wind, lightning, water, lighting, dust/noise and containment acceptable
Emergency	911 location/access, alarm, muster/accountability and specialized rescue confirmed

PROJECT: _____	DATE / SHIFT: _____
COMPETENT PERSON: _____	PHASE / MEMBER: _____
DEFICIENCIES / ACTIONS:	

13. Test Your Knowledge

Circle the best answer. Review missed questions with your foreman before demolition or structural removal.

1. What is required before demolition begins? A. Written evidence of a competent-person engineering survey B. Only a toolbox talk C. A delivery ticket	2. What happens to utilities before work? A. Ignore them B. Shut off/cap/control and notify involved utility C. Cut them during demolition
3. When may equipment work on a deck/floor? A. Whenever it fits B. After lunch C. After sufficient capacity for imposed load is verified	4. What must happen before the final member connection is cut? A. Member is positively supported/rigged under approved plan B. Remove all taglines C. Stand on the member
5. Who performs continuing demolition inspections? A. Delivery driver B. Competent person C. Any visitor	6. May debris exceed allowable deck/floor load? A. Yes if temporary B. Only overnight C. No
7. What follows unexpected movement or weight? A. Stop, stabilize and obtain reassessment B. Pull harder C. Add workers	8. Who may enter an adversely affected balling/clamming zone? A. Everyone B. No workers during those operations C. Visitors only
9. What controls old bridge-coating disturbance? A. No special action B. Substance-specific lead/coating exposure program C. Water only	10. Who may attempt collapse rescue? A. Any available employee B. Equipment operator alone C. Trained, equipped and assigned responders

EMPLOYEE: _____

DATE: _____

ANSWER KEY: 1-A | 2-B | 3-C | 4-A | 5-B | 6-C | 7-A | 8-B | 9-B | 10-C