Mobile Crane Safety

Overview

Purpose	This procedure outlines the minimum safe work requirements for lifting practices and operating mobile cranes at Marathon Los Angeles Refinery (LAR).
Scope	This Standing Instruction applies to Marathon (MPC) and contract employees at LAR locations, including the offsite locations, e.g., Blue Barn, Calciner, Sulfur Recovery Plant and Watson Cogen
Out of Scope	A deviation from this instruction must be approved by the LAR Safety Department.
Records Retention	Printed copies of this document should not be retained more than 12 months. Any revision to this document will be retained a maximum of 10 years following the revision.

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1.0 References

1.1 Refining References

Number	Description
HSS-201	Safe Work Permitting
HSS-202	Stop Work Authority
HSS-603	Mobile Crane Suspended Personal Platform
MNT-RIG-023	Inspection and Maintenance Requirements for Rigging & Hoisting
MNT-RIG-024	Inspection & Maintenance Requirements for Fixed and Mobile Cranes

1.2 Industry References

Number	Description
ASME B30.5	Mobile and Locomotive Cranes
ASME B30.23	Personnel Lifting Systems
ANSI/ASSE A10.42-2000 (R2010)	Safety Requirements for Rigging Qualifications and Responsibilities.

1.3 Regulatory References

Number	Description
CAL/OSHA Title 8 CCR GISO Group 13	Cranes and other Hoisting Equipment (Sections 4884 – 5049)
CAL/OSHA Title 8 CCR CSO Article 15	Cranes and Derricks in Construction (Sections 1610 – 1619.5)
CAL/OSHA Title 8 CCR ESO Group 2 Article 37	Provisions for Preventing Accidents Due to Proximity to Overhead lines (Sections 2946 - 2949)
OSHA 29 CFR 1926 Subpart CC	Cranes and Derricks in Construction (Sections 1926.1400 – 1926.1442 including App A, B & C)

1.4 Terms

The following terms are used in this document:

- Articulating Crane
- Assembly / Disassembly (A/D)
- Assembly / Disassembly Director
- Audible Signal
- Bird Caging
- By-Pass Key
- Certificating Agency
- Certified Crane Operator
- Choker Hitch
- Competent Person
- Construction Work
- Construction Safety Orders (CSO)
- Cribbing (also referred to as “Blocking”)
- Critical Lifts
- D/d Ratio
- Dedicated Spotter (power lines)
- Encroachment
- Escort
- Fall Zone
- Flexible Intermediate Bulk Container (FIBC)
- General Industry Safety Order (GISO)
- Ground Conditions
- Grounding & Bonding
- Hitch
- Kink
- Lifting/Hoisting Equipment
- Lifting Technical Authority
- Lift Director
- Lift over live process
- Lift Plan
- Load
- Load Chart
- Non-Conductive
- Operational Aids
- Power Lines
- Prohibited Zone
- Qualified Crane Operator
- Qualified Person
- Qualified Rigger
- Qualified Signalperson
- Radius
- Rated Capacity/Load
- Reeving
- Routine Maintenance Lift
- Shackle
- Side Load
- Signal Person(s)
- Site Lift Foreman
- Sling

- Softener
- Sorting Hook
- Suspended Personnel Platform
- Swing/Crush Hazard Area
- Synthetic Sling Shackle
- Tandem Lift
- Tilt up or tilt down operation
- Total Gross Load
- Two-blocking
- Vehicle Spotter
- Wire rope
- Work Zone

Reference: For details, see Appendix A: Terms and Definitions.

2.0 Roles and Responsibilities

2.1 Roles and Responsibilities

The table below describes the roles and responsibilities related to this document.

Roles	Responsibilities
2.1.1 Security	a. The gate security guard shall notify the Lifting Technical Authority/Rigging Department Foreman of cranes entering the Marathon Los Angeles Refinery.
2.1.2 Safety Manager, or designee	a. Shall approve all critical lifts.
2.1.3 Operations Specialist	a. Shall approve lifts greater than 50,000 pounds over live process lines or equipment in their area.
2.1.4 Site Lifting Technical Authority (LTA), or designee	a. Provide technical advice and ensures that the site practices are followed. b. Approve all cranes before conducting the first lift. c. Ensure that all mobile cranes have current state certification documentation. d. Approve and authorize all Critical Lift Plans. e. Participate in investigation of incidents, accidents, near misses or dangerous occurrences associated with lifting operations. f. Conduct random checks to verify that certified Crane Operators have in their possession current proof of certification. g. Conduct random checks to verify that mobile crane lifting activities are performed in accordance with this standing instruction. h. Ensure a system is in place to document the inspections, repairs and testing requirements for all MARATHON-owned lifting devices and equipment.
2.1.5 Garage / Rigging / Contractor Crane Representative	a. Ensure mobile cranes are in safe working order per manufacturer's specification and Federal, State and Local regulations prior to use. b. When notified in writing by the Crane Operator of a deficiency, shall notify all affected employees, at the beginning of each shift, of the deficiencies and, if applicable, alternative measures. c. Ensure that crane maintenance is performed by a qualified person.

