



CONCRETE, FORMWORK AND REINFORCING STEEL

Bridge Placement, Pumping, Temporary Support and Reinforcing Operations

POLICY STANDARD

Plan concrete loads, access, placement sequence and pump system before the pour. Maintain formwork and reinforcing stability, keep employees out of suspended-load and pressurized-hose danger zones, and stop immediately for movement, leakage, line separation, blockage or loss of communication.

PHEIFER BROTHERS CONSTRUCTION CO., INC.

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USE OF THIS POLICY

This policy establishes minimum company requirements and is not all-inclusive. Engineered drawings, current pump/manufacture instructions, qualified-person direction, ASME B30.27 and project requirements may require additional or more protective controls.

Primary Regulatory References

- 29 CFR 1926 Subpart Q - Concrete and Masonry Construction
- 1926.701 - General requirements; 1926.702 - Equipment and tools
- 1926.703 - Cast-in-place concrete; 1926.704 - Precast concrete
- 1926 Subparts E, L, M, R, V and CC as applicable to PPE, scaffolds, falls, steel, electrical and hoisting

1. Purpose, Scope and Responsibilities

Purpose and Scope

This policy applies to bridge decks, piers, abutments, barriers, footings, walls, columns, caps and other work involving formwork/falsework, shoring/reshoring, reinforcing steel, concrete placement and finishing, pumps/placing booms, buckets, tremies, precast members and post-tensioning.

Responsibilities

- Management provides engineered designs, qualified/competent oversight, trained operators, maintained equipment and resources.
- A qualified person/engineer addresses structural design, construction loads, formwork/falsework, shoring, reshoring and modifications requiring design expertise.
- The competent person/foreman inspects work, coordinates the pour, controls access and stops unsafe operations.
- The pump operator controls the pump/placing boom, completes inspections, follows the manufacturer and stops for unsafe conditions.
- The placing crew follows the communication plan, controls the discharge hose only as trained and stays clear of hose-whip/exclusion zones.
- Employees inspect assigned equipment/PPE, report defects and do not alter forms, shores, rebar supports or pump components without authorization.

Subcontracted Pumping

- Confirm operator qualifications, pump inspection/maintenance, insurance/project requirements and responsibility boundaries before mobilization.
- Pheifer Brothers and the pump employer jointly coordinate setup, soil/outrigger conditions, power lines, pipeline route, communication, exclusion zones, cleanup and emergency response.
- A subcontractor's operator remains responsible for equipment operation; the Pheifer foreman remains responsible for coordinating company employees and site hazards.

2. Planning, Loads and Access

Pre-Pour Plan

- Review current drawings, revisions, placement rate/sequence, concrete unit weight, construction loads, pump location and access.
- Verify formwork, falsework, shores, working decks and scaffolds are designed for anticipated vertical/lateral/dynamic loads.
- Plan truck and pump traffic, backing/spotters, washout, lighting, weather, public/live traffic, water, overhead/below work and emergency access.
- Establish exclusion zones for buckets, pump boom, pipeline, discharge hose, post-tensioning and areas below.
- Identify fall protection, rescue, impalement, silica, chemical and electrical controls.

Construction Loads

- Do not place equipment, material or other construction load on concrete unless a person qualified in structural design determines the structure can support it.
- Control ready-mix trucks, pump outriggers, buggies, reinforcing bundles, screeds and finishing machines so loads remain within design.
- Do not stockpile concrete or allow uneven placement that overloads forms/falsework.

Access and Work Platforms

- Provide safe ladders, stairs, ramps, walkways or scaffolds; do not climb rebar, forms, walers or braces unless specifically designed as access.
- Guard edges/openings and maintain fall protection at the company six-foot threshold or lower where another rule applies.
- Keep platforms clear of hoses, cords, slurry, tie wire and tools; provide lighting and slip-resistant access.

Weather and Pour Readiness

- Evaluate wind for boom/bucket control, lightning, extreme temperature, rain/ice and visibility.
- Do not begin without enough personnel, backup communication, lighting, wash facilities and contingency for pump or form failure.

3. Formwork, Shoring and Reshoring

Design and Drawings

- Design, fabricate, erect, support, brace and maintain formwork for all reasonably anticipated vertical/lateral loads.
- Keep current formwork, shoring, working-deck and scaffold drawings/revisions available at the jobsite.
- No field modification, removed brace/tie or changed placement sequence without required qualified-person approval.

