
	SOP-130 (Ver. 4) Crane Safety Program
Standard Operating Procedure (SOP)	Effective: 1/25/2022 Supersedes: 11/02/2020
Approved By: James D. Herberg General Manager 	

I. Purpose

The Orange County Sanitation District (OC San) is committed to protecting our employees, contractors and the public from unsafe conditions and practices. The purpose of the Crane Safety Program is to define the work practices and inspection procedures to help ensure that operators of the cranes and hoists are protected from the potential hazards associated with the movement of equipment and material.

OC San employees may be required to operate cranes and related equipment as part of their job duties. To minimize risks to people and property OC San restricts the operation of all cranes to those persons who have been properly trained, authorized, or certified to operate cranes.

II. Background

Moving large, heavy loads is a crucial component of OC San's operation. Procedures have been developed for these operations, including careful training and extensive workplace precautions. There are significant safety issues to be considered, both for the operators of the diverse "lifting" devices, and for employees in proximity to them.

The Crane Safety Program applies to all OC San employees as well as contractors conducting crane work while on any OC San property. The intent of this program is to control crane hazards by ensuring the following:

- Equipment is maintained and operated according to manufacturer's recommendations.
- Responsible persons are trained.
- Safe work practices and safety regulations are followed.
- Environmental conditions affecting lift operations are monitored.
- Critical Lift Plans are developed for high hazard lifts.

This program must be understood and complied with by all persons charged with the responsibility of operating, servicing, and managing fixed and mobile cranes, and related equipment on OC San's behalf.

III. Definitions

Boom: A member section of a crane or derrick, the lower end of which is affixed to a mast, base, carriage, or support, and the upper end supports a hook or other end attachment. The

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length of the boom shall be taken as the straight-line distance between the axis of the foot pin and the axis of the end sheave pin.

Boom Stop: A device used to limit the angle of the boom at the highest position.

Bridge: Principal horizontal beam(s) of the overhead crane which supports the trolley.

Crane Operator: Any person operating a crane.

Critical Lift: A non-routine crane lift requiring detailed planning and additional or unusual safety precautions.

Counterweight: Weights used for balancing loads and the weight of the crane in providing stability for lifting.

Chart (Load): The manufacturer's minimum and maximum lifting limitations for any crane.

Designated Signal Person: An individual who is assigned to give recognized hand signals to the crane operator during any crane lifting operation.

Drum: The spool or cylindrical unit around which wire rope is wound to raise and lower loads.

Ground worker: An individual who performs a variety of duties to support crane lift operations including unskilled physical labor and specialized equipment operation.

Hoist (Boom): A hoist drum and rope reeving system used to raise and lower the boom.

Hold-Harmless Agreement: A contract under which the one party agrees to indemnify, defend, and hold harmless a second party, from and against all claims arising out of use of equipment.

Lifting Devices: Devices that are not normally reeved onto the hoist chain, wire rope, or web strap, such as grabs, and other supplemental devices used for ease of handling certain types of loads. The weight of these devices is to be considered part of the load to be lifted.

Lift Supervisor: Supervisor responsible for direct oversight of a crane lift operation, and ensuring the operation meets OSHA and regulatory requirements for inspection, personal qualification, and site preparations.

Load Chart: The manufacturer's absolute limitations of a crane based on structural strength and stability of the crane.

Mechanic: Performs technical duties and responsibilities in the maintenance, repair, service, and troubleshooting of cranes and other mobile equipment.

Mobile Crane: Hydraulic or lattice booms on wheeled or crawler-tracked undercarriages.

Outriggers: Support members attached to the crane's carrier frame which is used to raise the crane off the rubber wheels for increased capacity and stability.

Overhead Crane: Any hoisting device where the hook-and-line mechanism runs along a horizontal beam that runs along two rails or the hook-and-line mechanism runs along a cantilevered (jib) boom arm.

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Pendant Control: Suspended push button controls from crane to floor for operator control of functions.

Qualified Person: A person designated by the employer who by reason of training, has demonstrated the ability to safely perform all assigned duties and, when required, is properly licensed.

Qualified Rigger: A person who is trained to handle and move loads during a crane lift operation.

Rated Capacity: The maximum load values shown on a load chart for a particular crane configuration.

Reeving: Refers to a rope system in which the rope travels around drums and sheaves.

Safety and Health Supervisor: Supervises and coordinates activities and operations within the Risk Management Division at OC San.

Rated Load: The maximum load for which a hoist is designated by the manufacturer.

Rope: For all hoisting operations, any reference to rope will mean wire rope.

Sheave: A grooved wheel or pulley used with a rope or chain to change direction and point of application of a pulling force.

Shock Loading: A sudden or unexpected load that is imposed upon a crane, or related equipment.

Spotter: A safety observer whose sole task is observing and warning against the unsafe approach to hazards, such as overhead power lines.

Tower Cranes: A crane having a revolving boom with counterweight mounted on a vertical mast or tower.

Trolley: Carries drum and hoist mechanism and travels on the bridge rail.

IV. Responsibilities

A. Risk Management

1. Review the Crane Safety Program on an annual basis and revise it, as necessary.
2. Identify those who are authorized for their use.
3. Provide the technical assistance regarding the regulatory requirements of cranes, chains, slings, and hoists.
4. Provide or arrange for training for the safe operation of overhead cranes, and the inspection procedure for chains, slings, and hoists.
5. Review and approve critical lift plans

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6. Review and approve hold-harmless agreements for contractors using OC San bridge cranes.
7. Coordinate quarterly inspections for OC San rigging.

