PILE DRIVING

Rig Setup, Pile Handling, Driving, Extraction and Marine Operations

POLICY STANDARD	Pile driving will be planned and directed by qualified, competent and authorized personnel. The rig, leads, hammer, lifting system, access, exclusion zones and emergency arrangements must be verified before work, and operations stop whenever stability, communication or control is lost.

PHEIFER BROTHERS CONSTRUCTION CO., INC.

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USE OF THIS POLICY

This policy establishes minimum requirements and is not all-inclusive. Applicable law, manufacturer instructions, engineered plans, project specifications and a more protective requirement govern when they differ.

Primary Regulatory References

- 29 CFR 1926.603 - Pile driving equipment; 1926.605 - Marine operations and equipment
- 29 CFR 1926 Subpart CC - Cranes and Derricks in Construction
- 29 CFR 1926 Subparts E, L, M, O, P, R and V as applicable

1. Purpose, Scope and Responsibilities

Scope

- Applies to impact, vibratory, press-in and drilled pile support operations; timber, concrete, pipe, H-pile and sheet pile; pile extraction; templates; leads; barges; and associated lifting, cutting and welding.
- Project-specific engineered and manufacturer requirements remain mandatory.

Management / Project Management

- Provide suitable equipment, engineered information, trained personnel, inspections and time to perform the work safely.
- Coordinate controlling-contractor, utility, traffic, environmental, marine and emergency requirements.

Qualified Person / Engineer

- Evaluate rig configuration, capacity, critical lifts, unusual setups, temporary works, modifications and technical conditions beyond a competent person's authority.

Competent Person / Foreman

- Lead the JHA, verify setup and ground support, inspect changing conditions, establish zones and stop unsafe work.
- Confirm operator, rigger and signal-person qualifications and conduct the crew briefing.

Operator and Employees

- Operator controls the equipment within manufacturer limits and accepts routine signals only from the designated signal person; anyone may give an emergency-stop signal.
- Employees stay outside restricted zones, inspect assigned PPE/equipment, report changes and exercise stop-work authority.

2. Engineering and Pre-Task Planning

Required Planning

- Review current foundation drawings, pile schedule, driving criteria, wave-equation/hammer limits when provided, splice details, sequence and tolerances.
- Identify utilities, overhead lines, traffic, railroads, waterways, excavations, adjacent structures, public exposure and simultaneous work.
- Obtain geotechnical information needed to evaluate working platform, soft ground, voids, slopes, scour, groundwater and vibration-sensitive features.
- Plan mobilization, assembly, test piles, pile delivery/storage, pickup points, pitching, driving, splicing, cutoff, extraction and demobilization.

Site-Specific JHA

- Name the competent person, operator, designated signal person, riggers, welders and rescue/first-aid contacts.
- Define equipment configuration, rated capacities, pile weights/lengths, rigging method, exclusion zones, access, fall protection and emergency route.
- Set stop-work limits for wind, lightning, ice, visibility, flood/current, vibration, settlement and communication loss.

Coordination

- Conduct a pre-operation meeting with affected crews and subcontractors. Resolve interfaces with cranes, concrete, excavation, demolition and live traffic.
- Reassess after relocation, change of pile/hammer/lead configuration, unexpected refusal, damage, near miss or changed ground/weather.

3. Rig Selection, Setup and Stability

Selection and Configuration

- Use equipment rated for the hammer, leads, pile, rigging and operating radius/configuration. Follow manufacturer load charts and prohibited-operation limits.
- No field modification, welding, added counterweight or altered safety device without required manufacturer or qualified-engineer approval.

Working Platform and Ground

- A competent person verifies firm, drained, level support and identifies underground hazards, excavations, fills, edges and weak pavement.
- Use engineered mats, crane mats or cribbing where required. Maintain full bearing without voids or unstable stacked blocking.
- Inspect settlement, water accumulation and level before each shift, after every move/setup and continuously during operation.

Stability

- Provide guys, outriggers, thrustouts or counterbalances as necessary to maintain rig stability.
- Stabilize inclined leads used for batter piles. Secure travel components and observe manufacturer limits for slope, boom/lead position and travel.
- Establish clearance from excavations, cofferdams, bridge edges and slopes based on actual loads and competent/qualified evaluation.