Shoring

- Inspect shoring before erection; do not use damaged equipment below required strength.
- Use sound, rigid sills; maintain firm contact of base plates, heads, extensions and adjustment screws; secure where necessary.
- Prohibit eccentric loading unless designed. Tiered single-post shores require qualified design, engineer inspection, vertical alignment, secured splices and two-direction bracing.
- Do not adjust single-post shores to raise formwork after concrete placement.
- Inspect erected shoring immediately before, during and after placement; immediately reinforce weakened/damaged shoring.

Placement Monitoring

- Assign a competent person to watch forms, shores, ties, braces, leakage and movement during placement.
- Maintain communication with pump/operator and authority to stop delivery immediately.
- Stop for unusual noise, deflection, settlement, bulging, tie failure, excessive leakage or placement outside design.
- Clear employees from the affected zone and obtain qualified evaluation before restart.

Form and Shore Removal

- Remove only when plans/specifications conditions are met or ASTM testing confirms adequate strength for self-weight and superimposed loads.
- Install reshoring as required while original forms/shores are removed; do not remove reshores until adequate concrete strength is established.
- Control falling material and protect openings/edges during stripping.

4. Reinforcing Steel and Post-Tensioning

Rebar Stability and Access

- Adequately support reinforcing steel for walls, piers, columns and similar vertical structures against overturning/collapse.
- Use engineered bracing/ties appropriate to cage size, wind, crane handling and construction loads; inspect after movement or impact.
- Do not climb unsupported cages or use reinforcing steel as an anchorage unless specifically designed/approved.
- Secure unrolled wire mesh against recoil; use mechanical help and protect hands/body from stored energy.

Impalement Protection

- Guard protruding reinforcing steel onto/into which employees could fall to eliminate impalement.
- Use engineered covers/troughs/caps demonstrated to protect against the actual fall exposure; simple scratch caps are not fall-impalement protection.
- Protect horizontal projections and route access/material to prevent puncture/cut hazards.

Rigging and Placement

- Use approved lifting points/rigging; control long bundles/cages with tag lines and exclusion zones.
- Do not stand under suspended reinforcing or between an uncontrolled cage and structure.
- Secure steel before releasing rigging. Coordinate crane, traffic, power lines and temporary bracing.

Post-Tensioning

- Only essential trained employees enter the tensioning area; no employee behind the jack during tensioning.
- Erect signs/barriers and control both anchorage ends/line of fire.
- Inspect jacks, hoses, fittings, anchors and calibration; never exceed design pressure/sequence.
- Release pressure before adjustment; treat tendons/jacks as stored-energy systems and follow engineered procedures.

5. Concrete Placement, Buckets and Finishing

Placement Controls

- Place in the engineered sequence/rate and distribute evenly; do not impact forms or reinforcing with bucket, hose or equipment.
- Maintain access and housekeeping; prevent concrete/slurry from obscuring edges, covers or walkways.
- Keep nonessential employees outside the placement zone and protect employees below.

Concrete Buckets

- Never ride a concrete bucket or work beneath it while elevated/lowered.
- Route elevated buckets to expose the fewest employees; use tag lines when safe and keep employees out of pinch/crush zones.
- Hydraulic/pneumatic gates require positive safety latches; bucket design must prevent concrete hanging on top/sides.
- Do not strike, climb or reach under a suspended bucket to clear material. Land and secure before servicing.

Tremies and Pneumatic Placement

- Secure tremie sections with wire rope or equivalent in addition to regular couplings.
- Employees applying cement/sand/water mixture through pneumatic hose wear protective head and face equipment.
- Restrain compressed-air hose connections with positive fail-safe joint connectors and control the discharge/exclusion zone.

Finishing Equipment

- Manually guided powered rotating trowels require a control that shuts off when hands leave the handles.
- Bull-float handles that could contact energized conductors must be nonconductive or equivalently insulated.
- Inspect screeds, vibrators, cords/GFCIs and hoses; use ergonomically sound handling and protect hearing/eyes.
- Concrete buggy handles may not extend beyond the wheels; maintain stable routes and control slopes/edges.