B. Lift Supervisors

1. Make sure Crane Operators and Riggers are properly trained and qualified.
2. Ensure that Crane Operators have satisfactory procedures for inspection of equipment.
3. Ensure that riggers are familiar with equipment manufacturer's procedures.
4. Coordinate communications between the crane operator and others working near the crane.
5. Thoroughly evaluate ground conditions, wind speed, overhead power lines, and develop a procedure or cancel crane lift operations in the event of severe weather warnings
6. Develop and follow a general lift plan or a written Critical Lift Plan.
7. Ensure that certifications for all cranes and operators on site are current.
8. Keep workers clear of hoisted loads.
9. Notify workers before a lift begins.

C. Crane Operators

1. Authorized crane, hoist, and sling operators shall be required to pass a written or oral examination and a practical operating examination offered by OC San unless they are able to furnish satisfactory evidence of qualifications and experience. Qualification shall be limited to the specific type of equipment for which the operator is examined. Crane training must be current at the time of use for the type of crane used.
2. Crane Operators shall be physically fit and thoroughly trained, competent, and not using any drug that could impair physical, visual, or mental reactions or capabilities, and must understand all the regulations regarding crane safety.
3. Read the operator manual for each crane operated.
4. Conduct and document pre-use inspection.
5. Use the crane manufacturer's load chart for each crane.
6. Know the weight of each load.
7. Follow the manufacturer's procedures for proper outrigger deployment.
8. Check the condition of the ground and blocking materials regularly.

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9. Check for overhead power lines and other obstructions.
10. Take into consideration, wind and temperatures when making any lift.
11. Respond to signals from the person who is directing the lift, or an appointed signal person.
12. The operator shall always obey a stop signal, no matter who gives it.
13. Do not use a crane for the purpose of pushing or pulling. Do not side load the crane beyond manufacturer recommendation.
14. Avoid hoisting, moving, or swinging suspended loads over or near workers.
15. Do not engage in any activity that diverts attention while operating the crane.
16. Stop and refuse to handle loads if there is a safety concern.
17. Never leave suspended loads unattended. In an emergency, if a load must remain suspended, ensure the area is clearly marked with signage and blocked on all four sides to prevent unauthorized access.

D. Spotters, Riggers, and Ground Workers

1. Use standard hand signals as identified in Attachment A of this program.
2. Be observant of hoisting operations in your work area.
3. Be observant and watch for signs of problems during each lift.
4. Check for overhead power lines and other obstructions.
5. Use rigging in accordance with manufacturers recommendations.
6. Never work or position yourself directly under a suspended load.
7. Use only slings or chains that are rated for the load being lifted.
8. Only use appropriate rigging devices for lifts.

E. Crane Mechanics

1. Be qualified to make adjustments and repairs.
2. Ensure all maintenance, inspections, and testing conducted is based on manufacturer's recommendations, and specific site conditions.
3. Seek approval in writing of crane manufacturer for any modifications of the crane that will change the structural or lift characteristics of the equipment.
4. Ensure all maintenance related inspections occur at frequency specified by the manufacturer, or Cal/OSHA.

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V. Standards and Practices

A. General Lifting Requirements

1. A competent person must visually inspect all lifting devices and equipment prior to use. Lifting operations shall not commence unless a visual assessment of the lift has been completed and the competent person has determined the lifting methods and equipment are safe and ready for use. If any deficiency is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard.
2. Load capacity charts recommended operating speeds, special hazard warnings, and other essential information shall be conspicuously posted in all cranes, hoists, and other equipment. The rated load capacity shall not be exceeded.
3. All crane load charts are to be clearly legible and in clear view from the operator's position. The rated load of a crane must be clearly marked on each side of a crane. Cranes shall have all required signage and decals on the crane body.
4. Hand signal charts must be either posted on the equipment or conspicuously posted in the vicinity of the hoisting operations.
5. Unless power lines are de-energized and visibly grounded, with confirmation from the utility owner, encroachment prevention measures must be implemented to prevent the crane from breaching a minimum clearance distance. For crane work near energized electrical lines up to 350kV, minimum clearance distance options are:
 - a. Maintain 20 feet distance; or
 - b. Determine the actual line voltage and implement encroachment prevention measures to maintain clearance using the table below.

VOLTAGE (NOMINAL, KV, ALTERNATING)	MINIMUM CLEARANCE (FEET)
UP TO 50	10
>50 TO 175	15
>175 TO 350	20
>350 TO 550	27
>550 TO 1,000	45
>1000	Established by Utility Owner/Engineer

- c. A proximity alarm shall be implemented to give the operator sufficient warning to prevent against encroachment. A dedicated spotter who is in continuous contact with the operator can also be used. The spotter shall be equipped with a visual aid to assist in identifying minimum distance.

