



EXCAVATION, TRENCHING AND COFFERDAMS

Cave-In Prevention, Water Control, Temporary Works and Safe Entry

POLICY STANDARD

No employee may enter an excavation, trench or cofferdam until utilities, soil, protective systems, water, atmosphere, access, equipment and emergency conditions have been evaluated and authorized by the designated competent person.

PHEIFER BROTHERS CONSTRUCTION CO., INC.

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USE OF THIS POLICY

This policy establishes minimum requirements and is not all-inclusive. Engineered plans, tabulated data, project specifications, permits, utility-owner requirements or site conditions may require additional controls.

Primary Regulatory References

- 29 CFR 1926 Subpart P, including 1926.650 through 1926.652 and Appendices A-F
- 29 CFR 1926.802 - Cofferdams
- 29 CFR 1926.106 - Working over or near water
- 29 CFR 1926 Subpart M - Fall protection
- Wisconsin Diggers Hotline / 811 and applicable utility-owner requirements

Official standards: www.osha.gov/laws-regs/regulations/standardnumber/1926/1926SubpartP and www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.802

1. Purpose, Definitions and Responsibilities

Purpose and Scope

This policy applies to trenches, general excavations, bridge footings and piers, utilities, sheet-pile enclosures, cofferdams, earth-retention systems and work near excavation edges. It addresses cave-ins, flooding, utility strikes, hazardous atmospheres, falls, drowning, structural failure and struck-by hazards.

Key Definitions

TERM	MEANING
Excavation	Any man-made cut, cavity, trench or depression formed by earth removal.
Trench	A narrow excavation generally deeper than wide, with a bottom width not greater than 15 feet.
Protective system	Sloping, benching, shoring, shielding or another system that protects from cave-ins.
Cofferdam	A temporary structure used to exclude/control water and soil so work can occur below surrounding water or groundwater.
Competent person	A person able to identify existing/predictable hazards and authorized to take prompt corrective action.
Qualified person	A person who can resolve technical problems through recognized education, training or experience.

Responsibilities

- Management assigns a qualified excavation competent person, obtains engineering support and provides protective systems, pumps, monitoring and emergency resources.
- The competent person classifies soil, selects/verifies protection, inspects conditions, authorizes entry and removes employees when hazards develop.
- Foremen coordinate the plan, barricades, access, equipment, traffic, lifting and exclusion zones and notify the competent person of changes.
- Employees enter only when authorized, remain within protection, use designated access, report hazards and exit immediately when directed or warned.

ENTRY AUTHORITY

Only the designated competent person may authorize initial entry or reentry after a hazardous condition has been corrected.

2. Pre-Excavation Planning and Utility Protection

Project and Pre-Task Planning

- Define excavation location, dimensions, depth, duration, sequence, access and adjacent work.
- Identify expected soil, groundwater, surface water, flood potential, contamination and atmospheric hazards.
- Evaluate roads, bridges, structures, foundations, retaining walls, utilities, vibration and surcharge loads.
- Select protective systems and keep applicable manufacturer data, tabulated data or engineered drawings at the jobsite.
- Plan equipment setbacks, haul routes, swing radii, material storage, lifting, illumination, weather response and emergency access.
- Coordinate cofferdam, crane, pile-driving, traffic-control, water-rescue and environmental requirements.

Utility-Strike Prevention

- Contact Wisconsin Diggers Hotline/811 before excavation and maintain a valid ticket and visible marks.
- Identify private utilities and owner systems not covered by public locating.
- Compare marks with plans, field evidence and expected service routes; resolve missing or conflicting information before digging.
- Use safe and acceptable means to establish exact utility location when approaching the estimated location, including potholing/positive identification as required.
- Follow tolerance-zone, hand/vacuum excavation and utility-owner requirements.
- Support, protect or remove exposed installations as necessary; preserve markings throughout the work.

Utility Contact

- Stop work, warn others and keep personnel away.
- For possible electrical contact, treat equipment and ground as energized; the operator generally remains in the cab unless fire or other immediate danger requires escape.
- Call 911 and the utility owner as appropriate; control ignition sources for gas/fuel releases.
- Do not touch, repair, cover or resume work until the utility owner and authorized management release the area.

NO BLIND DIGGING

An 811 ticket does not locate private facilities or establish depth. Positively identify utilities before mechanized crossing or close approach.

3. Soil Classification and Cave-In Protection

Soil Classification

- The competent person classifies soil using at least one visual and one manual analysis unless the excavation uses the default Type C slope of 1.5H:1V or another approved design option that does not rely on classification.
- Assume Type C when soil is previously disturbed, fissured, subject to vibration, submerged/seeping, granular, or otherwise cannot support a higher classification.
- Reclassify after rain, drying, freezing/thawing, vibration, water, soil change or other altered conditions.
- Never rely on appearance alone; document company-required classifications and the observations/tests used.