2.1.6 Rigging Site Foreman	a. Designate a qualified person as the Lift Director (ASME B30.5) and verify that the area for the crane is adequately prepared. b. The preparation includes, but is not limited to, the following: • Access roads for the crane and associated equipment. • Allow sufficient room to assemble and disassemble the crane. • Ensure that the ground is level and will support the crane and lift. • Evaluate potential sub-surface hazards, excavations, slopes, and underground utilities that would create a hazard prior to set up and crane operation. • Ensure that the crane setup and operation is not in close proximity to power lines. • Ensure crane placement will not require the load to pass over Life Support Systems, such as catalyst life support trailers and active fresh air bottles. • Designate a qualified person (Assembly/Disassembly [AD] Director) to supervise the assembly and disassembly of a crane. • Verify that Crane Operators meet the requirements of a qualified or certified Operator. • Address environmental conditions that may adversely affect crane operations. Such as wind velocity, heavy rains, fog and lightning. • Address safety concerns raised by the crane operator, or any person involved in the lift. • Ensure that all necessary precautions are implemented and followed prior to and during critical lifts and pick & carry operations (if allowed by manufacturer).
2.1.7 Assembly / Disassembly (A/D) Director	a. Assembly/disassembly shall be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons (“A/D Director”). b. Where the assembly/disassembly is being performed by only one person, that person shall meet the criteria for both a competent person and a qualified person. For purposes of this standard, that person is considered the A/D Director.

	c. When assembling or disassembling cranes and their attachments, the A/D Director shall ensure compliance with the manufacturer's prohibitions so that exposure to workers of the unintended movement or collapse is minimized. d. The A/D Director shall understand and review the manufacturer's procedure with the crew prior to the assembly and disassembly operation. e. The A/D Director shall communicate with the crew their tasks, the hazards associated with their tasks, and the hazardous positions and locations to avoid. f. During the Pre-Lift meeting, the A/D Director shall discuss with the crew the crane's load chart and limitations during the A/D Operation.
2.1.8 Lift Director	a. Be a qualified rigger. b. Hold a pre-lift meeting. c. Ensure that all loads are rigged by a qualified rigger or a trainee under the direct visual supervision of a qualified rigger. d. Ensure that all personnel understand their responsibilities, assigned duties, hazards and controls involved in crane operations. e. Designate the qualified Signalperson(s). f. Stop crane operations if alerted to an unsafe condition. g. Ensure the lifting area is prepared to support crane operations and is barricaded to prohibit non-essential personnel and traffic from entering the lift area. h. Inform the Crane Operator of the weight of the load. i. Ensure that all lifting and rigging equipment is appropriate for the task and inspected before use. j. Ensure that the load is properly rigged and balanced over the center of gravity before it is lifted more than a few inches. k. Ensure that the lift plan is followed, and all necessary controls are in place prior to the start of the lift. l. Understand and avoid the Swing/Crush Hazard Area.

2.1.9 Rigger	a. Be qualified to rig the object that is to be lifted. b. Ensure the fall zone is barricaded to prohibit non-essential personnel and traffic from entering the lift area. c. Ensure that the load is properly rigged and balanced over the center of gravity before it is lifted more than a few inches. d. Be responsible for pre-use, during-use and post-use inspection of rigging equipment and remove any defective equipment from service. e. Ensure that the lift plan is followed, and all necessary controls are in place prior to the start of the lift. f. Understand and avoid the Swing/Crush Hazard Area. g. Know the safe working capacity and limitations of all rigging equipment and do not exceed these limits. h. Stabilize the load with blocks, chocks, or other means before disconnecting. i. Stay out from under suspended loads.
2.1.10 Crane Operator	a. Be qualified or certified for the type of crane to be operated. b. Understand and apply the information contained in the crane manufacturer's operating manual, (i.e., knowing and following the procedures specified by the manufacturer for assembly, disassembly, set up, load/capacity chart and reeving the crane). c. Understand and avoid the Swing/Crush Hazard Area. d. Perform documented frequent and periodic inspections using the manufacturer recommendations and Marathon Inspection & Maintenance Requirements for Mobile Cranes. e. Promptly report, in writing, the need for adjustments or repairs to supervision and document in the crane logbook for the next crane operator to review. f. Remove the crane from service when defective components create an imminent safety hazard, until repaired, replaced or adjusted. g. Verify that the crane is level and set up properly and has the necessary lifting capacity to perform the proposed lifting operations in the planned configuration. h. Ensure the crane is grounded or bonded, for static electricity. i. Obey stop or emergency stop signal at all times, no matter who gives it.

	j. Keep the load under control at all times and prevent it from contacting people, the crane, and/or other equipment and structures. Do not swing a load over any person or occupied building or facility. Refer to CAL/OSHA Title 8 CSO for exceptions. k. Secure crane, as described in Section 9.4, before leaving crane unattended. l. Crane operators shall not operate a crane when physically or mentally unfit. m. OSHA states crane operators shall do monthly wire rope inspections.
2.1.11 Signal Person	a. Know, understand and be competent in the application of the standard signals for mobile cranes as specified in ASME B30.5 Section 5-3.3. and the "Hand Signal" section in CAL/OSHA 1617.1 b. Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads. c. When using a radio, maintain constant communication with the Crane Operator on a dedicated channel. d. Be able to communicate with the Crane Operator and Lift Director. e. Know the load path. f. Assure the load does not swing over any personnel. Refer to CAL/OSHA Title 8 CSO for exceptions.
2.1.12 Tag Line Person	a. Assist with controlling the load. b. Keep the tag line free of knots, fraying, and prevent it from catching on other objects. c. Stay out from underneath the load as well as away from any position that the load could fall. d. When working within one boom's length of the energized power line prohibited zone, shall ensure tag lines are clean, dry and non-conductive.
2.1.13 Training	The Learning and Development Department shall • Manage the training of the Marathon personnel that conduct lifting operations to the latest ASME B30.5 Mobile Crane & Locomotive Standard and CAL/OSHA Title 8 regulations for cranes used in Construction and General Industry work. • Maintain Marathon personnel training frequency cycles and their training records.

2.1.14 Contract Companies	Contract Companies and their subcontractors, performing work and or lifts, are subject to all parts of this document and are responsible for meeting and following these requirements: • Shall train personnel that conduct lifting operations to the latest ASME B30.5 Mobile Crane & Locomotive Standard and CAL/OSHA Title 8 regulations for cranes used in Construction and General Industry work. • Shall ensure that all employees involved in lifting operations carry documentation of training. • Ensuring that qualified contract employees at LAR that perform Rigging and Signal Person tasks have an identifying sticker on the exterior of their hard hat. • Contractors are responsible for reviewing and understanding all crane and rigging requirements specific to the site/area in which they are working.