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6. Proper barricades shall be placed around swing radius of cranes and other lifting equipment as appropriate. Maintain minimum clearance of 3 inches overhead and 2 inches laterally must be provided and maintained between the crane and any obstruction.
7. Where passageways, foot walks, or walkways exist, their placement must not present a hazard to employees when cranes are in use: Foot walks shall be of rigid construction and designed to sustain a distributed load of at least 50 pounds per square foot and shall be slip resistant. Elevated walkways must provide adequate fall protection through the installation of appropriate guardrail systems.
8. All personnel who are not involved with the lift shall be kept at a distance outside of the swing radius of the load. Hard hats, eye protection, safety vest, and safety footwear shall be worn.
9. Employees shall not work or walk under a suspended load, nor ride the ball or load.
10. Suspended loads shall be attended constantly unless they are physically secured to prevent unintended movement. The operator shall remain at the controls while the crane is being used or supporting a load.
11. All safety devices on the lifting equipment must be operational.
12. Clearance from obstructions: minimum clearance of 3 inches overhead and 2 inches laterally must be provided and maintained between the crane and any obstruction. Where passageways, foot walks, or walkways exist, their placement must not present a hazard to employees when cranes are in use: Foot walks shall be of rigid construction and designed to sustain a distributed load of at least 50 pounds per square foot and shall be slip resistant. Elevated walkways must provide adequate fall protection through the installation of appropriate guardrail systems.
13. Mobile cranes shall be uniformly level within one percent of level grade and located on firm footing. Ground bearing pressures shall be determined by Lift Supervisor.
14. Wind must not exceed the speed recommended by the manufacturer or, where manufacturer does not specify this information, the wind speed shall be determined by a qualified person.
15. The hoist chain or hoist rope shall be free from kinks or twists and shall not be wrapped around the load.
16. The load shall be attached to the load block hook by means of slings or other devices.
17. Care shall be taken to make certain that the load, sling, attachments, and load block clear all obstacles. The load shall be clear from any obstruction.
18. The load, sling, or lifting device shall be seated in the bowl of the hook. Hooks shall have an operational safety latch that fully closes.
19. The load shall be secured, balanced, and positioned in the hook, sling, or lifting device before the load is lifted more than a few inches.

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20. The hook shall be brought over the load in such a manner as to minimize swinging.
21. The load shall be moved in a slow and controlled manner. There shall be no sudden acceleration or deceleration of the moving load.
22. Cranes shall not be used for side pulls.
23. Exposed moving parts, such as gears, set screws, projecting keys, chains, and chain sprockets, which constitute a hazard under normal operating conditions, shall be guarded.
24. The load shall not be lowered below the point where two wraps of rope remain on each anchorage of the hoisting drum unless a lower limit device is provided, in which case no less than one wrap shall remain.
25. The load block should be lifted above head level for storage when the crane is not in use.
26. Mobile cranes are not to be moved when the boom is in the elevated or in a working position unless manufactured for pick and carry purpose.
27. When outriggers are used on mobile cranes, the outriggers shall be extended or deployed per the crane manufacturer's load and capacity chart specifications and set to remove the machine weight from the wheels.
28. When rotating a mobile crane, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radius at which it can be controlled. A tag or restraint line shall be used when rotation of the load is hazardous.
29. A fire extinguisher of not less than 10-ABC rating shall be kept in serviceable condition and readily accessible to the crane operator.
30. When hoisting personnel or using bridge as a work platform:
 - a. A full-body harnesses must be used for fall protection.
 - b. Personal fall arrest and positioning systems must be anchored to a substantial part of the equipment, as approved by the Critical Lift Plan.
 - c. Fall restraint systems must be anchored to any part of the equipment capable of withstanding twice the maximum load. A personal fall arrest system is permitted to be anchored to the crane's hook (or other part of the load line) when approved by a Critical Lift Plan.
31. Hoists shall not be operated by other than hand power of one operator. Hoists shall not be operated with an extension on the lever.

B. Inspections

1. Frequent Inspections

- a. Crane operators shall inspect each crane or hoist prior to each use, including observation during operation for any deficiencies that might appear between regular inspections.

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- b. Inspection records will be maintained with the crane for at least one year, after which they will be retained by Risk Management per retention schedule.
 - c. Any deficiencies shall be carefully examined, and a determination made as to whether they constitute a hazard. If adjustments or repairs are necessary, or any defects are known, the operator shall report this promptly to the appointed person.
 - d. Defective cranes must be removed from service and locked out of service until defects are corrected.
 - e. Frequent inspections shall include but not be limited to the following items:
 - 1) Operating mechanisms for proper operation, proper adjustment, and unusual sounds, such as, but not limited to, squeaking, grinding, grating, etc.
 - 2) Verify operation of the upper limit device(s) under no-load conditions.
 - 3) Tanks, valves, pumps, lines, and other parts of air or hydraulic systems for leakage.
 - 4) Hook attachment and securing means.
 - 5) Rope for proper spooling onto the drum(s) and sheave(s).
 - 6) Warning device(s) for proper operation.
 - f. The operator shall check the hoist brake(s) at least once each shift if a load is approaching the rated load. This shall be done by lifting the load a short distance and applying the brake(s).
2. Periodic (Quarterly/Annual) Inspections
- a. Mobile cranes, bridge cranes, and gantry crane periodic inspections will be completed by an OC San service provide that is qualified to perform such inspections. The service provider is overseen by the maintenance division.
 - b. Inspections are documented. Annual inspections results are to be submitted to Cal/OSHA.
 - c. At least every 12 months the equipment must be inspected by a qualified person. Disassembly is required, as necessary, to complete the inspection. The equipment inspection must include the equipment structure (including the boom and, if equipped, the jib), structural members (for deformed, cracked, or significantly corroded), bolts, rivets, and other fasteners (loose, failed, or significantly corroded), as well as inspected for cracked welds.
 - d. Periodic inspections will be completed four times each year. The annual certification can serve as one of the required periodic inspections.
 - e. These inspections shall include all items listed under frequent inspection, as well as:
 - 1) Noting any cracked, corroded, worn or loose members or parts.
 - 2) Noting and replacing loose bolts and tightening those bolts.