Protective-System Threshold

- Protect each employee from cave-in unless the excavation is entirely in stable rock, or is less than 5 feet deep and the competent person finds no indication of possible cave-in.
- The competent person may require protection at any depth when hazards exist.
- Protective systems must resist all intended and reasonably anticipated loads, including soil, water, equipment, traffic, vibration, stored materials and adjacent structures.
- Excavations deeper than 20 feet require a system designed by a registered professional engineer or based on tabulated data prepared/approved by one.

Common Cave-In Warning Signs

- Tension cracks, fissures, sloughing, bulging, heaving or subsidence.
- Soil falling from the face, raveling behind a shield or loss beneath support members.
- Water seepage, boils, piping, erosion or unexpected groundwater.
- Deflected shoring, displaced shield, damaged bracing or changing loads/vibration.

**DEPTH IS NOT
THE ONLY
FACTOR**

A shallow excavation can still collapse. Soil condition, water, vibration, surcharge and nearby structures determine the actual risk.

4. Sloping, Shoring, Shielding and Engineered Systems

Sloping and Benching

- Use the default maximum slope of 1.5 horizontal to 1 vertical for Type C conditions unless another Subpart P option, approved tabulated data or engineered design is used.
- Follow OSHA Appendix B configurations for classified soils. Type C soil may not be benched.
- Remove or scale loose material and protect employees below from falling/rolling soil and equipment.
- Do not work on sloped or benched faces above others unless lower employees are protected.

Shoring and Support Systems

- Install and use in accordance with manufacturer data, approved tabulated data or engineered drawings kept available at the site.
- Secure members against sliding, falling, kickout or predictable failure; do not exceed design loads.
- Coordinate installation with excavation and remove from the bottom upward while backfilling progresses, unless the approved design directs otherwise.
- Add support before temporarily removing any member; release members slowly and watch for failure indicators.
- Excavation up to 2 feet below support members is allowed only when the system is designed for full depth and no soil loss/failure indication exists.

Shield and Trench Box Rules

- Use within rated depth, soil and surcharge limits; prevent hazardous lateral or vertical movement.
- Employees must enter/exit within the protected area and may not remain in a shield while it is installed, removed or moved vertically.
- Do not work outside the box in an unprotected area. Protect employees from cave-in while entering/exiting.
- Excavation up to 2 feet below a shield is permitted only when its design covers full depth and no soil loss indication exists.

Damage and Deviations

- A competent person evaluates damaged protective equipment. Remove it if suitability cannot be assured; registered-professional-engineer approval is required before return when applicable.
- Do not deviate from manufacturer limits or engineered drawings without the required written approval.

5. Access, Spoils, Equipment and Edge Protection

Access and Egress

- Provide a stairway, ladder, ramp or other safe means of egress in every trench 4 feet or deeper.
- Locate egress so employees travel no more than 25 feet laterally.
- Secure ladders, extend them for safe transition and keep access clear of spoil, hoses, mud, ice and equipment.
- Employee-only ramps are designed by a competent person; equipment ramps are designed by a competent person qualified in structural design.
- Cofferdam access is addressed in Section 9 and requires at least two rapid exits.

Spoils, Materials and Falling Objects

- Keep spoil, materials and equipment at least 2 feet from the edge, or use retaining devices sufficient to prevent falling/rolling material.
- Scale loose rock/soil or use barricades/other protection.
- No employee may be beneath loads handled by digging or lifting equipment.
- Keep employees clear of vehicles being loaded/unloaded unless protected in a compliant cab.

Mobile Equipment and Traffic

- Establish setbacks considering depth, soil, slope, protective-system design, machine weight, vibration and edge stability.
- Use barricades, stop logs, signals or spotters when an operator lacks a clear view of the edge; grade away from the excavation when feasible.
- Use high-visibility apparel and approved temporary traffic control where public traffic exposure exists.
- Do not park, stockpile or swing loads over an excavation unless the protection/design accounts for the load.

Edge and Crossing Protection

- Barricade open excavations against employees, vehicles and the public.
- Provide walkways where crossing is required; install compliant guardrails when walkways are 6 feet or more above lower levels.
- Use fall protection when required by Subpart M or the site assessment; keep safe approach and escape routes.

LINE OF FIRE

Employees must remain outside equipment blind spots, swing radii, suspended-load zones and unprotected excavation areas.

6. Water, Atmospheres and Adjacent Structures

Water Accumulation and Dewatering

- Do not permit work in accumulated or accumulating water unless effective protection is provided.
- Use special support/shielding, water removal, diversion, harness/lifeline or other controls appropriate to the hazard.
- The competent person monitors water-removal equipment and operations.
- Divert surface water and provide drainage; inspect after rain, runoff, pump failure or other hazard-increasing event.
- Stop for rising water, boils, piping, erosion, soil loss or loss of pump capacity.