3.0 Lift Planning

3.1 Standard Lifts

3.1.1 The standard lift at a minimum, shall address the following

3.1.2 Identify the size, shape, weight, and center of gravity of the object(s) to be lifted.

3.1.3 Select the proper rigging equipment and the method for connecting and disconnecting the load.

3.1.4 Identify the lifting radii at the pick and set locations.

3.1.5 Select the correct size of the crane for the load to be lifted.

3.1.6 Job site conditions. Examples include obstructions, ground conditions, crane access, SIMOPS, and nearby equipment (e.g., live process equipment, overhead power lines)

3.1.7 Environmental conditions

3.1.8 Identify and establish roles and responsibilities of the work crew.

3.1.9 Communication method agreed to by the Crane Operator, Rigger, and Signalperson (i.e., radio, hand signals, etc.).

3.1.10 A contingency plan for emergencies related or unrelated to the lifting operation.

3.1.11 Lift area (fall zone) is clear of non-essential personnel and is properly barricaded.

3.2 Critical Lifts

3.2.1 Critical lifts shall require a written plan with required documents

3.2.2 Critical lifts include any lift with complex, critical, or additional risks above and beyond the norm.

3.2.3 Examples of critical lifts include, but are not limited to the following:

a. Lifts near energized power lines

b. Lifts over 75% of the crane's rated capacity

c. Lifts using multiple cranes

d. Lifts over 50,000 lbs. and over operating units or live pipelines

e. Suspended personnel platform lifts (Refer to HSS 603).

f. Proof Load Testing for state certifications and after repairs

g. Any lift over 100,000 lbs.

3.3 Critical Lift Plan

3.3.1 Critical Lifts shall meet all requirements of standard lifts and shall have all documents listed in Appendix B**.** The critical lift plan, shall be reviewed, approved, and signed by the Safety Manager and LTA.

3.4 Pre-Lift Meeting

3.4.1 For a Critical Lift, at a minimum, the meeting shall be attended by the LTA (or designee), Permit Cosigner, Crane Operator, work crew, and Owning Department Representative.

3.5 Plan Changes

3.5.1 All changes in the planned rigging shall be approved and documented on the Lift Plan by the LTA.

a. If the rigging identified in the plan is not available at the time of the lift, then the proposed rigging shall be equivalent or have a higher rated capacity than the rigging in the plan.

b. If, during the course of the lift, any of the parameters identified on the critical lift plan worksheets are found to be underestimated, (i.e., load weight, angle, radius, etc.), the lift will be immediately stopped. The critical lift meeting will be reconvened to determine the appropriate course of action.

c. Upon starting the job, any change to the lifting plan requires the crew to stop the job and hold a team meeting.

d. In the event that a load is modified (structurally or weight) from the time the initial load calculations were performed and the time it is to be lifted, the Lift Director shall re-assess the changes to ensure all requirements within this standard are met. Examples of this would be when fixed ladders, platforms, piping and other hardware is installed prior to the lift being made, but after the load calculations were completed.

e. Record plan execution feedback and lessons learned on the Critical Lift Plan Lessons Learned form.

f. Completed forms shall be maintained by the Marathon Rigging Department.

3.6 Contractors	3.6.1 Contractors may use their own "Lift Plan Worksheets", provided they meet the intent of this standing instruction and all state and federal requirements. 3.6.2 If the Contractor "Lift Plan Worksheets" Do Not meet the MPC requirements, then a completed LAR Marathon Critical Lift Plan is required. 3.6.3 Following the lift, the completed worksheet, along with other records pertaining to the job, is to be filed with Marathon.

4.0 General Crane Safety

4.1 Ground Requirements and Sub-Surface Conditions	4.1.1 The crane shall not be assembled or operated unless ground conditions are firm, drained, and graded to a sufficient extent to meet the equipment manufacturer's specifications for support and degree of level. 4.1.2 The crane ground bearing pressure must be determined and must not exceed the guidelines listed below: a. Concrete 3,000 pounds per square foot (PSF) b. Asphalt 2,000 PSF c. Dirt or gravel 1,000 PSF 4.1.3 Marathon Engineering shall approve ground bearing pressures that exceed the limitations in 4.1.2.
4.2 Cribbing / Matting	4.2.1 Outrigger Mats/Cribbing shall be used for all mobile crane operations. 4.2.2 Outrigger Mats/Cribbing shall be sized to meet the requirements in this standing instruction. 4.2.3 Outrigger mats / cribbing shall be sized to meet the pounds per square foot for the supporting surfaces. 4.2.4 Crane mats made of hard wood timbers shall be through bolted to secure them together to act as a single unit.
4.3 Outrigger Supports	4.3.1 Outriggers and stabilizers must be visible to the crane operator or to a signal person during extension, setting and retraction. 4.3.2 Be strong enough to prevent crushing. 4.3.3 Be free from defects. 4.3.4 Be of sufficient width and length to prevent settling, shifting or toppling under load.
4.4 Safety Devices	4.4.1 Boom stops to resist the boom falling backwards. (Except Derricks and Hydraulic). 4.4.2 Boom hoist disconnects shutoff, or hydraulic relief to automatically stop the boom when it reaches a pre-determined high angle. 4.4.3 Boom angle or radius indicator and boom length indicator (for all telescopic booms) readable from the operators' station 4.4.4 Crane level indicator 4.4.5 Jib stops

4.4.6 Equipment with foot pedal brakes

4.4.7 Hydraulic outrigger jacks and hydraulic stabilizer jacks shall have an integral holding device/check valve

4.4.8 Horn

a. Crane operation shall not begin unless all of the safety devices are in proper working order. If a safety device stops working properly during operations, the crane operator shall safely stop operations.