6. Pump Setup, Outriggers and Power Lines

Site and Ground Assessment

- Pump operator and competent site representative select a firm, level setup with adequate bearing capacity and clearance for the complete boom/outrigger envelope.
- Identify excavations, trenches, vaults, utilities, uncompacted fill, bridge edges, slopes, underground structures and recent backfill.
- Maintain manufacturer/engineered setback from edges and voids. Obtain qualified evaluation when soil/support capacity is uncertain.

Outriggers and Stabilization

- Deploy outriggers fully as designed unless the manufacturer permits a documented reduced-outrigger configuration with corresponding operating limits.
- Use manufacturer-approved mats/cribbing sized for calculated reaction and soil capacity; support entire float, level and stable without bridging/voids.
- Do not set on debris, frozen crust, unstable blocking, manholes, unsupported pavement or stacked improvised material.
- Barricade outriggers and pinch zones; inspect for settlement before pumping and throughout the pour. Stop/relevel if movement occurs.
- Do not travel, reposition or raise outriggers with the boom/line in an unsafe condition or personnel in the zone.

Overhead Power Lines

- Survey boom, pipeline, hose, truck and material paths before setup. Treat lines as energized unless utility confirms deenergized and visibly grounded or otherwise protected.
- Plan a minimum 20-foot assessment zone. Establish the applicable minimum clearance with the utility/owner, manufacturer and electrical rules before operation.
- At minimum, keep equipment and material 10 feet from lines 50 kV or less; greater voltage requires greater clearance under applicable OSHA rules. Use the most protective applicable requirement.
- Use a dedicated spotter, warning line/barricade and range-limiting device when needed; spotter performs no conflicting duty.
- If contact occurs, operator generally remains on equipment, warns others away and contacts the utility/EMS; jump clear only for immediate fire/emergency and avoid simultaneous contact with ground/equipment.

7. Pipeline, Clamps, Reducers and Restraints

System Compatibility

- Use pipe, hose, reducers, elbows, couplings, clamps, gaskets and end hose compatible with the pump, pressure, mix and manufacturer specifications.
- Do not mix worn/incompatible components, exceed rated working pressure or use makeshift repairs.
- Discharge-pipe supports must be designed for 100% overload. Secure/support vertical/horizontal lines against movement and dynamic loads without transferring unsafe loads to formwork/scaffold.

Inspection Before Pressurization

- Inspect pipe wall/wear, dents, cracks, corrosion, hose cuts/bulges/soft spots, fittings, clamp condition, pins/locking devices, gasket seating, support and alignment.
- Remove defective or unknown-rated components. Do not weld/repair structural or pressure components except under manufacturer-qualified procedure.
- Confirm clamps are correctly installed, fully closed and locked; never substitute wire, bolts or unapproved hardware.

Reducers and Direction Changes

- Support reducers, elbows and transition points against thrust and movement; avoid sharp bends, kinks and unsupported spans.
- Use the planned sequence/orientation and manufacturer-required safety restraints at connections where separation/whip could occur.
- Do not use a reducer or rigid/metal fitting at the free discharge end unless specifically allowed by the manufacturer and safely controlled.

Safety Restraints

- Install whip checks/safety cables or other secondary restraints where required by manufacturer, system design or hazard assessment.
- Anchor restraint to suitable independent points and size/configure it to control the component without creating a new strike hazard.
- A restraint does not make a worn clamp, damaged hose or improper coupling acceptable.

**ZERO TOLERANCE
FOR
QUESTIONABLE
CONNECTIONS**

Stop and replace any clamp, pin, hose, reducer, support or restraint that cannot be positively verified before pressure.

8. Pump Operation, Communication and Hose Control

Operator Control

- Only the trained/authorized operator controls the pump/placing boom and remains at the controls or approved remote position with clear communication.
- The operator understands manufacturer limits, boom configuration, outrigger status, emergency stop and hand/radio signals.
- Stop pumping when visual contact/communication with the designated signal person is lost.

Communication Plan

- Designate one primary signal person at the discharge point; only emergency-stop signals are accepted from anyone.
- Review start, stop, slow, reverse, emergency stop, boom movement and restart signals before pumping.
- Use reliable radio or standardized hand signals; account for noise, distance, night work and obstructions.
- Before startup/restart, signal personnel clear and receive positive confirmation from hose crew.