Hazardous Atmospheres

- Where oxygen deficiency or a hazardous atmosphere exists or could reasonably be expected, test before entry into excavations greater than 4 feet deep.
- Test oxygen, flammability and toxic contaminants with calibrated direct-reading instruments in the appropriate order.
- Provide ventilation or respiratory protection and test as often as needed to verify controls remain effective.
- Prevent exposure below 19.5% oxygen and to flammable gas above 20% of the lower flammable limit.
- Keep appropriate attended rescue equipment readily available where hazardous atmospheres exist or may develop. Apply confined-space requirements when the excavation meets that definition.

Adjacent Structures and Pavement

- Support or underpin buildings, walls, foundations, retaining systems and other structures endangered by excavation.
- Do not excavate below a footing/base where a hazard could result unless supported, in stable rock, or approved by a registered professional engineer under the standard.
- Do not undermine sidewalks, pavement or appurtenant structures without support or equivalent protection.
- Monitor settlement, cracking, vibration and movement; stop and obtain engineering review when stability is uncertain.

ATMOSPHERE + COLLAPSE

Ventilation and rescue equipment do not correct an unstable excavation. Both atmospheric and cave-in protections must be effective before entry.

7. Competent-Person Inspections and Field Control

Required Inspections

- Inspect excavations, adjacent areas and protective systems before work and as needed throughout each shift whenever exposure is anticipated.
- Inspect after every rainstorm and after freezing/thawing, vibration, blasting, equipment impact, water rise, soil change, protective-system change or other hazard-increasing occurrence.
- Verify utilities, soil, protective system, access, atmosphere, water, edge loads, equipment controls, traffic, adjacent structures and emergency resources.
- Document inspections using the company form and note deficiencies, corrective actions and entry/reentry authorization.

Field Entry Checklist

VERIFY BEFORE ENTRY	MINIMUM EXPECTATION
Competent person	Present/available, designated and authorized
Utilities	Located, positively identified and protected as required
Protective system	Correct design/data, depth, soil, installation and condition
Access	4-foot threshold; no more than 25 feet lateral travel in trenches
Spoils/loads	2-foot separation or effective retention; equipment setback established
Water/atmosphere	Controlled and monitored; testing completed where required
Emergency	Location, alarm, evacuation, rescue and communication reviewed

Changed Conditions

- Remove exposed employees immediately when a possible cave-in, system failure, hazardous atmosphere or other danger is identified.
- Barricade/isolate the area and correct the cause; do not rely on paperwork from a prior shift.
- Obtain engineer, utility owner or manufacturer support when conditions exceed competent-person authority or plan limits.
- Only the competent person may authorize reentry after correction and reassessment.

VERIFY - DO NOT ASSUME

A prior inspection, locate, soil classification or protective-system setup does not replace the current crew's field verification.

8. Cofferdam Engineering, Installation and Removal

Project-Specific Engineered Plan

- Each cofferdam must have a written project-specific plan prepared/reviewed by qualified personnel; Pheifer Brothers requires a registered professional engineer to design or approve the cofferdam and associated temporary works.
- Define geometry, sheet piling, wales, struts, ties, bracing, connections, materials, design loads and allowable movement.
- Address soil, groundwater, current, scour, uplift, hydrostatic pressure, flood/overtopping, ice, debris, vessel impact, equipment/crane loads and adjacent structures.
- Specify installation, staged excavation/dewatering, monitoring, modifications, removal, controlled flooding and emergency action levels.
- Keep current stamped/approved drawings, calculations as required, revisions and inspection criteria available onsite.

Installation

- Establish exclusion zones for pile driving, lifting, bracing and sheet installation.
- Use qualified operators, riggers and signal persons; inspect lifting points and rigging.
- Install sheets, wales, struts, ties and bracing in the engineered sequence.
- Do not excavate or dewater beyond the stage supported by the installed system.
- Confirm line, grade, interlocks, connections, welds/bolts and bracing before advancing.
- Only the engineer or formally authorized process may approve changes or field modifications.

Removal

- Remove in the engineered sequence and coordinate bracing removal with backfill/flooding to maintain stability.
- Control stored energy in struts, sheets, ties and members; establish falling-object and line-of-fire zones.
- Stop for binding, unexpected load transfer, movement, soil loss or changing water conditions.
- Document final inspection and leave the area stable and protected.

DESIGN CONTROLS

Production demands do not authorize changes to bracing, dewatering stages, loads or removal sequence. Obtain written engineering approval where required.