4.5 Operational Aids

4.5.1 The following operational aids are required on all mobile cranes:

a. Anti-two-block device (A2B) for all points of potential two-blocking, e.g., jibs, boom extensions, and main boom.

b. Load indicator and/or a rated capacity limiter.

c. Hook latches on all crane hooks.

d. Guards fastened and capable of supporting the weight of a 200-pound person on all exposed moving parts that constitute a hazard under normal operating conditions.

e. Fire extinguisher of not less than 10-B: C rating. It shall be kept in serviceable condition readily accessible to the operator station and affected people shall be familiar with its use.

- Crane operation shall not begin unless the listed operational aids are in proper working order, except where an operational aid is being repaired the employer uses temporary alternative measures as specified by the manufacturer.

4.6 Environmental Conditions

4.6.1 Environmental conditions may prevent lifting operations from occurring

a. No lifts shall be made during inclement weather conditions (i.e., strong wind, heavy rains, thunder, electrical storms and fog) that may affect the safe operation of the crane.

b. When possible, hydraulic crane booms shall be retracted and lowered to the ground during electrical storms, high wind conditions and when recommended by the manufacturer.

c. No lifts shall be made when lightning is detected (within 6 miles).

d. Wind speeds above 20 mph, all crane lifts shall be stopped, lifting conditions re-assessed and require approval from the LTA or their designee to continue the lifting operations.

e. When wind speeds reach 30 mph, including gusts, all lifting operations shall be stopped.

4.7 Swing / Crush Hazard Area

4.7.1 All personnel assigned to work on or near the crane shall be trained how to recognize struck-by and pinch/crush hazard areas posed by the rotating superstructure, outrigger operations or other movements such as crawler track position.

a. Accessible areas within the swing area of the rotating superstructure or equipment shall be barricaded to prevent personnel from being crushed.

b. When it is not feasible to erect barriers, the hazard areas shall be clearly marked by a combination of warning signs (such as “Danger: Swing

		Crush Hazard Area") and high visibility markings on the equipment identifying the hazard areas. c. Before a lift crew member goes into the hazard area out of view of the Crane Operator, the person shall inform the Crane Operator. d. The Crane Operator shall not rotate the superstructure until they are informed by the lift crew member and visually confirms that they have exited the hazard area and are in a safe position.
4.8 Signaling	4.8.1	Only qualified persons shall be permitted to give signals, except for a stop or emergency stop signal can be given by any person for safety reasons.
	4.8.2	Only one person shall give signals to a crane/derrick at a time, except in an emergency stop.
	4.8.3	Where any part of a crane is within the working radius of another crane, all crane crews shall institute a communication system to coordinate operations.
4.9 Crane Access / Condition	4.9.1	All equipment (e.g., steps, handholds, ladders and guardrails/railings/grab rails) shall be maintained in good condition.
	4.9.2	Walking/stepping surfaces, except for crawler treads, shall have slip-resistant features/properties.
	4.9.3	Cab windows shall be clean, in good condition and must provide a clear, unobstructed view of the load, work area and signalman.
4.10 Signage	4.10.1	The crane's operational manual shall be available in the cab at all times.
	4.10.2	A durable, clearly legible load rating chart shall be provided with each crane and securely affixed in the cab or operator's station easily visible to the Operator while at the controls.
	4.10.3	Special hazard warnings or instructions shall be posted on or in the crane. a. There shall be an electrocution hazard warning placard conspicuously posted in the cab and in view of the Crane Operator and at least two (2) placards on the outside of the mobile crane.

5.0 Inspections

5.1 General	5.1.1	All cranes working at the LAR shall be inspected using the manufacturer and MNT-RIG-024 guidelines.
5.2 New and Non-Marathon Cranes	5.2.1	Upon entering the facility, the LTA (or designee) shall inspect the crane prior to the first lift. The crane operator will be required to fill out the Marathon LAR Inspection Form.
5.3 Modified Equipment	5.3.1	Equipment that has had modifications or additions which affect the safe operation of the equipment shall be inspected by a certificating agency prior to initial use, in accordance with Title 8 CCR §1613.1. a. Manufacturer written approval is required for modifications or additions that affect the safe operation of any mobile crane.

5.4 Repaired or Adjusted Equipment	5.4.1	Equipment that has had a repair or adjustment that relates to safe operation (such as: A repair or adjustment to a safety device or operator aid, or to a critical part of a control system, power plant, braking system, load hook, or in-use operating mechanism), shall be inspected by a qualified person after such a repair or adjustment has been completed, prior to initial use.
	5.4.2	Proof load tests are required in the case of major modifications or repairs to important structural components, and shall comply with General Industry Safety Orders, Section 5022.
	5.4.3	Proof load tests shall be based on the manufacturer's load ratings for the conditions of use and shall consist of the application of a proof load as close as possible, but not exceeding 110 percent of the load ratings for the boom on the crane. Proof loads shall be applied at the designed maximum and minimum boom angles or radii or as close to these as practicable and at such intermediate radii as the certifying agency may deem necessary.
5.5 Post Assembly	5.5.1	Upon completion of assembly, the equipment shall be inspected by a qualified person, in accordance with Title 8 CCR §1613.3. and manufacturer specifications.
5.6 Frequent / Each Shift	5.6.1	A qualified person shall visually inspect (unless further investigation is needed) the crane's controls, rigging and operating mechanism prior to the first operation on any work shift. At a minimum, the inspection shall include a. Control mechanisms for maladjustments interfering with proper operations b. Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter c. Air, hydraulic and other pressurized lines for deterioration or leakage d. Hydraulic system for proper fluid level e. Hooks and latches for deformation, cracks, excessive wear or damage f. Wire rope reeving for compliance with specifications g. Wire rope in accordance with Title 8 CSO 1613.10 h. Electrical apparatus for malfunctioning i. Tires (when in use) for proper inflation and condition j. Ground conditions k. Equipment position (is level within tolerances specified by manufacturer's recommendations) l. Cab windows for cracks, breaks or other deficiencies that would hamper operator's view m. Safety devices and operational aids for proper operation
5.7 Periodic	5.7.1	Monthly inspections shall be in accordance with Title 8 CCR §1613.5,. The annual certification may count as one of the periodic inspections.