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- 3) Testing the limit indicators (wind, load, etc.), power plant and electrical apparatus.
 - 4) Examining the electrical apparatus for any signs of pitting, or any deterioration of controller contractors, limit switches, and push button stations.
 - 5) Travel distance steering.
 - 6) Testing the braking system for excessive wear on the lining, pawls, and ratchets.
 - 7) Hooks and cables.
 - 8) Bolts, rivets, and other fasteners: loose, failed or significantly corroded
- f. If any adjustments must be made to the unit, the crane will not be operated until all guards have been installed, all safety devices reactivated, and all maintenance equipment moved. If any defect is found, the crane will not be operated until the repair or adjustment is

3. Quadrennial (every four years) Proof Load Test

- a. Load test is conducted in accordance with requirements for periodic inspections.
- b. Load testing must be performed at no more than 125 percent of the rated load unless it is otherwise recommended by the equipment manufacturer.
- c. Inspections are documented. Load results are to be submitted to Cal/OSHA as part of annual inspection.

4. Rigging

- a. Each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a qualified person. Additional inspections shall be performed during sling use, where service conditions warrant. Damaged or defective slings shall be immediately removed from service.
- b. Rigging shall have affixed, legible markings with manufacturer safe working loads.

C. Signals

1. A designated signal person must be provided when the equipment travel is not in full view of the operator.
2. Only qualified persons shall be permitted to give signals. A stop signal may be given by any person.
3. A uniform signal system shall be used on all operations and if hand signals are used, they shall be clearly understood by the operator. Recommended hand signals are provided in Attachment A.
4. Signals must be suitable for the site conditions, and tested before beginning operations, if necessary.

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5. The operator must safely stop operations if the ability to transmit signals is interrupted.
6. When a device is used to transmit signals for one crane (or multiple cranes), it must be on a dedicated channel, and the operator must use a hand-free device for reception of signals.
7. Applicable hand signal charts (Attachment A) must be posted conspicuously on equipment or in the vicinity of the operations.

D. Lift Planning

1. General

- a. Each lift involving a bridge crane, mobile crane, hoist, or gantry shall be planned, hazards identified and controls, and overseen by the Lift Supervisor.
- b. A pre-lift meeting involving the participating personnel (i.e., crane operator, lift supervisor, rigger) must be conducted prior to making a lift.
- c. The Lift Supervisor shall be present at the lift site during non-critical or ordinary lift operations. If the lift is being made by only one person, the person assumes all responsibilities of the Lift Supervisor.

2. Critical Lifts

- a. Critical Lift is any lift with one or more of the following characteristics, which require additional planning requirements:
 - 1) Load is lifted over an occupied building.
 - 2) Lift meets or exceeds 75% of the crane's capacity at the given radius as posted in the load chart for the specific crane and its configuration (Note: applies to mobile cranes only).
 - 3) Lift requires two or more cranes.
 - 4) Lifting of 100,000 pounds or more.
 - 5) Lifts involving personnel platforms.
 - 6) Working within minimum distance from overhead power lines.
 - 7) Traveling with a lifted load.
- b. Critical lifts shall have the following additional planning requirements:
 - 1) A qualified person shall prepare a Critical Lift Plan. The qualified person preparing the plan may be the crane operator, lift supervisor, or designated rigger, and shall include the other qualified individuals in the lift plan.
 - 2) The plan shall be documented, and a copy provided to the contractor, resident engineer, and Risk Management for review prior to any critical lift.

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- 3) The plan shall be reviewed by, and signed by, all personnel involved with critical lift.
- c. The Critical Lift Plan shall include details of:
- 1) The make, model and capacity of the crane and a proof of current inspection and/or testing.
 - 2) Exact weight of the load to be lifted and all rigging components that adds to the weight.
 - 3) The manufacturer's maximum load limits for the entire range of the lift as listed in the load charts shall also be specified.
 - 4) The rigging plan shall show lift points, rigging procedures and the required lifting hardware.
 - 5) The plan shall describe ground conditions, outrigger, or crawler track requirements, and if necessary, the design of mats or cribbing.
 - 6) Weather conditions or environmental conditions under which lift operations must be stopped.
 - 7) Operational signaling, coordination and communication requirements for the lift operation.
 - 8) Any site obstructions (buildings, boom clearances, etc.).
 - 9) Drawings and any other detailed information required to ensure the safe and successful execution of the lift.
- d. Hoisting Personnel
- 1) The use of a crane to hoist employees on a personnel platform is prohibited, except when the use of conventional means of reaching the worksite, such as a ladder, stairway, aerial lift, elevating work platform or scaffold, would be more hazardous.
 - 2) In addition to the requirements for a Critical Lift Plan, the additional conditions for lifting personnel with a crane shall be:
 - a) Crane capacity must be reduced by 50%
 - b) Outriggers must be properly extended with crane leveled.
 - c) No lifts shall be made on an auxiliary load line while personnel are suspended on a platform.
 - d) Hooks used shall be of a type that can be closed and locked.
 - e) Bosun's (Boatswain's) chairs may be used instead of a personnel platform, if the employer can demonstrate to OC San Risk Management

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that use of a personnel platform is infeasible due to circumstances at the worksite.