Hose-Whip and Discharge Zone

- Establish an exclusion zone around the end hose and connections during startup, restart after delay/blockage, priming and air introduction.
- Keep the end hose free of kinks and excessive bends; support/control it without wrapping around the body or standing astride it.
- Never hold or carry the hose by a coupling/clamp. Use the flexible hose body and enough trained employees/mechanical support.
- Do not place hands/feet near the discharge, reducers, clamps or pinch points. Never look into or reach into the hose/pipe.
- Minimize free fall/drop and uncontrolled movement; use approved end-hose length/diameter and no unauthorized attachments.

Boom Movement

- Operator warns crew before moving; keep employees clear of boom, hose and pinch/crush points.
- Do not drag hose/pipe with the boom unless manufacturer allows the planned method.
- Stop for wind, lightning, visibility, structural alarm, outrigger movement, hydraulic leak or interference with traffic/structure/power lines.

9. Blockages, Stored Pressure and Line Cleaning

Blockage Response

- Stop pumping immediately; warn the crew and barricade the hose/line danger zone.
- Operator follows manufacturer procedure, which may include controlled reverse strokes. Do not repeatedly overpressure the line.
- Identify likely location without striking, heating or opening a pressurized line.
- Before loosening any clamp or component: stop/secure pump, lockout/tagout where servicing exposure exists, relieve stored pressure, verify zero pressure and protect against gravity/material discharge.
- Open connections slowly from a protected position only after authorization; never stand in line with an opening, elbow, reducer or hose end.

Stored Energy

- Treat the entire delivery system as pressurized until the operator verifies zero energy; gauge reading alone may not prove trapped pressure is absent.
- Account for compressed air, elastic hose expansion, elevated concrete columns, hydraulic accumulators and gravity.
- Never separate a clamp, cut a hose or remove a blockage while pressure/energy remains.

Pipeline Cleaning

- Use the manufacturer-approved method; prefer water/vacuum or another lower-energy method where suitable.
- If compressed air is used, it must be an approved written procedure with compatible equipment, positive fail-safe hose connectors, pressure regulation, a rated catcher/recovery device and a fully controlled exclusion zone.
- Secure every connection and discharge point; never discharge a cleaning ball/projectile freely or toward people, traffic, equipment or structures.
- Account for projectile velocity and residual concrete. No person stands in front of the outlet, looks into the line or attempts to catch material by hand.
- Do not open the line until compressed air and trapped pressure are shut off, bled to zero and verified.

NO IMPROVED AIR CLEANING

Compressed-air cleaning can launch concrete and cleaning devices with fatal force. If the full manufacturer procedure and catcher are not available, do not use compressed air.

10. Concrete Burns, PPE and Hygiene

Wet Concrete Hazard

- Wet concrete/cement is caustic and abrasive. Prolonged contact, especially inside boots/gloves/clothing, can cause deep chemical burns with little immediate pain.
- Cement dust can irritate eyes/airways and may contain trace sensitizers. Follow Hazard Communication and Silica programs where applicable.

PPE

- Wear alkali-resistant waterproof gloves, long sleeves/full-length pants, safety glasses with side protection and face shield/goggles for splash as task requires.
- Wear waterproof boots high enough to prevent entry; pull pant legs over boots where practical. Do not kneel in wet concrete without impermeable protection.
- Use hard hat/chin strap, high visibility, hearing and fall protection required by the site/task; ensure PPE fits and does not create entanglement around hoses.

Immediate Washing and First Aid

- Immediately remove contaminated clothing, boots, watches/jewelry and wash skin thoroughly with clean water and pH-neutral soap. Do not wait for pain or redness.
- Do not use vinegar/acid or harsh abrasive cleaners unless directed by medical/product guidance; they can worsen injury.
- Flush eyes with clean water for at least 15 minutes, holding lids open, and obtain prompt medical evaluation.
- For persistent redness, pain, blistering, large-area or prolonged contact, seek medical attention immediately and report the exposure.
- Do not return contaminated clothing/PPE to use until thoroughly cleaned or replaced.

Facilities and Housekeeping

- Provide accessible clean water/eyewash appropriate to the exposure and a washout plan before the pour.
- Keep eating/drinking areas free of cement/concrete contamination; wash hands/face before breaks.
- Control slurry/washout to prevent slips, traffic hazards and environmental release.

11. Precast, Inspection, Training and Stop Work

Precast Concrete

- Support precast units against overturning/collapse until permanent connections are complete.
- Lifting inserts: at least 2 times intended load for tilt-up and 4 times for other precast; lifting hardware at least 5 times intended load, unless a more protective applicable requirement governs.
- Only essential employees may be under precast members being lifted/tilted; maintain erection/exclusion plan and temporary bracing.