	5.7.2	An inspection record shall be maintained which includes the date of the inspection, the signature of the person who performed the inspection, and the serial number or the identifier of the crane inspected, the items checked and the results of the inspection. The most recent inspection records shall be maintained on file.
5.8 Annual / Comprehensive	5.8.1	At least every 12 months, the equipment shall be inspected by a certificating agency, in accordance with Title 8 CCR §1613.6.

6.0 Assembly and Disassembly (A/D)

6.1 A/D Safety

6.1.1 For assembly/disassembly, at a minimum, a meeting shall be attended by:

a. The A/D Director,

b. Marathon Rigging Foreman or designee,

c. Crane Operator, and

d. The work crew.

6.1.2 The A/D Director will review the Load Chart information with the crew during the pre-lift meeting as part of the Toolbox Talk.

6.1.3 The A/D Director must address hazards associated with the operation, which include:

a. Blocking material must be the proper size, quantity, condition, correctly located, and method of stacking to be sufficient to sustain the loads and stability of the boom sections, prevent unintended dangerous movement and collapse of any part of the boom / sections.

b. When using an assist crane, the loads that will be imposed on the assist crane at each phase of A/D shall be verified in accordance with Fed-OSHA Regulations CFR Title 29 Labor, Subtitle B, Chapter XVII, Part 1926, Subpart Cc: Cranes and Derricks in Construction, 1926.1417(o).

c. Where there is insufficient information to accurately identify the center of gravity, measures must be taken to prevent unintended dangerous movement.

d. The point(s) of attachment of rigging to a boom (or boom sections or jib or jib sections) shall be suitable for preventing structural damage and facilitating safe handling of these components.

e. To ensure stability upon pin removal the boom sections, boom suspension systems and components shall be rigged or supported to maintain stability upon the removal of the pins.

f. To avoid “snagging”, the boom suspension ropes and pendants shall not be allowed to catch on the boom or jib connection pins or cotter pins (including keepers and locking pins).

g. Ensure all counterweights are properly supported and personnel are clear prior to hoisting the counterweights.

h. Ensure that the testing of the boom hoist brake has been conducted and is in proper working order prior to A/D of the boom

i. Ensure backward stability before swinging, traveling, and when attaching or removing equipment components.

j. When synthetic slings are used, the synthetic sling manufacturer's instructions, limitations, specifications, and recommendations shall be followed.

k. Synthetic slings shall be protected from: Abrasive or sharp edges and configurations that could cause a reduction of the sling's rated capacity, such as distortion or localized compression.

6.2 A/D Operation	6.2.1	When assembling or disassembling a crane (or attachments), the user must comply with all applicable manufacturer prohibitions, procedures, and Marathon Rigging Foreman or Designee shall be notified prior to start of assembly and disassembly operation. A qualified Assembly/Disassembly Director will be designated to direct the work crew.
	6.2.2	Employer procedures may be used where the employer can demonstrate that the procedures used meet the following requirements: a. Prevent unintended dangerous movement, and prevent collapse, of any part of the equipment b. Provide adequate support and stability of all parts of the equipment c. Position employees involved in the A/D operation so that their exposure to unintended movement or collapse of part or all of the equipment is minimized d. The employer must follow the manufacturer procedures when synthetic slings are used for assembly and disassembly
6.3 Disassembly	6.3.1	Dismantling of cranes and their components also includes changing the lengths of the booms and jibs.
	6.3.2	All rigging work shall be conducted by a qualified rigger.
	6.3.3	When pins or similar devices are being removed from the boom, jib or other components, employees must not be under these parts.
6.4 A/D Near Energized Power Lines	6.4.1	For A/D Operations near energized power line refer to section 9.0 Lifts Near Energized Power Lines

7.0 General Crane Operations

7.1 Crane Setup

7.1.1 Crane outriggers shall be fully extended (unless other configurations are allowed in the load chart) and the tires raised free of the ground.

7.1.2 A spotter shall be used when extending and retracting the outriggers.

7.1.3 The crane shall be setup on a firm level surface and level within 1% of grade when lifting.

7.1.4 Before verifying counterweight clearance, the Crane Operator is responsible to ensure enough spotters are available to cover all areas of close clearance and that the spotters have established radio communication with the Crane Operator.

7.2 Grounding / Bonding for Static Electricity

7.2.1 Prior to a lift, all cranes shall be grounded/bonded. Two accepted grounding /bonding methods are:

a. Ground the crane using a grounding strap or conductor, from the crane frame to a grounding rod or any point on the grounding grid.

b. If a grounding rod or grid is not available, ground the crane using the grounding strap connected to a 5/16 inch or larger chain with a minimum of 10 feet coiled on the ground or pavement.

- If the bonding/grounding requirements above cannot be used, contact a Marathon Electrical Engineer for other acceptable grounding methods.

7.3 Pre-Lift Operation

7.3.1 The weight of the load shall be determined prior to the lift.

7.3.2 Ensure the load is disconnected from all anchor points before lifting.

7.3.3 Hoist lines shall be vertical. The hoisting wire rope shall not be wrapped around the load.

7.4 Lift Operation

7.4.1 The Crane Operator shall not engage in any practice or activity that diverts their attention while engaged in operating the crane i.e., the use of cellular phones or personal electronic devices.

7.4.2 No one shall access the crane after the operator has engaged the controls.

a. Except during training when the instructor may need to coach an operator in training)

7.4.3 The Crane Operator shall be in control of the operational aid's override key or by-pass switch and shall notify all personnel involved with the lift prior to activating the "by-pass".

7.4.4 The load or the boom shall not be lowered below the point where less than two full wraps of wire rope remain on grooved drums and three full wraps on un-grooved drums.