Travel and Repositioning

- Lower/secure hammer and pile as required, clear the route, use a spotter, control swing and keep personnel outside crush zones.
- Stop for unexpected tilt, mat movement, track sinkage, structural contact or loss of visibility.

4. Inspection, Assembly and Maintenance

Before Use and Each Shift

- A competent person begins the required crane-equipment visual inspection before each shift and reassesses during operation.
- Check controls, brakes, safety devices, operational aids, wire rope/reeving, hooks/latches, sheaves, head block, leads, pins, retainers, welds, hoses, fittings, guards, access, alarms and emergency stops.
- Check hammer/cushion/anvil, pile cap/helmet, fuel/exhaust/hydraulic systems and all manufacturer-specific items.

Periodic and Event Inspections

- Document monthly inspections while equipment is in service and retain at least three months.
- A qualified person completes and documents annual/comprehensive inspection at least every 12 months; retain at least 12 months.
- Inspect after assembly, safety-related repair/adjustment, modification, severe service, overload/shock, accident, structural contact or at least three months idle as required by 1926.1412.

Defects and Maintenance

- Remove equipment from service when a deficiency is a safety hazard; tag it and prevent use until corrected.
- Block, crib, pin and de-energize components before maintenance. Apply hazardous-energy control and verify zero energy for hydraulic, pneumatic, electrical, gravity and stored mechanical energy.
- Never use hands to find hydraulic leaks. Only qualified personnel make structural, control-system or pressure-system repairs.

5. Leads, Hammers, Hoses and Access

OSHA Equipment Safeguards

- Provide operator overhead protection that preserves visibility and is equivalent to 2-inch planking or material of equivalent strength.
- Install lead stop blocks to prevent raising the hammer against the head block and guards across the head block to keep cable in sheaves.
- Provide a blocking device capable of supporting the hammer whenever employees work under it; lowering alone is not blocking.
- Fixed leads require a ladder and adequate attachment points for fall protection. Loft platforms require standard guardrails.

Pressurized Systems

- Secure steam or air hose at the hammer with at least 1/4-inch chain/cable of adequate length to prevent whipping if the joint fails.
- Provide safety chains or equivalent at every hose connection. Inspect hoses, couplings, restraints and valves before use.
- Steam controls require two shutoff valves, including a quick-acting lever valve within easy reach of the hammer operator.
- Relieve and verify zero pressure before opening, repairing or disconnecting any line.

Access and Falls

- Use designed stairs, ladders, platforms or approved lift systems; do not climb structural members or ride hooks, loads or piles.
- Use fall protection under the company Fall Protection policy and rescue plan. Keep access free of mud, ice, hoses and trip hazards.

6. Pile Handling, Pitching and Exclusion Zones

Delivery and Storage

- Inspect piles for cracks, splits, damaged lifting points, sharp edges, unstable coatings and incorrect identification.
- Chock, crib and stack piles on firm level support; limit stack height and prevent rolling, sliding or collapse.

Rigging and Pickup

- Determine actual pile weight, center of gravity and approved pickup points. Use rated, inspected rigging and engineered lifting devices where required.
- Use tag lines when they can be controlled without creating entanglement or pull-in hazards. Never wrap a tag line around the body.
- Only essential employees involved in hooking, guiding or receiving may enter the fall zone under Subpart CC conditions, and no one may stand beneath a suspended pile.

Pitching into Leads

- Clear all employees while piling is hoisted into the leads as required by 1926.603(c)(2). Use remote release, stabbing guide, template or other method that minimizes hands-on exposure.
- Keep hands and body out of leads, guides, jaws, pile helmet and pile/structure pinch points. Use tools rather than hands for alignment where practicable.
- Do not release rigging until the pile is stable, captured and confirmed by the designated signal person.

Zones

- Barricade the hammer/pile fall zone, counterweight swing, rig travel path, rigging path, pressurized-hose area and flying-debris zone.
- Assign a spotter when the operator cannot see the boundary; stop if unauthorized personnel enter.

7. Driving, Splicing, Cutting and Extraction

Driving Operations

- Accept normal operating signals only from the designated signal person. Stop immediately for any emergency-stop signal or lost communication.
- Keep personnel clear of hammer, leads, pile top, suspended components and material ejection. Do not touch or guide a pile while the hammer is operating.
- Monitor alignment, refusal/set, bounce, pile damage, cushion condition, lead movement, rig level and adjacent vibration/settlement.
- Stop for abnormal noise, cracked pile, damaged splice, uncontrolled movement, hose leak, broken wire, loose pin, unexpected refusal or exceeded driving criterion.