Concrete Placing-Boom Inspection

- Operator completes pre-use/shift inspection per manufacturer: boom sections/welds, pins/retainers, slew system, hydraulic hoses/cylinders/leaks, controls/E-stops, outriggers/mats, alarms, pipeline/supports and safety devices.
- Complete frequent/periodic and annual or other inspections at manufacturer/ASME/project intervals by persons with the required qualifications; document results and corrective actions.
- Inspect after overload, contact, accident, structural repair, major modification, extended storage or event affecting integrity before return to service.
- Remove equipment for cracks, deformation, leaking load-holding components, missing pins/guards, failed controls or unapproved structural repair. Only manufacturer-qualified procedures/personnel repair structural/critical components.

Training

- Train operators and affected employees on system hazards, setup, power lines, components, communication, hose control, blockages, pressure release, cleaning, burns and emergency actions.
- Require hands-on demonstration for assigned duties. Retrain after changes, incident/near miss or inadequate performance.
- Toolbox talks reinforce but do not replace operator, competent-person, rigging, fall, respirator or regulatory training.

Stop-Work Triggers

- Unverified ground/outrigger support; power-line clearance not established; missing inspection or operator qualification.
- Damaged/mismatched pipe, clamp, hose, reducer or restraint; loss of communication; person in exclusion zone.
- Blockage, unexpected pressure, line movement/separation, boom alarm/leak, outrigger settlement, form movement/leakage, severe weather or concrete exposure injury.

12. Concrete Pumping Pre-Pour Checklist

VERIFY	MINIMUM EXPECTATION
Plan/roles	Pour sequence/rate; operator, foreman and signal person identified; emergency stop reviewed.
Pump records	Correct unit/configuration; pre-use inspection complete; required periodic inspections current.
Ground/setup	Bearing/support and voids assessed; pump level; outriggers configured; mats/cribbing adequate.
Power lines	Lines identified; applicable clearance/spotter/barrier/range limit established.
Pipeline	Rated/compatible pipe, hose, reducers, clamps/pins/gaskets; supports for 100% overload.
Restraints	Required secondary restraints installed; free end has no unauthorized rigid attachment.
Hose zone	End-hose length/configuration correct; startup/restart whip exclusion zone established.
Communication	Radio/signals tested; one designated signaler; anyone may emergency stop.
Blockage/pressure	Manufacturer procedure, LOTO/pressure relief and protected opening position reviewed.
Cleaning	Approved method; if air, fail-safe connectors, regulator, catcher and exclusion zone ready.
Forms/rebar	Current drawings; inspection complete; placement monitor; impalement/fall controls.
Burn prevention	Alkali-resistant PPE, wash water/eyewash, clean clothing and medical/reporting plan.
FINAL GO / NO-GO	The pump operator and Pheifer foreman both confirm the setup, system, communication and exclusion zones before pumping. Either may stop the pour.

13. Test Your Knowledge

Circle the best answer. Review missed questions with your foreman before concrete placement.

1. What must pump outriggers bear on? A. Loose blocking B. Stable support sized for reaction and soil capacity C. Any pavement	2. What is required before loosening a blocked-line clamp? A. Zero pressure/energy verified and servicing controls applied B. More pump pressure C. Strike the pipe
3. Who gives routine pump signals? A. Anyone nearby B. The truck driver C. The designated signal person; anyone may emergency stop	4. Where should workers stand during startup/restart? A. Beside the coupling B. Outside the hose-whip exclusion zone C. In front of the hose
5. What supports discharge pipe? A. Supports designed for 100% overload B. Tie wire C. Formwork without approval	6. May compressed air discharge a cleaning ball freely? A. Yes B. If pressure is low C. No - use an approved catcher and exclusion zone
7. What is the immediate response to wet concrete in a boot? A. Finish the pour B. Remove it and wash thoroughly immediately C. Let it dry	8. May employees work under elevated concrete buckets? A. No B. Yes with hard hats C. Only briefly
9. What happens when pump communication is lost? A. Continue slowly B. Guess the signal C. Stop pumping	10. Who may modify engineered formwork? A. Any carpenter B. Only through required authorized/qualified approval C. The concrete driver

EMPLOYEE: _____

DATE: _____

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