1 Status

1.1 Update of existing policy, effective 11/18/11.

2 Purpose

2.1 This Safety Policy and Procedure outlines safe craning procedures to help ensure that any operator has the appropriate guidelines and safety policies at their disposal.

3 Applicability

3.1 This policy applies to all subsidiary companies and departments of The Cianbro Companies.

3.2 All organizations are required to comply with the provisions of this policy and procedure. Any deviation, unless spelled out specifically in the policy, requires the permission of the Corporate Safety Officer or designee.

4 Definitions

4.1 Caution Zone: That Cianbro established area not less than 20 feet from energized power lines or it may be more than 20 feet depending on power line size (kV) (see 9.4 Appendix D.).

4.2 Competent person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to team members, and who has authorization to take prompt corrective measure to eliminate them. The competent person in charge of the lift is the lift director as per ASME (defined below). Personnel responsibilities as per ASME American Society of Mechanical Engineers:
   • All responsibilities listed below shall be assigned in the work site organization. A single individual may perform one or more of these roles.
   • Crane Operator: directly controls the crane’s functions
   • Crane Owner: has custodial control of a crane by virtue of lease or ownership
   • Crane User: arranges the crane’s presence on a worksite and controls its use there.
   • Lift Director: directly oversees the work being performed by a crane and the associated rigging crew.
   • Site supervisor: exercises supervisory control over the work site on which a crane is being used and over the work that is being performed on that site.

4.3 Danger Zone: When the crane working area is within the erected/fully extended boom length of the “prohibited zone”, with the power lines energized.

4.4 Fall Zone: This means the area (including but not limited to the area directly beneath the load) in which it is reasonably foreseeable that partially or completely suspended materials could fall in the event of an accident.

4.5 Prohibited Zone: That immediate area around energized power lines which is restricted from crane operations depending on power lines size (kV) (see 9.4 Appendix D.).
4.6 Qualified Evaluator (not a third party): A person employed by the signal person’s employer who has demonstrated that he/she is competent in accurately assessing whether individuals meet the Qualification Requirements in this subpart for a signal person.

4.7 Qualified Evaluator (third party): An entity that, due to its independence and expertise, has demonstrated that it is competent in accurately assessing whether individuals meet the Qualification Requirements in this subpart for a signal person.

4.8 Qualified Person: A person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the project.

4.9 Qualified rigger: A rigger who meets the criteria for a qualified person.

4.10 Throat Opening: Any distortion causing an increase in throat opening of 5% not to exceed ¼ in. (6mm) (or as recommended by the manufacturer.)

5 Policy

5.1 All crane activities shall comply with the specific manufacturer’s specifications and limitations as well as this policy and the requirements set forth in ANSI B-30.5 and OSHA 1926.1400 Sub Part CC Cranes and Derricks in Construction regulations.

5.2 Prior to any work crane operators shall identify any hazards listed in this policy and fill out appropriate planning forms when needed.

6 Responsibilities

6.1 The top Cianbro Manager of the job site is responsible for the implementation of this policy on the project.

6.2 Corporate Safety is responsible for maintaining this document.
7 Crane Safety Index

7.1 Developing the Activity Plan
Prior to starting any crane work, a detailed plan should be developed that identifies any potential hazards and the preventative measures appropriate to eliminate the hazard. Complex or extremely heavy picks, or picks in congested areas warrant extensive planning (critical picks). Activity Plans must include consideration of Owner specific requirements such as arbitrary increases to lifted loads or clearances to sensitive equipment or property.

7.1.1 Listed below are some items to consider when developing the activity plan:

A. Crane location and swing area
B. Proper rigging equipment and inspection
C. When traveling cranes around jobsites with restricted operator visibility, (especially around/under power lines), a competent person (spotter) must be assigned to walk the crane from the point of origin to its destination. Boom sections lowered and proper distances from obstructions must be maintained.
D. Evaluate stability of material crane will set on following 1926.1402 Ground Conditions.
E. Weight evaluation
   • Crane/hoist capacity - load/list charts
   • Combined weight of objects and rigging
   • Sling and rope capacities as rigged
F. Critical lift plans:
   Before making a critical lift, a critical lift activity plan including the applicable attached pre-lift checklist, shall be prepared by the crane operator, Lift director, qualified rigger and qualified signalperson. The plans shall be documented and a copy provided to the project manger or superintendent responsible at the jobsite. The plan shall be reviewed and signed by all team members involved with the lift.
G. Critical lift definition:
   A non-routine crane lift, requiring detail planning and additional or unusual safety precautions. Critical lifts include lifts made when the load weight is 75% of the rated load chart capacity of the crane; Lifts which require the load to be lifted, swung or placed out of the operators view; or lifts made with more than one crane; lifts involving non-routine or technically difficult rigging arrangement; hoisting personnel with a crane or derrick; or any lift which the lift supervisor or crane operator believes should be considered critical.

   NOTE: Attachment checklists must be completed for weights being lifted >75% of the crane rated load chart capacity.

H. Engineering (lift should be calculated and sketched for training purposes.)
I. What other work is going on in the area. Are barricades, alarm systems - crane horn, etc. needed?
J. When working around power lines (within the “Danger Zone”) we must follow Cianbro’s requirements as described in section 7.2 below:

   REMEMBER - No job is too big or too small for an activity plan.

7.2 Crane Signal Persons

7.2.1 Crane signal persons must be certified by a 3rd party organization (NCCCO or NCCER) or qualified by Cianbro. In all cases, the team member will have passed both a written and a practical exam. Documentation shall be maintained by the Cianbro Institute.

7.2.2 A signal person is required in the following situations:
   - The point of operation is not in full view of the operator
   - The operator’s view is obstructed when traveling
   - The operator or the person rigging the load determines it is necessary.