7.4.5 Side loading of booms shall be limited to freely suspended loads.

7.4.6 Cranes shall not be used for dragging loads sideways.

7.4.7 The lift shall be made in a slow controlled manner.

7.4.8 No one shall be permitted to stand/walk under the load when lifted, and the load shall not be lifted over personnel.

a. **Exception:** For construction work, where loads may be passed directly over workers, occupied workspace or process equipment, safety type hooks or equivalent means of preventing the load from becoming disengaged shall be used.

7.4.9 An audible warning signal (i.e., horn) shall be sounded and the fall zone cleared of all non-essential personnel prior to swinging the load.

7.4.10 A tag or restraint line shall be used where rotation of the load is hazardous.

7.4.11 Boom and/or load line free fall are prohibited.

7.4.12 Boom-type mobile cranes which operate at night shall have their load hooks and working areas adequately illuminated.

a. **Note:** Boom heads and load blocks should be painted with high-visibility yellow or other contrasting colors.

7.5 Crane Standby

7.5.1 Before leaving the crane unattended, Crane Operator shall:

a. Set the travel, swing, boom brakes, and other locking devices.

b. Place the controls in the "off" or neutral position.

c. Stop the engine.

d. The boom shall be retracted and lowered as far as practical if the crane is inactive for more than 2 hours and at the end of shift. This is to facilitate the inspection required by the new operator coming on shift and to verify proper operation.

- For pinned boom cranes only: Unless requested by Marathon, pinned boom cranes are not required to retract their booms at shift change if they are in continuous operation and the crane operators do a face-to-face turnover at the crane.

7.6 Suspended Loads

7.6.1 Before leaving the crane unattended, Crane Operator shall land or properly secure any attached load, or other lifting device. Conditions were suspended loads may be left unattended:

a. The area is barricaded.

b. The load is suspended over water.

c. The load is blocked up or otherwise supported from below during repairs or emergencies.

7.7 Traveling

7.7.1. A qualified rigger and the Crane Operator will make the following considerations when traveling:

a. Make determinations regarding boom location, ground support, travel route, overhead obstructions, and speed of movement necessary to ensure safety.

- The boom shall be carried in line with the direction of motion and the superstructure except when negotiating turns or when the boom obstructs the crane operator's vision.

b. Personnel shall not get on or off the crane when it is in motion

c. Personnel shall not ride on hooks, loads or headache balls

d. All cranes greater than 15 tons rated capacity traveling on LAR roadways, with the exception of boom trucks, shall have two escorts, one in front of the crane, and one in the rear. The spotters shall have a means of contact with the crane operator via 2-way radio at all times during transporting the cranes throughout LAR roadways, and inside unit boundaries.

e. The crane shall be secured against rotation, except when negotiating turns when there is an operator in the cab, or when the boom is supported on a dolly.

f. While traveling, the headache ball or block shall be restrained so that it cannot swing freely.

g. A spotter shall direct all crane movements in congested areas and when the crane operator's vision is obstructed. Multiple spotters, front and rear, are required for all cranes entering an operating unit.

h. Boom extensions or jibs shall be stowed or removed, unless relocating the crane in the same unit or adjacent unit.

7.8 Traveling Under Power Lines

7.8.1 Cranes traveling under power lines shall have a dedicated spotter who is in continuous contact with the driver/operator, if any part of the crane will get closer than 20 feet to the power line.

7.8.2 For minimum clearance distances while traveling, refer to section 9.3.

7.8.3 For Pick and Carry Operations, refer to section 8.1.

8.0 Lifting Operations

8.1 Pick and Carry Operations

8.1.1 It is prohibited to carry loads on jibs or boom extensions, unless approved by the manufacturer.

8.1.2 The following are the minimum requirements for approved pick and carry operations:

a. The Crane Operator shall determine if it is necessary to reduce the rated capacity.

b. For cranes with tires, maintain the tire pressure specified by the manufacturer.

c. Use the shortest length of boom and lowest boom angle as possible.

d. Crane Operator shall maintain the load as close to the ground as possible.

e. The load shall be secured to prevent the load from swinging.

f. Pick and carry operations shall require escorts/spotters depending on location if the load is deemed a traffic hazard during the pick and carry operation, on LAR roadways or inside unit boundaries.

8.2 Mobile Crane Lifts on Rubber (Tires)

8.2.1 When possible, use the crane's outriggers as raising or lowering the boom, extending, or retracting the boom, and/or swinging the boom "on rubber" with or without a load can cause the crane to become unstable and cause it to turnover in either the forward or backward direction.

8.2.2 If it is necessary to perform a crane lift "on rubber," the following considerations shall be made:

a. Lifts "on rubber" are prohibited unless permitted by the crane manufacturer, and outriggers cannot be deployed.

b. Lifts made without the use of outriggers shall follow the manufacturer recommendations.

c. The crane's capacity shall be based on the "on-rubber" load chart.

d. The tires shall be inflated to the pressures listed in the load chart.

e. When equipped, verify that the axle lockout function is working properly.

8.3 Tandem Lifts and Tilt Up/Tilt Down (Tailing) Operations

8.3.1 The requirements for performing Tandem Lifts and Tailing Operations are as follows:

a. The lift shall be planned per the critical lift requirements when more than one crane or other lifting device will be supporting the load.

- At the LTA's discretion, the critical lift plan for tilt up/down operations (tailing) may be waived. For example, when lifting standpipes and small deep well pumps.

b. The load chart shall be reduced on each crane by not less than 25 percent to assure safe distribution of both vertical and horizontal load to the cranes involved (unless equalizer or other acceptable provisions in which case a lesser reduction may be applied).

c. A qualified person shall be in direct audible communication with both crane operators at all times to direct the lifting operation.

8.4 Alternate Lifting Equipment

8.4.1 Alternate lifting equipment should not replace the use of cranes. A Variance (following HSS-004) to use alternate lifting equipment such as telehandlers and forklifts with or without fork attachments will require approval of the Rigging Foreman and Safety Manager. The Variance approval will require the signatures of the Rigging Foreman and Safety Manager.