- f) Fall Protection must be provided per Cal/OSHA 8 CCR 1670.

E. Rated Load and Other Markings

1. The rated load of the crane shall be plainly marked on each side of the crane. If the crane has more than one hoisting unit, each hoist and each hoist attachment should have the rate load clearly marked. The marking shall be legible from the ground or floor. The load shall not exceed the rated load of the crane or hoist.
2. The rated load of the hoist shall be marked on the hoist or trolley unit or its load block and shall be legible from the ground or floor.
3. Markings provided in Attachment B shall be included at equipment.
4. The load includes the total superimposed weight on the load block or hook and includes any lifting devices such as magnets, spreader bars, chains, and slings.
5. Every load that is lifted by a crane shall be well secured and properly balanced in a sling or other lifting device. Fleet Services Division or Risk Management shall be contacted regarding proper rigging.
6. A label shall be affixed on all electrical control enclosures. The label shall state that lockout/tagout is required before removing cover or servicing of equipment, as well as not to operate the crane without the cover in place.
7. For mobile cranes, a durable rating chart(s) with legible letters and figures shall be provided with each crane and attached in a location accessible to the operator while at the controls. The data and information to be provided on these charts shall include, but not be limited to, the following:
 - a. A full and complete range of manufacturer's crane load ratings at all stated operating radii, boom angles, work areas, boom lengths and configurations, jib lengths and angles (or offset), as well as alternate ratings for use and non-use of optional equipment on the crane such as outriggers and extra counterweights, which affect ratings.
 - b. A work area chart for which capacities are listed in the load rating chart.
 - c. Where ratings are limited by structural, hydraulic, or factors other than stability, the limitations shall be shown and emphasized on the rating charts.
 - d. In areas where no load is to be handled, the work area figure and load rating chart shall so state.
 - e. Recommended reeving for the hoist lines shall be shown.
 - f. If the weight of any portion of the hoist rope is required to be considered as part of the crane's lifted load, the method for determining such rope weight shall be provided.
8. No crane shall be loaded beyond the specifications of the load rating chart, except for test purposes. The load to be lifted shall be within the rated capacity of the crane in its

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existing configuration. When loads that are not accurately known are to be lifted, the designated person responsible for supervising the lifting operations shall ascertain that the weight of the load does not exceed the cranes ratings at the maximum radius at which the load is to be handled.

9. The rated load of the hoist shall be marked on the hoist or its load block and shall be legible from the ground. The hoist shall be marked with the manufacturer's identification information, on a plate or label attached to the hoist, or cast, forged, or stamped on the hoist.
10. Each control actuator shall be marked to indicate the direction of resistant movement.
11. The supporting structure or anchoring means shall have a load rating at least equal to that of the hoist.

F. Slings, Ropes, Cables and Other Attachments

1. Defective rigging shall be immediately removed from service and all defects or repairs needed shall be recorded.
2. Safety latches are required on all crane and spreader cable hooks (except for shakeout hooks that are used for their intended purpose).
3. Tag lines should be used unless their use creates an unsafe condition. Glove shall be worn when handling and using a tagline. Taglines shall be non-conductive.
4. Selection and installation of equipment on cranes must meet recommendations of the rope manufacturer, crane manufacturer, or a qualified person.
5. Rigging shall have:
 - a. Permanently affixed and legible identification markings as prescribed by the manufacturer that indicate safe working load, and
 - b. Shall not be loaded more than its recommended safe working load, and
 - c. Shall not be used without affixed, legible identification markings.
6. Rigging equipment, when not in use, shall be removed from the immediate work area so that it does not present a hazard to employees.
7. Rotational resistant ropes may be used at the discretion and under the guidance of a qualified person. Chain or wire rope slings shall not be shortened with knots, bolts, or other makeshift devices.
8. Slings shall be set to avoid slippage, be padded, or protected from the sharp edges of their loads, and slings used in a basket hitch shall have the loads balanced to prevent slippage.
9. All steel chain slings shall have a permanently affixed durable identification stating size, grade, rated capacity, reach, and inspection date. Worn or damaged alloy steel chain slings or attachments shall not be used until repaired. All steel chain slings with cracked or deformed master links, coupling links, or other components shall be

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removed from service. Alloy steel chain slings shall be permanently removed from service if heated above 1,000 degrees Fahrenheit (F).

10. Fiber core wire rope slings of all grades should be removed from service if they are exposed to temperatures more than 200 degrees F. Wire rope slings should be removed from service if any of the following are present:
 - a. Six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay.
 - b. Wear or scraping of one-third the original diameter of outside individual wires.
 - c. Kinking, crushing, bird caging, or any damage is noted.
 - d. Corrosion of the rope or end attachments.
 - e. There is evidence of heat damage.
 - f. End attachments are cracked, deformed, or worn.
 - g. It is determined that the hooks have been opened for more than 15 percent of the normal throat opening measure at the narrowest point or twisted 10 degrees from the plane of the unbent hook.