Splicing and Cutting

- Suspend driving and lower/block/secure the hammer and pile before employees enter the work zone.
- Use approved splice details and qualified welders. Control hot work, fire, fumes, coatings, lead, hexavalent chromium and confined-space hazards as applicable.
- Support/block the pile before cutoff; control the cut section and falling material. Pile driving must stop unless cutoff work is at least twice the longest pile length from the driver.

Extraction / Sheet Pile

- Confirm extraction load, equipment capacity and rigging; avoid shock loading and side loading.
- Keep employees outside the projected release/fall zone. Stop for binding, excessive tilt, line pull or ground movement.
- When steel tube piles are blown out, keep employees well beyond the range of falling material.

8. Cranes, Rigging, Signals and Power Lines

Subpart CC

- When equipment is within the scope of OSHA Subpart CC, comply with assembly/disassembly, ground conditions, inspection, operation, fall-zone, signaling, rigging and operator-qualification requirements.
- Use a qualified rigger for rigging work required by the standard and a qualified signal person when signals are used.
- Do not side-load, drag piles with the boom, exceed rated capacity or use unapproved attachments/configurations.

Communication

- Agree on standard hand/radio signals, who signals, blind-pick relay method and emergency stop before work.
- The operator stops if the signal is unclear, conflicting or lost. Radios must be dedicated enough to avoid missed instructions.

Power Lines

- Before operation, identify the work zone and determine whether equipment, load line, pile or rigging could come within 20 feet of a power line.
- If so, deenergize and visibly ground, maintain the clearance in OSHA Table A, or use the 20-foot option with required encroachment-prevention measures.
- Use required planning meeting, warning line/barricade, dedicated spotter or other listed measure. Treat lines as energized unless the utility confirms otherwise.
- For contact: operator generally remains aboard, warns everyone away and calls the utility/911; jump clear only for immediate fire or other greater danger.

9. Excavations, Water and Temporary Works

Excavated Pits and Jacked Piles

- Where piles are driven in an excavated pit, slope walls to the angle of repose or sheet-pile and brace them as required by 1926.603(c)(3) and the excavation plan.
- Jacked-pile access pits require ladders and bulkheaded curbs to prevent material from falling in.
- Coordinate surcharge from the rig, mats, piles and cranes with the excavation/cofferdam competent person and engineer.

Barges and Floats

- Barges/floats supporting pile driving must meet 1926.605. Verify capacity, stability, freeboard, deck loading, mooring/spuds, access, housekeeping, lighting and lifesaving equipment.
- Account for hammer/lead reactions, lifted-pile movement, current, wake, wind, ice and changing water elevation.
- Provide U.S. Coast Guard-approved PFDs where drowning exposure exists, ring buoys with at least 90 feet of line and an immediately available lifesaving skiff where required.

Temporary Works

- Templates, falsework, cofferdams, access trestles and work platforms must be designed, installed, inspected and altered under the required competent/qualified oversight.
- Do not attach guys, winches or pile-driving loads to a structure unless the attachment and load are approved.
- Stop for scour, leakage, movement, cracking, failed bracing, settlement or loss of access/egress.

10. Health, PPE and Environmental Controls

PPE

- Wear properly fitting hard hat with chin strap buckled, safety glasses, high-visibility apparel, work boots and task-specific gloves.
- Add face shield, welding PPE, fall protection, PFD, arc/electrical protection and respiratory protection as the hazard assessment requires.

Noise and Vibration

- Pile hammers commonly exceed noise limits. Use feasible engineering/administrative controls, establish hearing-protection zones and comply with the Hearing Conservation policy.
- Use required hearing protection without defeating communication; consider dual protection based on exposure data.
- Monitor vibration effects on employees, utilities, excavations, fresh concrete, adjacent structures and the public when required by the plan.

Air and Chemical Hazards

- Control diesel exhaust, welding/cutting fumes, treated timber dust, silica, lead/bridge coatings and hydraulic fluids under applicable programs.
- Do not use a respirator unless selected and used under the Respiratory Protection program.