8.4.2 Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturer's prior written approval. Capacity, operation, and maintenance instructions, plates, tags, or decals shall be attached accordingly.

8.5 Flexible Intermediate Bulk Container (FIBC) Use

8.5.1 The requirements for using a Flexible Intermediate Bulk Container, Bulk Bag, or super sack (FIBC) are as follows

a. Users are to visually inspect the FIBC sacks and lifting eyes for damage prior to lifting with a crane or forklift.

b. Never suspend a FIBC sack with less than the eyes provided on the sack.

c. Ensure all forklift tines and rigging attachments that are utilized with the lifting eyes are free of sharp edges.

d. The edges should be rounded to at least the thickness of the loops/eyes a minimum of 5mm.

e. The lift area shall be barricaded with tags.

f. All sacks shall be lifted just clear of the ground and held for at least 30 seconds to ensure the integrity of the lifting eyes before continuing to lift the sack.

g. All personnel shall be removed from the fall zone prior to lifting the sack to the designated location.

h. The crane operator shall not lift the sack more than a few inches until the fall zone is cleared of personnel.

i. The individuals receiving the sack shall stand clear of the sack until it is landed on the hopper or other appropriate device.

j. The sacks shall not be lifted over personnel.

k. The sacks must be supported on the hopper prior to personnel opening the sack for dumping.

l. No hands or other parts of the body are to be placed beneath an elevated sack.

9.0 Lifts Near Energized Power Lines

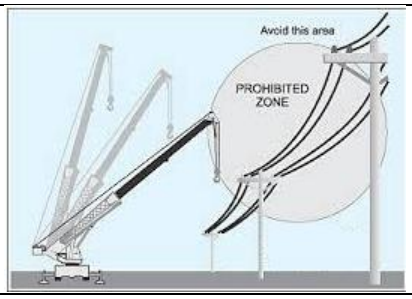
9.1General

9.1.1 Power lines are presumed to be energized unless the utility owner/operator confirms that the power line has been and continues to be de-energized and visibly grounded at the worksite.

9.1.2 If it is physically possible, under any circumstances (including natural disasters) that ANY part of the crane, load line or load (including rigging and lifting accessories), if operated up to the crane's maximum working radius, could get closer than 20 feet to a potentially energized power line, then a Critical Lift Checklist in Proximity of Power Lines shall be required.

9.2 Prohibited Zone

9.2.1 An invisible boundary around an electrical power line, the radius of which is determined based on the voltage of the power line.



9.3 Minimum Clearance Distance

The minimum clearance distant from energized power lines are:

WORKING ZONE	
Voltage (nominal, kV, alternating current)	Distance (feet)
Up to 50	10
Over 50 to 175	15
Over 175 to 350	20
Over 350 to 550	27
Over 550 to 1,000	45
Over 1,000	As established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution

WHILE TRAVELING WITH NO LOAD	
Voltage (nominal, kV, alternating current)	*Distance while traveling*
Up to 0.60	4
Over 0.60 to 50	6
Over 50 to 345	10
Over 345 to 750	16
Over 750 to 1,000	20
Over 1,000	As established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution

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.

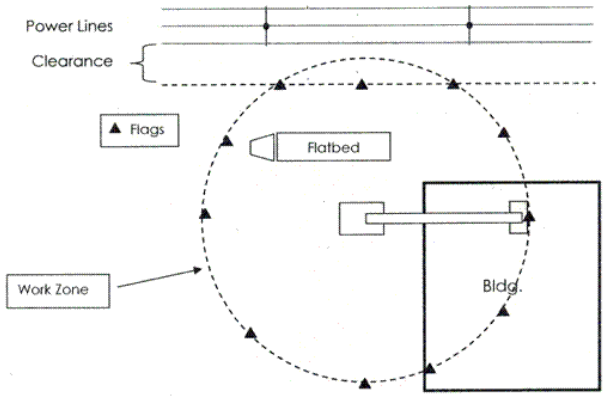
9.4 Working Zone

9.4.1 **Lifts over power lines are prohibited.**

9.4.2 Before beginning lifting operations near power lines, the Lift Director shall identify the Work Zone by either:

a. Demarcating boundaries (such as with flags, or a device such as a range limit device or range control warning device) and prohibiting the operator from operating the equipment past those boundaries, or

- Specify the method for demarcating boundaries on the Permit and Job Safety Analysis
- Defining the work zone as the area 360 degrees around the equipment, up to the equipment's maximum working radius



9.5 Performing Lifts Near Energized Power Lines

9.5.1 Entry into the Minimum Clearance Distance (section 9.3) is Strictly Prohibited unless the Power Lines are DE-energized and Visibly Grounded at the Worksite.

9.5.2 If any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line the employer shall meet the requirements in Options 1, 2, or 3 (identified below).

a. De-energize and ground. Confirm from the utility owner/operator that the power line has been de-energized and visibly grounded at the worksite.

b. Ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer than 20 feet to the power line.

c. Identify the Minimum Clearance Distance, utilizing the chart in section 9.3 and determine if any part of the equipment, load, load line, rigging or lifting accessories (while operating up to the equipment's maximum working radius in the identified work zone) could get closer than the minimum approach distance of the power line.

9.6 Preventing Encroachment / Electrocution

9.6.1 The following encroachment precautions are required for options 2 and 3 in section 9.5 (above).

a. Conduct a 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

b. Tag lines, if used, shall be clean, dry and non-conductive.

c. Erect and maintain a warning line, barricade or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at 20 feet from the power line, if using Option 2 in section 9.5 or at the minimum clearance distance under Table 2 (if using Option 3 of Section 9.5 (above).

d. If the operator is unable to see the elevated warning line, a dedicated spotter shall be used as described in Section 9.7 (below).