7.3 Special Crane Safety Requirements for Overhead High Voltage Lines

7.3.1 Whenever there are overhead power lines on a job site, the following must be in place:
   - Large clear signs shall be posted identifying the overhead lines.
   - The working zone of the crane(s) shall be identified. If it is identified as a portion of the 360 degree maximum working radius of the crane, the working zone boundaries must be marked by flags or a device such as a range limit device or range control warning device.
   - If the working zone is closer than 20 feet (or the voltage is known and you will be closer than the distance listed in Table A of Appendix D of this policy), then you must either: Have the line owner or operator de-energize and visibly ground the line or follow all of the requirements in 7.2.2, 7.2.3, and in "STEPS YOU MUST TAKE TO MAINTAIN THE REQUIRED MINIMUM CLEARANCE DISTANCE" included in Appendix D of this policy.
7.3.2 The following steps shall be taken to eliminate the hazard of electrocution or serious injury as a result of contact between the energized power lines and the crane, load line or load within the “Prohibited Zone”:

- An on-site meeting between competent Cianbro person and a competent representative of the owner of the lines or a competent representative of the electrical utility should take place to establish the procedures to safely complete the operations.
- Load control, when required, shall utilize tag lines of a non-conductive type (dry polypropylene).
- A qualified signal person(s), whose sole responsibility is to verify that the required clearance is maintained, shall be in constant contact with the crane operator.
- No one shall be permitted to touch the crane or the load unless the signal person indicates it is safe to do so.
- Operation of boom and load over electric power lines is extremely dangerous, due to perception of distance and multiple contact points as viewed from the position of the operator and/or position of the signal person. The operator should avoid operating the crane, with or without a load, in this area.
- Devices such as ribbons, balls, etc. should be attached by a qualified person to the power lines to improve visibility, or equivalent means employed to aid in location of the prohibited zone.

7.3.3 Any time we are required to operate a crane or lifting equipment within the “Caution Zone”, a specific hazard activity plan shall be prepared by the assigned supervisor with input from the crane operator/rigger and safety person. The plan must be written, approved by the Senior Cianbro manager on site and reviewed with all individuals in the work area with a copy sent to the Corporate Safety Department.

A. The activity plan shall include at a minimum those considerations and steps listed in section 7.1 above plus:

- Identify “Caution Zone” area boundary at least 20 feet from energized power lines. Depending on line size (kV) distance may be more than 20 feet.
- Paint or use other visible methods to clearly designate Caution Zone area boundary along the ground from the power line to any portion of the equipment.
• A spotter that is a qualified signal person shall be assigned to ensure equipment/loads never breach the prohibited zone from the power lines. The signal person, whose only function will be monitoring the distance, shall be in direct communication with the operator.
• Request owner or a designated representative of the electrical utility to cover lines (rubber boots or sleeves) in the immediate work area where incidental contact could occur. Applicable distance from lines shall be maintained.

7.3.4 When traveling crane with no load and boom or mast lowered the minimum safe distance from energized power lines up to 0.75 kV is 4 feet. Refer to Table T in 9.5 Appendix E for safe distances greater than 0.75 kV.
• A competent signal person must be assigned to monitor distance while traveling and be in direct communication with the operator.

7.3.5 Team member protection against electrical hazards.
• Shut off - tag out - ground lines, whenever possible.
• Rubber sleeves are appropriate - but not by themselves. The identified prohibited zone shall still be maintained.
• Large Overhead Power Lines identified with signs, flagging, etc.
• Avoid using areas under or in close proximity to power lines for laydown or storage areas.

7.4 Site Preparation

7.4.1 Prior to mobilizing crane in work area, the following should be considered:
• Access roads are adequately prepared.
• There is room to erect and/or extend the boom.
• Blocking is available to support the boom while it is being assembled and dismantled.
• The maximum radius, maximum loads and maximum lift height of each lift are known.
• If the crane is to be set up on a structure; the allowable structural loads are not exceeded by crane loads.
• Is there adequate swing clearance between the counterweight and any obstacles? (Should maintain a minimum of 2 feet.)
• Ropes or barricades are positioned to prevent entry into any part of the crane swing area.
• Operating locations are far enough away from shoring, excavations, trenches, buried utilities, foundations, etc., to eliminate risk of collapse.
• All erection, dismantling, and operating locations must be drained, graded, leveled and compacted so that, in conjunction with the use of supporting materials (if necessary), they meet the equipment manufacturer’s specifications for adequate support and degree of level.
• All operating locations are graded, leveled and compacted.
• Public access to lift area is prohibited and barricades are available.
• Operating locations are chosen so that the minimum clearances from power lines are maintained by Cianbro and OSHA requirements. If not, the power lines must be either shut down and properly grounded or relocated by the utility company so that contact cannot be made. Refer to the section 7.2 Special Crane Safety Requirement. Overhead High Voltage lines.”
• Persistent wind direction and wind speed can exert unplanned dynamic loading. Extreme caution must be exercised when lifting as wind speed increases.
• Proper leveling of crane.
• Hardwood mats or blocking are available if the ground is soft.
• Visibility for making lifts which could require tag person and/or radio communications.
• All “Caught Between” points are identified and eliminated if possible.
7.5 Tips for Setting up Cranes

(Be sure to verify these basic points.) Follow Cianbro’s “Informational Safety Policy and Procedure” for assembling and dismantling cranes. All manufacturer procedures and prohibitions must be complied with when assembling and disassembling a crane. The assembly and disassembly must be directed by a competent and qualified person.

7.5.1 Locate the hoist line over the center of gravity of the load being hoisted. This will allow the load to be lifted without “swinging”. The center of gravity of the load will always position itself under the boom point. (Try this with the headache ball.) The boom tip must be situated directly over the load center of gravity (make sure the load line is always vertical).

7.5.2 Know the weight of the load. This may seem to be an obvious requirement, however, when investigating many accidents it has been learned that in many instances actual load weight differed considerably from the estimated weight. When making lifts over 75% of the rated load chart capacity, the load weight must be known exactly. Do not overlook the weight of the load block, cable and any other rigging, they are all part of the load weight. Always refer to the load charts for deductions.

7.5.3 The maximum load radius the machine will be working at or required to move the load must be known. The furthest load radius must be used to determine the lifting capacity of the crane from the load chart to ensure a safe hoisting operation. Remember, load radius is the horizontal distance measured from the “center of rotation” to the “center of gravity of the load”.

7.5.4 Set up on firm, level footing. If outriggers are used they shall be fully extended; float pads shall be level and properly cribbed, if necessary, to provide support.