11. Metal mesh slings shall have permanently affixed to it a durable marking that states the rated capacity for a vertical basket and choker hitch loadings. If handles are used on metal mesh slings, the rated capacity must be at least equal to the metal fabric and exhibit no deformations after load testing. If handles are attached to fabric, they should be joined so that the rated capacity of the sling is not reduced, the load is evenly distributed across the width of the fabric, and the sharp edges will not damage the fabric. Metal mesh slings shall not be used to lift loads more than their rated capacities. Metal mesh slings which are not impregnated with elastomers may be used in a temperature range of -20F to 550F without decreasing the working load limit. If the sling is impregnated with other materials, then the sling manufacturer's recommendations must be followed. Metal mesh slings must be immediately removed from service, if any of the following conditions are present:
 - a. A broken weld or brazed joint along the sling edge.
 - b. A reduction in wire diameter of 25 percent due to abrasion or 15 percent due to corrosion.
 - c. Lack of flexibility due to distortion of the fabric.
 - d. A 15 percent reduction of the original cross-sectional area of metal at any point around the handle eye.
 - e. Distortion of the female handle so that the depth of the slot is increased more than 10 percent.
 - f. Distortion of either handle so that the width of the eye is decreased more than 10 percent.

12. Natural and Synthetic Fiber Rope Slings
 - a. Natural and synthetic fiber rope slings, except for wet frozen slings, may be used in a temperature range from -20F to 180F without decreasing the working load limit. For operations outside of this range, the manufacturer's recommendations should be followed. Fiber rope slings should not be spliced in any manner.

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- b. Natural and synthetic fiber rope slings shall be immediately removed from service if there is:
 - 1) Abnormal wear.
 - 2) Powdered fiber between strands.
 - 3) Variations in the size or roundness of strands.
 - 4) Discoloration or rotting.
 - 5) Distortion of hardware in the sling.
 - c. Only fiber rope slings made from new rope shall be used. Use of repaired or reconditioned fiber rope slings is prohibited.
 - d. Each sling should be marked or coded to show the rated capacities for each type of hitch and type of synthetic web material.
 - e. Nylon web slings should not be used where there are fumes, vapors, sprays, mists, or liquids of acids or phenolic present.
 - f. Polyester and polypropylene web slings shall not be used where there are fumes, vapors, sprays, mists, or caustics present.
 - g. Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists, or liquid caustics are present.
 - h. Synthetic polyester web slings should not be used with temperatures more than 180F. Polypropylene web slings should not be used at temperatures more than 200F.
 - i. Synthetic web slings shall be immediately removed and destroyed if there are:
 - 1) Acid or caustic burns.
 - 2) Melting or charring of any part of the sling surface.
 - 3) Snags, punctures, tears, or cuts.
 - 4) Broken or worn stitches.
13. Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.
14. Job or shop hooks and links, or makeshift fasteners, formed from bolts, rods, etc., or other such attachments, shall not be used.
15. Shock loading is prohibited.
16. Only use slings with permanent affixed identification markings that show the maximum load for each sling.

G. Bridge Crane Service Platforms (if provided)

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1. The dimension of the working space in the vertical direction from the floor surface of the platform to the nearest overhead obstruction shall be a minimum of 48 inches at the location where a person is performing a function while on the platform.
2. Service platforms shall have a clear passageway at least 18 inches wide, except at the bridge drive mechanism where no less than 15 inches of clear passageway shall be allowed.
3. The dimension of the working space in the direction of access to live (energized) electrical parts that are likely to require examination, adjustment, servicing, or maintenance while energized shall be a minimum of 30 inches.
4. The door(s) of electrical control cabinets shall either open at least 90 degrees or be removable.
5. Service platforms shall have a slip-resistant walking surface.
6. Surface platforms shall be provided with guard railings and toe boards.
7. Guard railings shall be at least 42 inches high and shall be provided with an intermediate railing.

H. Contractor Use of Bridge Cranes

1. The contractor must complete and submit OC San's Contractor Release, Waiver of Liability, and Indemnity Agreement to Risk Management for approval.
2. The contractor must submit training verification to Risk Management for use of OC San bridge crane. OC San requires that contractors demonstrate that they have an awareness of safe crane operation. A letter stating that those operating the crane are trained, competent, and qualified to operate the designated crane is sufficient. This letter must be signed by the crane operator's supervisor.

I. Training

1. Crane Operators

- a. Cranes shall only be operated by qualified personnel certified by an accredited certifying entity, such as the National Commission on the Certification of Crane Operators (NCCCO). In addition, they shall only be operated by the following:
 - 1) Designated and trained persons
 - 2) Trainees under the direct supervision of a designated person
 - 3) Maintenance and test personnel when it is necessary in the performance of their duties
 - 4) Crane inspectors
 - 5) No one other than personnel specified above shall enter a crane cab or pulpit, apart from persons such as supervisors, whose duties require them to

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do so, and then only in the performance of their duties and with the knowledge of the operator or other appointed personnel.