Environment and Weather

- Control spills, turbidity, debris, treated-timber waste and in-water work under project permits.
- Stop for lightning, unsafe wind, poor visibility, ice, flood/current or temperature conditions beyond the plan or manufacturer limits.

11. Emergency Response, Training and Records

Emergency Plan

- Before work, identify exact location/access, 911 caller, responder guide, first-aid/CPR coverage, rescue equipment, utility contacts and water rescue method.
- Plan for rig overturn/collapse, dropped pile, crushing/entrapment, electrical contact, fire, hose failure, man overboard, cofferdam/excavation failure and environmental release.
- Stop, secure energy/movement if safe, warn others, call 911 and preserve the scene. Do not enter a collapse, energized or suspended-load zone for rescue without trained/equipped responders.

Training

- Train employees for assigned duties and hazards. Operators, signal persons and riggers must meet applicable Subpart CC requirements.
- Provide equipment-specific instruction on controls, inspections, setup, hammer/lead systems, zones, signals, power lines, fall/water hazards and emergency actions.
- Retrain after changes, unsafe performance, incident/near miss or when knowledge/skill is inadequate. Toolbox talks supplement but do not replace required training.

Records and Review

- Maintain JHAs, lift/engineering plans, equipment inspections, operator/signal/rigger documentation, training, repairs, incidents and corrective actions.
- Review this program at least annually and after significant change or incident. Printed copies are uncontrolled unless formally issued.

Immediate Stop-Work Triggers

- Rig/lead instability; settlement; damaged pile, rigging or safety device; person in exclusion zone; lost signal; unresolved power line/utility; pressure leak; exceeded criterion; severe weather; temporary-work movement.

12. Pre-Operation Checklist

VERIFY	MINIMUM EXPECTATION
People	Competent person, operator, designated signal person, riggers and rescue/first aid identified.
Plan	Current drawings, pile/hammer data, sequence, pickup/splice/cutoff and stop limits reviewed.
Ground	Working platform, mats, edges, voids, excavation surcharge, drainage and level acceptable.
Rig	Correct configuration/capacity; assembly and shift inspections complete; deficiencies resolved.
Leads/hammer	Stop blocks, head-block guard, hammer blocking device, stability and overhead protection in place.
Hoses	Condition acceptable; hammer and each coupling restrained; shutoffs/zero-energy method ready.
Rigging	Pile weight/CG/pick points verified; rated inspected gear; fall zone and tag-line method set.
Zones	Pile/hammer fall zone, swing, travel, pressure and debris zones barricaded/controlled.
Signals	One designated signal person; signals/radios tested; emergency stop understood by all.
Power lines/utilities	Work zone and clearance method established; spotter/barrier and utility controls ready.
Access/PPE	Approved access/fall rescue; hard hats/chin straps, eye/hearing, hi-vis and PFD as needed.
Emergency	Exact location, 911/access, rescue method, first aid, shutdown and muster reviewed.

FINAL GO / NO-GO	The operator and competent person both confirm the rig, ground, pile-handling method, communication and exclusion zones before operation. Either may stop the work.

13. Test Your Knowledge

Circle the best answer. Review missed questions with your foreman before pile driving work.

1. Who may give an emergency-stop signal? A. Anyone B. Only the foreman C. Only the signal person	2. What is required when employees work under the hammer? A. Lower it slightly B. A device capable of safely supporting it C. A warning sign
3. When may an employee stand beneath a suspended pile? A. During alignment B. With a hard hat C. Never	4. What prevents a hammer from being raised into the head block? A. Lead stop blocks B. Tag lines C. Outriggers
5. What happens when communication is lost? A. Continue slowly B. Stop the operation C. Use guesses	6. Before opening a pressure line, what must be verified? A. Hammer is warm B. Coupling is painted C. Pressure and stored energy are zero
7. What must be evaluated before rig setup? A. Ground support and nearby hazards B. Only pile color C. Lunch timing	8. When is pile cutoff allowed near active driving? A. Anytime B. Only when the 1926.603 separation/suspension rule is met C. While the hammer cycles
9. What must fixed leads provide? A. Rope access only B. No access C. Ladder and adequate fall-protection attachment points	10. Who controls routine operating signals? A. The designated signal person B. Any observer C. The nearest driver

EMPLOYEE: _____ DATE: _____

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