NOTE: If outriggers are not fully extended, use the “on rubber” capacity charts. For those cranes for which the manufacturer allows for intermediate outrigger placement, extend to those positions only, and be sure to use the appropriate chart for that position. Outrigger beams must be set in accordance with manufacture recommendations.

7.5.5 Level the crane. A few degrees out of level can cause serious side loading of the boom, especially at longer boom lengths. Also, when swinging loads towards the low side, the radius will increase causing greater “tipping” forces on the crane.

7.6 Critical Pick Planning

7.6.1 Before making critical picks we must evaluate the materials and equipment on the crane barge to check for weights, location and securing. All items need to be balanced to avoid any possibility of machine listing.

7.6.2 During the pick, all items that can affect the movement of the crane, load or barge, should be monitored (wind, current, wake, weather, etc.).

7.6.3 A list of all hazards and their solutions must be filled out in the Activity Plan.

7.6.4 Crane booms should be as short as possible for the lift.

7.6.5 Cranes radius should be short as possible and loads as close to the ground as possible.

7.6.6 Charts must be specific for a boom offset if it is being used.

7.6.7 All rigging and equipment must be inspected and documented before the lift.

7.6.8 Review all aspects of the Activity Plan with the crew to make sure of their understanding of the process.
7.6.9 Cianbro's Critical Lift Checklist must be completed.

7.6.10 Critical lifts should not be made in winds at 15 mph or above unless other special considerations are used.

7.7 Keeping Clear of the Load
A. Where available, hoisting routes that minimize the exposure of team members to hoisted loads must be used, to the extent consistent with public safety.
B. While the operator is not moving a suspended load, no team member must be within the fall zone, except for team members:
   • Engaged in hooking, unhooking or guiding a load;
   • Engaged in the initial attachment of the load to a component or structure; or
   • Operating a concrete hopper or concrete bucket.
C. When team members are engaged in hooking, unhooking, or guiding the load, or in the initial connection of a load to a component or structure and are within the fall zone, all of the following criteria must be met:
   • The materials being hoisted must be rigged to prevent unintentional displacement.
   • Hooks with self-closing latches or their equivalent must be used.
     1. Exception: “J” hooks are permitted to be used for setting wooden trusses.
   • The materials must be rigged by a qualified rigger.
D. Receiving a load: Only team members needed to receive a load are permitted to be within the fall zone when a load is being landed.
E. During a tilt-up or tilt-down operation:
   • No team member must be directly under the load.
   • Only team members essential to the operation are permitted in the fall zone (but not directly under the load). A team member is essential to the operation if the team member is conducting one of the following operations and the employer can demonstrate it is infeasible for the team member to perform that operation from outside the fall zone:
     1. Physically guide the load;
     2. Closely monitor and give instructions regarding the load’s movement; or
     3. Either detach it from or initially attach it to another component or structure (such as, but not limited to, making an initial connection or installing bracing.)

7.8 Cranes on Barges
Working with barge-mounted crane presents many challenging circumstances. Before putting any crane on a barge, appropriate engineering steps should be taken to determine that capacities and lists can be maintained within safe limits. Experienced team members, compatible equipment configurations, properly sized equipment and paying attention to details are critical to our success. Minimum barge list must always be the goal.

7.8.1 The following are a number of important procedures and considerations for working from barges:
A. The proper list charts must be used for picks on the water. Land charts should never be used for marine operations.
   • A 1° list chart shall be used at a minimum unless all dynamic forces can be controlled during the lift. Any lifts requiring capacity chart of less then 1° needs to be an engineered lift.
   • List charts need to be specific to the crane that is being used.
     Example: List charts for the Manitowoc 4100W Vicon Series 3 Ringer come in 1/2°, 1° and 2° only. The 2° list must never be exceeded.
   • List charts must match the machine serial number.
   • Machine list and barge list both need to be considered together.
B. Barge list is unknown until the crane has the entire weight of the load. Be prepared to set the load back down if necessary to reposition the crane. Barge list can be calculated by a qualified engineer.
C. All methods to secure a load should be taken into consideration (i.e. cable load to front of barge, set load on another barge tied to front of crane barge, etc. before moving the crane barge).
D. The crane should be balanced so the load or the counterweight does not affect the list or trim of the barge.

E. Things to consider in the planning; (Remember: At 75% or more of the manufacturer. Recommendations, a qualified engineer must be involved in the planning.)
   • Wind – will not exceed manufacturer’s recommendations
   • Seas or wave action – should be “flat”
   • Tide or current conditions
   • Obstacles in the area
   • Always keep block tied back when not in use
   • Before leaving the crane unattended lower the boom to an intermediate angle
   • When leaving crane over night lower the boom to an intermediate angle with the ball or block attached to the barge with adequate rigging. Crane should be balanced with list and trim close to zero or zero
   • Marine traffic – should be controlled
   • Weight calculations
   • Power lines over head
   • Under water / underground utilities
   • Check for water in barge compartments – pump out if necessary
   • Fuel in the equipment
   • Access to the barges

**Note:** Remember that load charts are for 0 wind, 0 wave action, 0 current and equipment in safe running condition.
7.8.2 Guidelines for Barge Selection and Use
The crane should be located in the center of the barge to minimize machine list. If it cannot be avoided, the crane may be located towards one end of the barge with engineering assistance in estimating machine list and ballast requirements.

- **A.** The barge needs to be approved for use with the crane by an engineer.
  - Items to include in the planning:
    - Materials needed on the barge.
    - Equipment to be placed on the barge.
    - Conex boxes and contents.
    - Loading and unloading of the crane (Ramps required?)
    - Boom length (can the crane place things onto the barge?)

- **B.** Placement of spuds
  - Keep the working end clear of spuds.
  - Determine spud length needed and add 10’.
  - Consider what will lift the spuds – crane or winches. (Place power pack so the winch operator can see the spuds).

- **C.** Number and placements of cleats
  - For heavy loads, hand lines can be tied off.
  - Tug or push boat tie-off.
  - Need to include adequate number and placement.

- **D.** Channel conditions
  - Is channel big enough to accommodate the barge?
  - Consider obstacles in the way of the pick / swing areas.
  - Is the water deep enough in all areas of the move?