9. Cofferdam Dewatering, Access and Flood Protection

Dewatering and Monitoring

- Dewater in controlled stages under the engineered plan while monitoring sheet movement, bracing deflection, settlement, heave, leakage, boils, piping, scour and nearby structures.
- Provide sufficient pumping capacity, backup pumping and alternate power appropriate to foreseeable inflow and consequence.
- Protect pumps, alarms, intakes and discharge lines from traffic, freezing, debris, blockage and accidental shutdown.
- Stop dewatering and evacuate for uncontrolled seepage, rapid rise, soil loss, structural distress or action-level exceedance.

Access and Rapid Exit

- Provide cofferdam walkways, bridges or ramps with at least two means of rapid exit and required guardrails.
- Keep exit routes separated where practical, illuminated and free of mud, ice, hoses and obstructions.
- Routes must lead to safe locations outside the emergency hazard area and remain available whenever occupied.
- Review evacuation signal, routes, assembly point and accountability before entry.

Flooding, Overtopping and Severe Weather

- Where high-water overtopping is possible, provide a means for controlled flooding of the work area.
- Monitor forecasts, river/lake levels, upstream releases, rainfall, snowmelt, ice, debris, pump performance and flood warnings.
- Establish action levels for increased monitoring, personnel/equipment removal, stop-work, evacuation and controlled flooding.
- Employee evacuation always takes priority over production or property protection.

Navigable Water and Drowning Protection

- Protect cofferdams near navigable channels from vessels where possible using lighting/markings, buoys/barriers, notices, patrol/workboats, radio and agency coordination.
- Require properly fitted U.S. Coast Guard-approved PFDs where drowning exposure exists.
- Provide required ring buoys, rescue boat/skiff and trained rescue capability under the Working Over or Near Water Program.

TWO RAPID EXITS

Cofferdam access must provide at least two rapid exit routes. A single ladder is not an acceptable cofferdam evacuation plan.

10. Emergency Response, Training, Records and Stop Work

Project Emergency and Rescue Plan

- Address cave-in, flooding/overtopping, cofferdam/bracing movement, utility contact, hazardous atmosphere, fire/explosion, equipment entry, medical emergency, drowning and severe weather.
- Post and train employees on warning signals, exact site location/access, who calls 911, who meets responders, evacuation routes, assembly/accountability and communication.
- Verify rescue-service capability and required equipment before exposure. Do not perform improvised entry into collapsed, flooded or hazardous-atmosphere areas.
- Only trained, equipped and assigned responders perform technical rescue.

Training and Documentation

- Train exposed employees on cave-in recognition, protection, competent-person authority, access, utilities, equipment, water/atmosphere, fall/drowning hazards, alarms and stop-work.
- Provide additional soil, system-selection, inspection and correction training for competent persons.
- Maintain designations, locate records, soil classification, inspections, tabulated data/engineering, atmospheric tests, pump/emergency inspections, pre-task plans, training and emergency plans.
- Retrain when assignments, conditions, equipment, plans or observed performance change.

Immediate Stop-Work Conditions

- Missing, damaged or inadequate protective system; cracks, sloughing, bulging, heave or movement.
- Rising water, boils, piping, soil loss, pump failure or flood/weather action-level exceedance.
- Unknown, damaged or contacted utility; hazardous atmosphere or failed monitoring/ventilation.
- Unavailable access/egress; improper spoil/surcharge/equipment position; public or equipment intrusion.
- Sheet piling, bracing, pavement or adjacent structures move; inspection is missing; actual conditions differ from the approved design.

REENTRY

Employees remain out until the condition is corrected. Reentry requires competent-person authorization and any necessary engineer, utility-owner, rescue or manufacturer support.

11. Test Your Knowledge

Circle the best answer. Review missed questions with the competent person or foreman before entering the work area.

1. At what trench depth is safe egress required? A. 2 feet B. 4 feet or deeper C. 10 feet	2. What is the maximum lateral travel to trench egress? A. 50 feet B. 100 feet C. 25 feet
3. When may a 5-foot-deep excavation lack cave-in protection? A. Only when entirely stable rock; the less-than-5-foot exception does not apply B. Whenever soil looks dry C. When work is brief	4. How far are spoils normally kept from the edge? A. 6 inches B. At least 2 feet, unless effectively retained C. 1 foot
5. Who authorizes entry and reentry? A. Any operator B. The first employee onsite C. The designated competent person	6. When is atmospheric testing required? A. Before entry over 4 feet where a hazardous atmosphere exists or could be expected B. Only after an alarm C. Never outdoors
7. How many rapid exits must a cofferdam have? A. One B. Three C. At least two	8. May employees remain in a trench box while it is moved vertically? A. Yes, with a hard hat B. No C. Only below 5 feet
9. What is required if high water may overtop a cofferdam? A. A means for controlled flooding B. A larger excavator C. One extra ladder	10. Who performs rescue in a collapsed or flooded excavation? A. The nearest coworker B. Anyone wearing a harness C. Trained, equipped and assigned responders

EMPLOYEE: _____

DATE: _____

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