- b. Operators of mobile cranes above 7.5 tons lifting capacity, or 25 feet of boom must carry certification during crane operation. In cases where other personnel (e.g., contractors) will be using these devices, they shall be similarly trained. The certification exemption for cranes less than 7.5 tons applies to maintenance tasks for general industry, not construction tasks as defined by OSHA. An employee who is not certified is allowed to operate equipment over 7.5 tons and a boom longer than 25 feet, only as an Operator-in-Training.
- c. Each OC San employee (i.e., rigger, signal person, and spotter) involved in crane operations must be trained in the hazards associated with crane hoist/lifting operations. Training shall include a classroom and practical examination covering, at minimum, the following topics:
 - 1) General Crane Safety,
 - 2) Performing Crane Inspections,
 - 3) Attaching, raising, lowering, and moving loads,
 - 4) Hand signals,
 - 5) Overhead power line awareness,
 - 6) Crush/pinch points prevention,
 - 7) Fall Protection, and
 - 8) Lockout/Tagout procedures.
 - 9) Training on specific controls for the crane, slings used with loads, and handling instructions.
 - 10) Each employee must be evaluated (e.g., tested) on the training topic to ensure the training provided is understood.

2. Designated Signal Persons

a. A Designated Signal Person shall:

- 1) Complete training from qualified trainer (mobile and tower cranes only).
- 2) Know, understand, and be competent in the types of signals used.
- 3) Have a basic understanding of the equipment operation and limitation.
- 4) Be competent in the Standard Methods for hand signals, understand signal person requirements contained in Attachment A.

3. Qualified Riggers

a. A Qualified Rigger shall:

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- 1) Be trained in the selection, inspection, and rigging practices for the rigging devices used.
 - 2) Demonstrate the ability to solve problems related to rigging loads.
 - 3) Appropriately trained for hazards (e.g., confined space) encountered during rigging operation.
4. Mechanics Performing Maintenance
- a. A Mechanic performing maintenance on a crane shall:
 - 1) Operate equipment only when, operation is critical for a maintenance task.
 - 2) Be familiar with the equipment or operate under the direct supervision of a qualified operator.
 - 3) Be qualified to perform maintenance on the equipment.

VI. Recordkeeping

All records created or generated during this procedure shall be legible and stored in a way that they are readily retrievable in facilities or electronic document/content management systems that provide a suitable environment to prevent damage, deterioration, or loss. Records may be in the form of any type of media, such as hard copy or electronic media. The OC San Records Retention Schedule is the official procedure governing the retention, retirement, and destruction of District records. Document owners should use these schedules to determine the item and series that best fit their records. Document owners are responsible for ensuring that documents are properly marked, indexed, and filed for their projects or area of responsibility.

VII. References

Cal/OSHA, Title 8 Sections 4884 -5048, General Industry Safety Orders.

Cal/OSHA, Title 8 Sections 1604-1619.4 and 1718, Construction Safety Orders.

American Society of Mechanical Engineers (ASME) B30.17-2006 and B30.2 -2011, Overhead and Gantry Cranes.

American Society of Mechanical Engineers (ASME) B30.5-2007, Mobile and Locomotive Cranes.

American Society of Mechanical Engineers (ASME) B30.9-2010, Slings.

American Society of Mechanical Engineers (ASME) B30.10-2009, Hooks.

American Society of Mechanical Engineers (ASME) B30.23-2011, Personnel Lifting Systems.

American Society of Mechanical Engineers (ASME) B30.16-2009, Overhead Hoists (Underhung).

OSHA Standard Interpretation of 1910.179, Use of Bridge and Gantry Cranes as Work Platforms, 4/6/93, and Guidelines for Platforms and Walkways on Cranes, 3/24/99.

Subject: **Error! Reference source not found.**

VIII. Revision History

Version	Date	By	Reason
1.0	01/15/2013	Collins, Rodney	New
2.0	09/21/2015	Davis, Heather	Arcadis recommendations implemented.
3.0	08/06/2020	Hachim, Sabrina Frattali, John	Periodic Update – Refer to Program Change Log
4.0	12/07/2021	Stone, Jereme	Annual Program Update – Refer to Program Change Log