- **E.** Barge list considerations
  - Can load be swung to the side without excessive listing?
  - Will tides or wake cause a concern with the barge?
  - Make certain we start with a 1° list chart.

- **F.** A drawing that is to scale should be used to show everything on the barge and how things will be moved during the pick.

- **G.** Tying down the crane:
  - A qualified engineer will design tie-downs.
  - Tie-downs will be designed so the crane can be moved if necessary.
  - Tie-downs are for securing the crane from sliding off the barge, not for anchoring the crane for a pick.

Can the barge accommodate all of the materials to be placed there or is a material barge needed? What size?

7.8.3 When moving cranes on barges with suspended loads and loads that are too heavy to swing over the side:

- **A.** Use a winch to rotate the barge to maintain complete control of the move unless the load is secured or resting on another barge. Securing the load will increase stability and limit movement. An engineer should be involved in the load securing methods and design.
  - **Note:** Extra caution should be used to ensure the boom tip is directly over the center of gravity of the load. The operator may have to raise the boom while hoisting the load to keep boom tip over the center of gravity of the load. (Make sure the load line is always vertical).

- **B.** When rotating a barge with a winch, with a suspended load on the crane, the winch operator needs to be positioned so that the load can be seen by the operator. This will allow the winch operator to make adjustments to the barge movement, helping
to keep the load centered under the boom. The winch operator needs to be well trained – possibly a crane operator. Spuds should be up and pinned. The winch operator and the crane operator need to be in radio contact with each other.

C. Set up the winch cables (and anchors) so the rotation of the barge can be completed without stopping and changing cables.

D. The load should be lowered as soon as possible to make it more stable (the operator needs to know this).

E. The crane swing-lock positive dog should not be engaged while raising, lowering or rotating the load. If the load starts to move slightly, the operator will maintain the ability to bring the load back to center. Any movement on the barge can cause list.

F. Whenever possible, spuds should not be raised once the crane has lifted the load. Moving the spuds may cause the barge to list. If the spuds need to be raised or lowered during the lift, they should only be moved together, at the same rate and after the rotation has been stopped.

G. Use a Load Indicating Device or Load Moment Indicator to check calculated weights.
   - This is only another tool and should not be relied upon as the only method of determining the weight. Operator experience must also be considered.
   - The load weight needs to be calculated by a qualified person.
   - Do not rely on shipping weights alone.
   - St. Paul's Critical Pick Criteria is useful in determining accurate weights.

7.8.4 Guidelines for Wind and Current
A. When working in strong currents (around 4 knots) then the following should take place:
   - The spuds should be placed across the current such that one spud does not take the entire load from the barge.
   - Consider using anchors to assist the spuds.
   - Find a protected area to secure the barge for the night or weekend (a dock, cove, etc.).
   - When making a critical pick, check the barge list prior to making the lift. Current or tidal flow can affect the list.
   - A wind meter (anemometer) should be used to measure wind speed.
   - Loads that have a large surface area, such as a building or large girder become a large sail. Special precautions should be taken to secure the load with air tuggers, winches or something that blocks the wind.
   - Never exceed the manufacturer’s recommendations for wind speed.
   - Wind speed usually increases with elevation.
   - Wind can cause swells and waves. Take this into consideration before making the pick.
   - Wind and current should be monitored throughout the pick process.

7.8.5 Cranes on barges with spuds:
   - When lifting a spud that has set overnight, or when it has settled into the mud, a minimum of a two-part line or block to lift the spud must be used.
   - With cranes that only have two single part lines, then both lines should be used together.

7.8.6 Securing the barge:
   - Make sure the barge is in a safe location and spuds are down.
   - Check all mooring lines.
   - Place lights with adequate power supply on barge perimeter.
7.9 Crane Failures and Upsets

7.9.1 Over 50% of all mobile crane failures and upsets are caused by:
- Failure to use outriggers.
- Failure to fully extend outriggers.
- Failure to get wheels off the ground.
- Failure to level the crane.
- Poor ground conditions.
- Improper blocking beneath the outrigger floats.
- Not knowing load weight/Picking more than chart will allow.

7.10 Inspection and Maintenance: A Part of Safety

7.10.1 Qualified and competent operators shall perform a safety inspection before putting any Cianbro or rental crane into service. Use a Cianbro Equipment Inspection form (SD-810) to document this inspection. This inspection must be repeated on a monthly basis. Also, OSHA regulations require a daily inspection of the following: (Daily inspections, use Cianbro’s operators safety inspection card (SH 925)) ASME 5-2.1.2

Frequent Inspection. All safety devices must be in proper working order before the crane can be operated.
- All control mechanisms for proper functioning.
- All safety devices for malfunction (anti-two block device, boom hoist kickout, load indicators, etc. for cranes so equipped).
- Air and hydraulic lines and fittings for deterioration.
- Operator’s manual, operating speeds, and other required safety and warning decals in place and visible.
- Load charts legible and fixed in a location visible to the operator while seated at the controls.
- The presence of an accessible fire extinguisher (10 BC rated) inside the cab for emergency use.

7.10.2 Cianbro’s crane maintenance program requires that the following be completed, including all rental equipment:
- Proper lubrication
- Adjustments
- Repairs
  Crane parts and components shall not be modified without the manufactures approval.
- All sources of energy that could interfere with the safe maintenance and/or repairs of crane components must be positively locked and tagged (ZES state) out at the energy source prior to performing maintenance or repairs.
- Remove key from the ignition switch. Turn off the master switch. Put key on the master switch lock with a tag.
- Monthly inspections must be completed on critical items in use such as brakes, crane hooks, and running ropes. This certification record must be kept readily available (use equipment inspection form (OP410)). Crane hooks with deformation or cracks will not be used and must be replaced.
- Annual inspections are done and recorded immediately following assembly or any changes to the cranes configuration before use. Use the new Annual Inspection Form (forms are located on www.cianbro.net Resources| Forms).
- Documented load tests must be completed and maintained whenever a major repair is completed, annually, or whenever a third party inspection is required for maritime operations (whichever comes first). The documentation must show the test procedures and confirm the adequacy of any repairs or alterations needed.
- Wire rope/rigging and boom inspection.
One of the most important pre-operational checks to be made on the crane is the wire rope/rigging and boom inspection. Assurance of safety and good condition of the equipment requires a program of periodic inspection of all wire rope and fittings. Refer to Cianbro’s “Safe Rigging Operations” Safety Policy and Procedure.

All rope which has been idle for a period of one month or more shall be given a thorough inspection by an authorized person before it is put back into service.

The time to remove a rope from service is related to the conditions of the particular installation. These conditions include the size, nature, and frequency of the lifts and when the next inspection will be.

All inspections are the responsibility of the operator. Call Cianbro’s Safety Department or the Equipment group with any questions about maintenance and inspection requirements.

All slings must be inspected for damage/defects each day (shift) before use.

7.10.3 Modifications or additions that may affect the capacity or safe operations of the equipment require written approval from the manufacturer.

7.10.4 Crane safety is a very important part of any work activity. Operators and project management needs to accurately plan craning, at all times; ensuring safe working limits are maintained. Remember there are five reasons for crane incidents:

- Site selection/set up
- Load limits/rigging
- Inspection
- Maintenance
- Operator error

NOTE: For more information frequently review “Bob’s Rigging and Crane Handbook”, IPT’s Crane and Rigging Handbook and/or for OSHA requirements labor Part 1926, 1400 Subpart CC.

7.11 Requirements for Crane Operators

7.11.1 Only crane operators approved by Cianbro shall be allowed to operate cranes for Cianbro. All Cianbro crane operators must be required to successfully meet the qualifications for the specific type of crane they are operating. Operators must meet the physical qualifications and operator requirements set forth in ASME B30.5 Section 5.3.1 including:

A. Cianbro crane operators have the right and responsibility to refuse to lift a load if they believe it is not safe to do so. The crane operator shall notify the supervisor and/or the lift director. Together they will determine the safe way to complete the lift.

B. Physical qualifications must meet the following:

- Adequate vision (with or without corrective lenses) and hearing (with or without a hearing aid) to meet the operational demands of the job.
- The ability to distinguish colors, regardless of position, if color differentiation is required.
- Sufficient strength, endurance, agility, coordination, and speed to meet the operational demands of the job.
- Normal depth perception, field of vision, reaction time, and coordination.
- Compliance with substance abuse testing criteria.
- No evidence of physical defects, emotional instability, seizures, or loss of physical control that could interfere with the operator’s performance.
- Operator physicals to re-evaluate operator status are required every two years.

C. Operator testing and demonstration requirements must verify the following:

- Satisfactory completion of a written exam covering operational characteristics, controls, and emergency control skills.
• Demonstrate the ability to read, write, comprehend, and use arithmetic and a load/capacity chart.
• Satisfactorily complete a written/verbal test on load/capacity chart usage for the specific type of crane they will operate.
• Satisfactorily complete an operation test demonstrating proficiency in performing lifting, lowering, booming, telescoping, and swinging functions at various radii. Testing shall also include inspections, securing procedures, and traveling.
• Demonstrate understanding of the applicable sections of the B30 Standard and other federal, state, and local requirements.
• Crane operators designated as having appropriate “Offshore” experience and training will also understand the requirements of the American Petroleum Institute (API) 2D Standard.
• Operators are required to be re-qualified if, at any time, management feels it is warranted or at intervals not to exceed 5 years per NCCCO requirements.
• Refresher training for all crane operators will be conducted at intervals not to exceed 4 years. The training will consist of, at a minimum, topics including applicable changes to company, manufacturer, OSHA, ANSI or API standards, principles of operation, crane maintenance, inspections, hand signals, load charts, and fire extinguisher training.
7.12 Crane Safety Rules Checklist:

☐ Watch out for power lines (20’ rule/“Danger Zone” Refer to attached policy.)

☐ Refer to Cianbro’s Informational Safety Policy and Procedure for “Crane Assembly and Dismantling”.

☐ Know the weight of the load.

☐ Know the pick and set zone radius.

☐ Know if you are in the structural or tipping portion of the chart.

☐ Perform pre-operational check of crane (daily/monthly/annual).

☐ Assign spotter when traveling crane.

☐ Set up on firm supporting surface.

☐ Provide adequate cribbing as necessary.

☐ Properly deploys all outriggers.

☐ Level crane in all directions.

☐ Get tires off the ground.

☐ Make sure you have adequate line when 2 parting, etc.

☐ MSDS sheets for chemicals located inside of crane.

☐ Fire extinguisher - monthly check.

☐ Make sure that all exposed moving parts such as gears, pulleys, belts, chains, shafts, flywheel, etc., are guarded or fenced.

☐ Check that all exhaust pipes are insulated in areas where contact by team members is possible in the performance of normal duties.

☐ Adequate lighting.

☐ Good window and windshield wipers.

☐ Keep load line vertical.

☐ Check for proper drum spooling.

☐ Make necessary weight deductions, block, rigging, etc. - always check load charts.

☐ Allow for high wind - reduce rating.

☐ Do not run out of rope. Have a minimum of three wraps on the drum or more if the crane manufacturer requires a higher minimum number of wraps.

☐ Do not two-block. Anti-two-block devices optional except for hoisting personnel.

☐ Barricade the swing radius with warning lines or barriers.

☐ Insist on proper hand signals.