ATTACHMENT A

Figure A-1: Recommended Hand Signals for Controlling Crane Operations

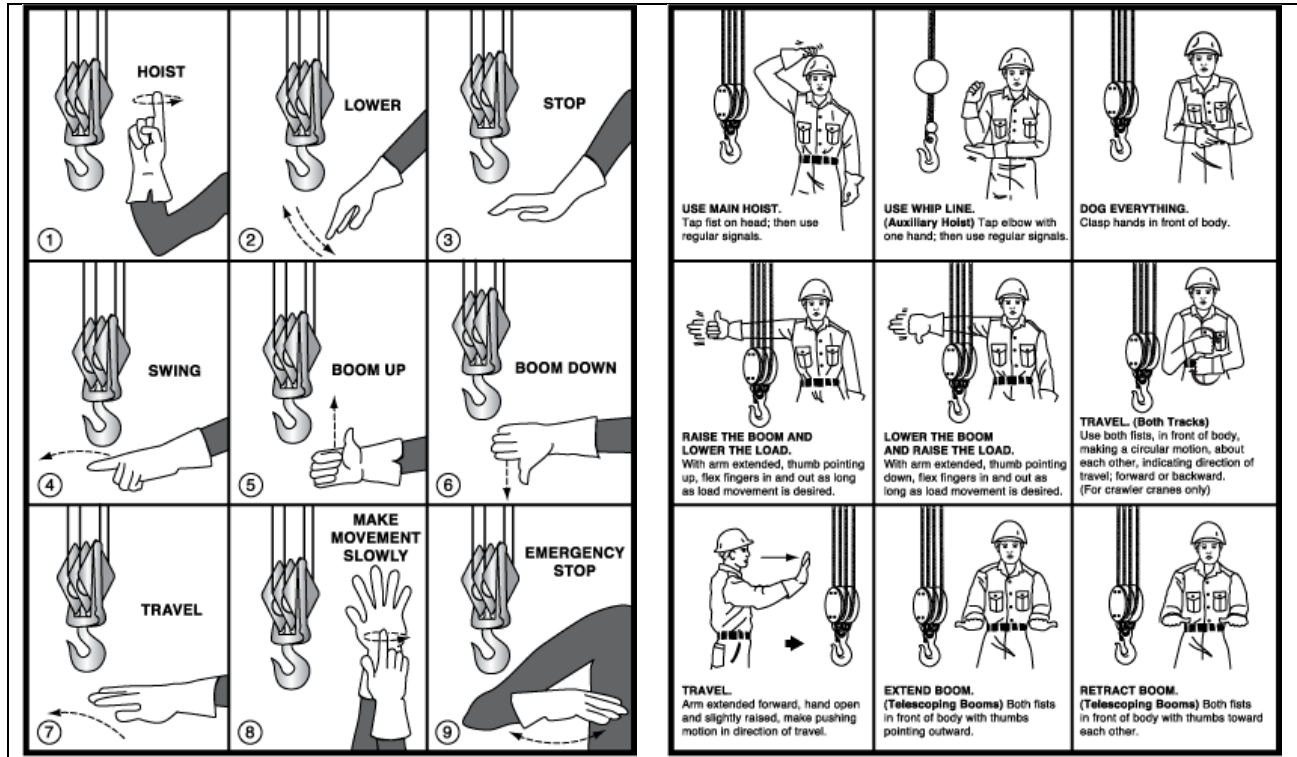


Figure A-2: Recommended Hand Signals for Boom Equipment Operations







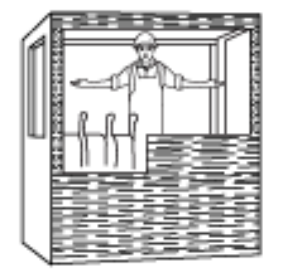



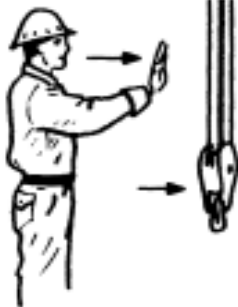



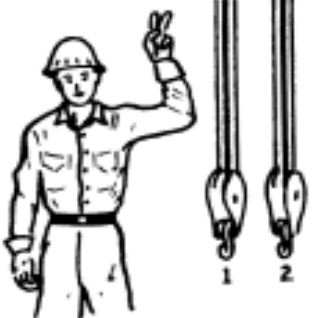


 <p>EXTEND BOOM. (Telescoping Boom) One Hand Signal. One fist in front of chest with thumb tapping chest.</p>	 <p>RETRACT BOOM (Telescoping Boom). One Hand Signal. One fist in front of chest. Thumb pointing outward and heel of fist tapping chest.</p>	 <p>OPEN (Clamshell). Arm extended. Open hand slowly.</p>
 <p>CLOSE (Clamshell). Arm extended. Close hand slowly.</p>	 <p>TROLLEY TRAVEL Palm up. Fingers closed. Thumb pointing in direction of motion. Jerk hand horizontally.</p>	 <p>BRIDGE TRAVEL Arm extended forward. Hand open and slightly raised. Make pushing motion in direction of travel.</p>
 <p>MAGNET IS DISCONNECTED. Crane operator spreads both hands apart—palms up.</p>	 <p>MULTIPLE TROLLEYS. Hold up one finger for block marked "1" and two fingers for block marked "2." Regular signals follow.</p>	

Figure A-3: Recommended Hand Signals for Overhead Crane Operations

 <p>HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.</p>	 <p>LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.</p>	 <p>BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.</p>
 <p>TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.</p>	 <p>STOP. Arm extended palm down, move arm back and forth.</p>	 <p>EMERGENCY STOP. Both arms extended palms down, move arms back and forth.</p>
 <p>MULTIPLE TROLLEYS. Hold up one finger for block marked "1" and two fingers for block marked "2". Regular signals follow.</p>	 <p>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 shown as example.)</p>	 <p>MAGNET IS DISCONNECTED. Crane operator spreads both hands apart palms up.</p>

ATTACHMENT B

Safety Devices and Operational Aids

The following safety devices and operational aids are required on all cranes covered by this policy, except gantry and overhead cranes, and cranes with less than 1-ton lift capacity. In addition, boom hoist limiting devices are not required for mobile cranes with a rated capacity of 3 tons or less.

Safety / Operational Device	Mobile Crane		Overhead & Gantry	
	Hydraulic	Lattice	Traveling	Stationary
horn/ warning device	x	x	x	
crane level indicator	x	x		
check valve on jacks	x	x		
load weighing device	x	x		
outrigger position sensor	x	x		
load chart	x	x	x	x
load moment indicator	x	x		
drum rotation indicator	x	x		
boom length indicator	x	x		
boom angle indicator	x	x		
boom hoist limiting device *	x	x		
boom stop		x		
anti-two block device	x	x		
locks on foot brake	x	x		
jib limiting device	x	x		
jib stop	x	x		
jib angle indicator	x	x		

* Boom hoist limiting devices are not required for mobile cranes with a rated capacity of 3 tons or less.