☐ Do not leave cab with load on crane or when crane is running.
☐ Start and stop and swing slowly.
☐ Check brakes when load is first lifted.
☐ Watch out for poor rigging.
☐ Watch out for stragglers.
☐ Check all latches.
☐ Keep alert.
☐ Know the plan.
☐ Boot power lines as an extra precaution.
☐ Operator nametag is on crane, boom truck, etc.
☐ Durable load chart is in crane and has clear legible letters and figures.
☐ Use sorting hooks (pelican hooks) for sorting only. (Never use pelican hook when raising load over any personnel or anything other than what it is intended for.
☐ Tag lines (6’x ½ inch diameter. minimum).
☐ Before leaving the crane unattended lower the boom to an intermediate angle with the block tied back. At this point the crane should be balanced.
7.13 Safety At Home
Make sure you maintain clearances from overhead power lines at your home. Do not carry ladders, poles or other objects when you are close enough that you could contact the overhead lines around your house.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

9.1 See attachments.

9.2 Document available on Cianbro.net or Cianbro.net>Standard Operating Procedures – on the SOP.

<table>
<thead>
<tr>
<th>Pre-Lift Checklist Land Based Cranes Only</th>
<th>SD1004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Lift Checklist Barge Mounted Cranes Only</td>
<td>SD1003</td>
</tr>
<tr>
<td>Pre-Lift Checklist Procedures for Overhead Cranes/Power Hoist</td>
<td>SD1005</td>
</tr>
<tr>
<td>Boom Truck Critical Lift Plan</td>
<td>SD1034</td>
</tr>
<tr>
<td>Pre-Lift Checklist for Two Cranes</td>
<td>SD1039</td>
</tr>
<tr>
<td>Pre-Lift Checklist Manual Hoist Exceeding 75% of Rated Capacity</td>
<td>SD1002</td>
</tr>
</tbody>
</table>
Many operators and riggers have been killed when dismantling or shortening booms and the main cause is usually failure to follow the procedures specified by the manufacturer. Work on the jobs involves the same hazards.

Never touch any (top or bottom) pin on any boom section located between the pendant attachment points and the crane.

If a set of lower pins (located between the pendant attachment points and the crane) is removed the boom will jackknife down when the last pin is pulled.

If a set of top pins (located between the pendant attachment points and the crane) is removed, the boom will jackknife when the last pin is pulled.
CONTINUED

Until the boom is solidly supported on its blocking, never touch the top pins ahead of the pendants. The boom will drop.

Caution: Never walk, work, lean or place any part of your body under the boom when it is being assembled, dismantled, shortened or lengthened. If necessary, use a long bar to knock the far side pins out.

Blocking under joint at both sides.

STAY OUT FROM UNDER THE BOOM
OUTSIDE =SAFE SIDE
INSIDE =SUICIDE
ASSEMBLY OF SHORT LATTICE BOOMS:

Caution:

1. This assembly method applies only when the "maximum cantilever length" specified by the manufacturer is not exceeded. See page 6 for the procedure to follow if the boom is longer than the "maximum cantilever length".

2. Be sure that the boom hoist pawl is always engaged except when lowering the boom. Don’t rely on the boom hoist brake alone to hold the boom. Wear, improper adjustment, water or oil on linings, and other factors may reduce the ability of the brake to hold the boom.

Check the manufacturer’s procedure and follow the instructions precisely. The following method is common to most manufacturers for pinned boom connections but may not apply to all: check the crane’s manual before attempting this job.

1. If so equipped, extend all outrigger beams fully and extend outrigger cylinders until wheels are clear of ground.

2. Level the carrier.

3. Check the amount of counterweight required in the load chart for the lifts to be made and the length of the boom being installed. Check also to ensure that enough counterweight is installed to lift the boom off the ground.

4. Check to see if the front bumper counter-weight is required.

5. If so equipped, the extendible counter-weight must be extended.

6. Rotate the upper-works to face “over the rear” or in the direction of maximum stability.

7. Set the swing lock.

8. Fully extend the gantry. If the machine has a live mast, check the load chart to see if it must be used.
9. Install the heel or foot section of the boom and attach the pendants to the ends.

10. Lay out the boom inserts in the correct order specified by the manual. (Unless otherwise specified by the manufacturer, assemble the boom with the short insert sections close to the boom foot.)

11. Draw all of the sections together. Line up the upper pin connection points. Insert the top pins only and install the cotter pins.

12. Boom up slightly until the bottom pin connection points line up. Engage the boom hoist pawl. Install the pins and cotters.

13. Lower the boom onto blocking until the pendants are slack.
THE BOOM SECTIONS MUST GO TOGETHER EASILY AND WITHOUT THE NECESSITY OF FORCING IN THE PINS.
REQUIRED CLEARANCE FOR NORMAL VOLTAGE IN OPERATION NEAR HIGH VOLTAGE POWER LINES 1926.1408 THE LINE’S VOLTAGE MUST BE DETERMINED (iii) OPTION (3) AND OPERATION IN TRANSIT WITH NO LOAD AND BOOM OR MAST LOWERED

<table>
<thead>
<tr>
<th>NORMAL VOLTAGE, kV (PHASE TO PHASE)</th>
<th>“PROHIBITED ZONE” MINIMUM REQUIRED CLEARANCE, FT (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation Near High Voltage, kV</strong></td>
<td><strong>Note (1)</strong></td>
</tr>
<tr>
<td>to 50</td>
<td>10 (3.05)</td>
</tr>
<tr>
<td>Over 50 to 200</td>
<td>15 (4.60)</td>
</tr>
<tr>
<td>Over 200 to 350</td>
<td>20 (6.10)</td>
</tr>
<tr>
<td>Over 350 to 500</td>
<td>25 (7.62)</td>
</tr>
<tr>
<td>Over 500 to 750</td>
<td>35 (10.67)</td>
</tr>
<tr>
<td>Over 750 to 1000</td>
<td>45 (13.72)</td>
</tr>
<tr>
<td>Over 1000</td>
<td></td>
</tr>
</tbody>
</table>

(As established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

| **Operations in Transit With No Load and Boom or Mast Lowered** |
|-------------------------------------|-------------------------------------------------|
| to 0.75                             | 4 (1.22)                                        |
| Over 0.75 to 50                      | 6 (1.83)                                        |
| Over 50 to 345                       | 10 (3.05)                                       |
| Over 345 to 750                      | 16 (4.87)                                       |
| Over 750 to 1000                     | 20 (6.10)                                       |

**Note:**
(1) Environmental conditions such as fog, smoke, or precipitation may require increased clearances.
9.5 Appendix E

(From OSHA Small Entity Compliance Guide)

Danger – High Voltage: Electrocutions caused by a crane, load, or load line contacting a power line have caused numerous fatalities. To prevent such accidents in the future, the standard contains detailed, systematic procedures that employers must follow when operating cranes near power lines. These procedures are designed to 1) prevent equipment from making electrical contact with power lines; and 2) protect workers in the event that such contact occurs.

Note: Special rules apply to work covered by 29 CFR, Subpart V, Power Transmission and Distribution. This Guide does not cover Subpart V work.

The First Step – Could the crane get closer than 20 Feet to a power line? Keeping a safe distance from power lines is the key to preventing power line accidents. Therefore, the first step you must take when planning to operate a crane on a site where a power line is present is to identify the crane’s work zone and use that work zone to determine how close it could come to the power line. If you determine that no part of the crane, load, or load line could get closer than 20 feet to a power line, no further precautions are required. If the initial plan for the crane’s use changes during the project, you must reevaluate whether the equipment could get closer than 20 feet to the power line. [Note: If the line’s voltage is over 350,000 volts, a 50-foot, rather than 20-foot, minimum clearance must be maintained. This Guide assumes that the voltage is less than 350,000 volts and uses the 20-foot clearance distance.]

There are two ways to identify the work zone and use it to determine whether the equipment could get closer than 20 feet to the power line. First, if the equipment (crane, load, load line, or rigging) could not get closer than 20 feet to the line even if the crane is operated at its maximum working radius, the 20-foot requirement is satisfied. Alternatively, you may establish a work zone by establishing boundaries (using flags or a device such as a range limit device or range control warning device) that are more than 20 feet from the power line and prohibiting the operator from operating the equipment past those boundaries.

Alternative to 20 Foot Clearance (Table A): If you know the line’s voltage, you may use the minimum clearance distance in Table A in lieu of 20 feet. Table A provides:

<table>
<thead>
<tr>
<th>Voltage (nominal, kV, alternating current)</th>
<th>Minimum clearance distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 50</td>
<td>10</td>
</tr>
<tr>
<td>over 50 to 200</td>
<td>15</td>
</tr>
<tr>
<td>over 200 to 350</td>
<td>20</td>
</tr>
<tr>
<td>over 350 to 500</td>
<td>25</td>
</tr>
<tr>
<td>over 500 to 750</td>
<td>35</td>
</tr>
<tr>
<td>over 750 to 1,000</td>
<td>45</td>
</tr>
<tr>
<td>over 1,000</td>
<td>(as established by the utility owner/ operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)</td>
</tr>
</tbody>
</table>

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

One way to determine the line’s voltage is to ask the line’s owner or operator. The utility must respond to such a voltage inquiry within two working days.
Continued

If you use Table A to determine the minimum clearance distance, you must determine whether any part of the crane, load, or load line could get closer than the Table A distance to a power line if the equipment is operated up to its maximum working radius in the work zone.

If you determine that part of the crane, load, or load line could come closer to the power line than the required minimum clearance distance (either 20 feet or the Table A clearance), you must either de-energize and ground the line or take specified steps to maintain the required minimum clearance distance. These options will now be discussed.

De-energize and ground: De-energizing and visibly grounding the line will protect against electrocution and avoid the need for additional precautions. However, the employer must rely on the power line’s owner or operator to take these steps, and utilities are generally unwilling to de-energize their lines because doing so will cut off service to their customers. As a result, this precaution will usually not be available. You must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be de-energized and the line is visibly grounded at the worksite.

Steps you must take to maintain the required minimum clearance distance: You must take all of the following steps.

- Conduct an activity planning meeting with the crane operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.

- If tag lines are used, they must be non-conductive.

- Erect and maintain an elevated warning line, barricade, or line of signs equipped with flags or similar high-visibility markings at the minimum clearance distance. If the operator cannot see the elevated warning line, a dedicated spotter must be used to signal the operator that the crane is passing the marked line.

In addition, you must use at least one of the following precautions:

- A dedicated spotter (a worker whose only duty is to observe the clearance between the equipment and the line) who is in continuous contact with the operator.

- A proximity alarm set to give the operator sufficient warning to prevent encroachment.

- A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.

- A device that automatically limits the crane’s range of movement, set to prevent encroachment.

- An insulating link/device installed between the end of the load line and the load.

If you use a dedicated spotter, the dedicated spotter must be able to judge the distance between the equipment and the line and inform the operator if the equipment is getting too close to the line. Therefore, the spotter must:

- Be equipped with a visual aid (such as a clearly visible line painted on the ground or a clearly visible line of stanchions) to assist in identifying the minimum clearance distance.

- Be positioned to effectively gauge the clearance distance.

- Where necessary, use equipment that enables the spotter to communicate directly with the operator.
• Give timely information to the operator so that the required clearance distance can be maintained.

• Be trained to be able to perform his/her duties effectively.

Operation below power lines generally prohibited: No part of the equipment, load line, or load (including rigging and lifting accessories) is allowed below a power line unless:

• The employer has confirmed that the utility owner/operator has de-energized and visibly grounded the power line at the worksite, or

• The highest point of the equipment’s boom, even if completely extended and vertical, will be more than the required minimum distance from the power line.

Team Member Training: If the equipment contacts a power line, death or injury may be avoided if the workers in and on the crane know and understand the steps they can take to protect themselves. In general, the crane operator and any other person on the crane will be safe as long as they remain on the crane. The greatest danger is faced by a person who simultaneously touches both the crane and the ground, but a person who is near, but not touching, the crane can also suffer electric shock. To ensure that employees have the information they need to protect themselves, you must train each operator and crew member assigned to work with the equipment on how to avoid electrocution in the event the equipment contacts a power line. Such training must include:

• Information regarding the danger of electrocution if a person simultaneously touches the equipment and the ground.

• The importance to the operator’s safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.

• The safest means of evacuating from equipment that may be energized.

• The danger of the potentially energized zone around the equipment (step potential).

• The need for crew in the area to avoid approaching or touching the equipment and the load.

• Safe clearance distance from power lines.

• The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.

• How to properly ground equipment and the limitations of grounding.

Assembling a crane near a power line: The precautions described above for crane operations must also be taken when assembling or disassembling a crane near a power line. Under no circumstances may a crane be assembled or disassembled beneath an energized power line.
Precautions for moving equipment: A crane traveling with a load must comply with the minimum phase to ground clearance distance and associated precautions listed above. If the crane is traveling with no load, the following clearance distances must be maintained.

<table>
<thead>
<tr>
<th>Voltage (nominal, kV, alternating current)</th>
<th>While Traveling – Minimum clearance distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 0.75</td>
<td>4</td>
</tr>
<tr>
<td>over .75 to 50</td>
<td>6</td>
</tr>
<tr>
<td>over 50 to 345</td>
<td>10</td>
</tr>
<tr>
<td>over 345 to 750</td>
<td>16</td>
</tr>
<tr>
<td>over 750 to 1,000</td>
<td>20</td>
</tr>
<tr>
<td>over 1,000</td>
<td>(as established by the utility owner/ operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)</td>
</tr>
</tbody>
</table>

In determining whether the equipment will maintain the required clearance distance, you must take into account the effects of speed and terrain on the equipment’s movement (including movement of the boom/mast). In addition, if any part of the equipment can get closer than 20 feet to the line, you must use a dedicated spotter to observe the clearance and signal the operator in order to keep the required minimum clearance.
Power line contact is the largest single cause of fatalities associated with cranes.
Lifting a load over the corner produces the maximum ground bearing pressure. This is the most dangerous position to make a lift.*

Take into account any dynamic or impact loads. Rapid swinging of the machine or suddenly stopping the load will greatly increase the ground pressure.

*Example - A 30 to 50 ton rough terrain or truck crane picking over the corner with a capacity pick can exert 120,000 to 200,000 pounds of down pressure on one outrigger. Be sure to provide for adequate support of all outriggers.

Outrigger Blocking

Any blocking under the outrigger float should be at least three times larger in area than the float, it should be rigid and completely support the total area.

The ground pressure on a truck crane can be higher than those of a crawler crane due to the smaller total bearing surface area of the pads. For this reason always make sure the ground under the outrigger is firm enough to support the machine in a fully loaded condition.
Note: Always have firm compacted earth even when using outrigger blocking

1) Hoist line centered over the C.G. of the load

2) Know the weight of the load

3) Know the radius

4) Firm Support

5) Crane Level
Tagline Use Guideline

WHY DO WE USE TAGLINES? TO HELP CONTROL LOADS/MATERIALS SUCH AS:

- Controlling loads in windy conditions
- To keep long materials from swinging into the crane booms
- To keep loads/materials from swinging into power lines
- Maneuvering loads through or around tight spaces
- Anytime when working around traffic and pedestrians
- When performing steel erection
- When hoisting close to or onto scaffolds
- When hoisting suspended personnel platforms, if appropriate
- When a rotation of the load would be hazardous
- When working on any site when MSHA rules apply (tag lines on all loads)

TYPES OF MATERIALS USED AS TAGLINES:

- Nonconductive line: dry polypropylene rope only (when used around power lines)
- Do not use electrical extension cords, wire, air hoses or lanyards used for fall protection
- No loops, hooks or knots on the ends of taglines (they tend to catch on items)

LENGTH OF TAGLINES:

- Short enough so as not to get tangled on items being lifted over
- Long enough to handle bulky/long loads from the ground (100% control)
- Long enough to control a load when landing

SECURING TO LOADS:

- Use knots that can be easily untied
- Can use snap hooks on end of tagline to secure to load
- Tie to bolt holes in steel, to rigging on loads, or wrap around the loads

HANDLING TAGLINES:

- Do not wrap the tagline around your hands, arms or body (You may find yourself going up with the load. For the reason, you cannot unwrap the line as fast as the load was being lifted.)
- May need 2-taglines to control the load
  Example: Have a tagline on each end of a girder where one team member would be pulling in one direction and the second team member would guide the load in a different direction
- May need to wrap a tagline around a fixed object to control or secure the line

STORING TAGLINES:

- Coiled up in rigging storage area
- Inside compartments of cranes, boom trucks and other lifting equipment
- Send taglines with rigging
- Store & inspect taglines as part of your rigging
The following are examples of load measuring devices:

**LLX Range with Microprocessor**
- new design with new technology
- 9 models: 250 kg to 100 ton
- up to 250 hours operation
- push-button controls
- 100% tare
- peak hold
- automatic shutdown
- numerous other important features and improvements

![LLX Range with Microprocessor](image)

**Dynafor MWX range**
With its top eye and large bottom hook, the DYNAFOR MWX range is designed for check weighing and load measuring applications on overhead cranes. They use the same electronics as the LLX range. The DYNAFOR MWX models have a battery life of up to 700 hours.

**Options:**
- Model (MWX-IR) with infrared controls available on 2.5t, 5t, and 12.5t capacities, (ON/Off, tare, peak hold)
- Hand held display, with controls (ON/OFF, tare, peak hold)
- LED display available on 2.5t, 5t, and 12.5t capacities

![Dynafor MWX range](image)
9.10 Appendix J

<table>
<thead>
<tr>
<th>HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.</th>
<th>LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE MAIN HOIST. Tap fist on head; then use regular signals.</td>
<td>USE WHIP LINE. (Auxiliary Hoist) Tap elbow with one hand; then use regular signals.</td>
</tr>
<tr>
<td>RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.</td>
<td>LOWER BOOM. Arm extended, fingers closed, thumb pointing downward</td>
</tr>
<tr>
<td>MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly as shown in example)</td>
<td>RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.</td>
</tr>
<tr>
<td>LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.</td>
<td>SWING. Arm extended, point with finger in direction of swing of boom.</td>
</tr>
</tbody>
</table>
STOP. Arm extended, palm down, move arm back and forth horizontally.

EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.

TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

DOG EVERYTHING. Clasp hands in front of body.

TRAVEL. (Both Tracks) Use both fists, in front of body, making a circular motion, about each other, indicating direction of travel; forward or backward. (For crawler cranes only)

TRAVEL. (One Track) Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For crawler cranes only)

EXTENDED BOOM. (Telescoping Booms) Both fists in front of body with thumbs pointing outward.

RETRACT BOOM. (Telescoping Booms) Both fists in front of body with thumbs pointing toward each other.

EXTENDED BOOM. (Telescoping Boom) One Hand Signal. One fist in front of chest with thumb tapping chest.

RETRACT BOOM. (Telescoping Boom) One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.