9.7 Additional Encroachment Measures

9.7.1 This section does not apply to work covered by Cal OSHA High-Voltage Electrical Safety Orders

9.7.2 A dedicated spotter who is in continuous contact with the operator shall:

a. Be equipped with a visual aid to assist in identifying the minimum clearance distance.

- Examples of a visual aid include but are not limited to: A clearly visible line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).

b. Be positioned to effectively gauge the clearance distance.

c. Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.

d. Give timely information to the operator so that the required clearance distance can be maintained.

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

9.7.4 A device that automatically limits range of movement, set to prevent encroachment.

9.8 Work Zone Below Power Lines

9.8.1 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 (at the worksite) visibly grounded the power line, except where one of the exceptions below applies.

9.8.2 Exceptions are:

a. The work is covered by the Cal-OSHA High-Voltage Electrical Safety Orders.

b. For equipment with non-extensible booms: The uppermost part of the equipment, with the boom at true vertical, would be more than 20 feet below the plane of the power line or more than the minimum clearance distance in

		section 9.3.
		c. For equipment with articulating or extensible booms: The uppermost part of the equipment, with the boom in the fully extended position, at true vertical, would be more than 20 feet below the plane of the power line or more than the minimum clearance distance in chart in section 9.3 below the plane of the power line.
		d. The employer demonstrates that compliance with this section is infeasible and meets the requirements of Cal- OSHA Title 8, Section 1612.3.
9.9 Electrical Contact with a Power Line	9.9.1	In the event that crane makes electrical contact with a power line, follow the procedure below:
		a. The Crane Operator should stay with the crane and attempt to move the lifting equipment away from the power line.
		b. The work crew shall not approach or touch the crane, the load, the tag line or any accessories attached to the crane.
		c. Should the Crane Operator's safety be jeopardized by fire, smoke or other imminent danger, he shall evacuate the crane by jumping free and clear, landing with both feet together.
		d. If caught within the electrically charged ground area, work crews and crane operator should depart the area by shuffling with feet close together or short hopping with feet close together. DO NOT STRIDE.
9.10 Other Electrical Hazards	9.10.1	When working near transmitter/communication towers, where the equipment is close enough for an electrical charge to be induced in the equipment or materials being handled, the transmitter shall be de-energized or the following precautions shall be taken:
		a. The equipment shall be provided with an electrical ground
		b. If tag lines are used, they shall be non-conductive

10.0 Training

10.1 General	10.1.1	Employees working as dedicated spotters shall be trained to enable them to effectively perform their task, including training on the applicable requirements of this standing instruction
	10.1.2	The employer shall train each operator and crew member assigned to work with the equipment on all of the following:
		a. Power lines are presumed to be energized unless the utility owner/operator confirms that the power line has been and continues to be DE-energized and visibly grounded at the worksite.
		b. Power lines are presumed to be uninsulated unless the utility owner/operator or a registered engineer who is a qualified person with respect to electrical power transmission and distribution confirms that a line is insulated.
		c. The limitations of a range control device, if used.
		d. The procedures to be followed to properly ground equipment and the limitations of grounding.
		e. Procedures to be followed in the event of electrical contact with a power line,

including:

- Information regarding the danger of electrocution from the operator simultaneously touching 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.

Appendix A: Terms and Definitions

A.1 Articulating Crane	A crane whose boom consists of a series of folding, pin connected structural members, typically manipulated to extend or retract by power from hydraulic cylinders.
A.2 Assembly / Disassembly (A/D)	The assembly and/or disassembly of equipment covered under this instruction.
A.3 Assembly / Disassembly Director	An individual who meets the criteria for both a competent person and a qualified person and is responsible for following the manufacturer A/D instructions and directing the work crew during crane boom assembly/disassembly.
A.4 Audible Signal	A signal made by a distinct sound or series of sounds (i.e., sounds made by a horn or whistle).
A.5 Bird Caging	Damage to a wire rope creating a torsional imbalance on the rope such that the strands are separated and distorted such that they will no longer evenly distribute the load to the rope; caused by sudden stops, pulled through too small a sheave, etc.
A.6 By-Pass Key	(Also referred to as Crane Safety Override Key or Switch) is a key or switch that is used to override the anti-two-block (A2B) and load moment limiter.
A.7 Certificating Agency	Certificating agencies are qualified agencies, and/or persons, licensed by CAL/OSHA to examine, test and certify cranes and derricks in accordance with Sections 344.60 through 344.67 of Title 8 of the California Code of Regulations.
A.8 Certified Crane Operator	Is a person holding a valid certificate of competency issued by an accredited certifying entity. A Power Lift Truck (forklift) with a boom attachment lifting with a hoist or hook requires a certified Crane Operator.
A.9 Choker Hitch	A method of rigging a sling in which the sling is passed around the load, then though one loop eye, end fitting, or other device, e.g., a shackle, with the other loop eye or end fitting attached to the lifting device; reduces vertical capacity 20%-25%.
A.10 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 employees, and who has authority to take prompt corrective measures to eliminate them.
A.11 Construction Work	Capital projects, Capital Improvements, Turnarounds (TAR) and non-standard events or as governed by CAL/OSHA Construction Safety Orders
A.12 Construction Safety Orders (CSO)	Refers to the CAL/OSHA regulations outlined in Title 8, subchapter 4, article 15. This regulation shall be followed for construction category tasks.

A.13 Cribbing (also referred to as "Blocking")	Is wood or other material used to support equipment or a component and distribute loads to the ground. Cribbing is typically used to support lattice boom sections during assembly/ disassembly and under outrigger stabilizer floats.
A.14 Critical Lifts	A critical lift is a lift that meets any of the following elements: 1. Any lift which exceeds 75% of the crane's rated capacity 2. Tandem crane lifts 3. Any lift over 50,000 lbs. and over operating units or live pipelines 4. Lifts in close proximity to power lines (within one booms length of the prohibited zone) 5. Lifting personnel 6. Any lift with complex, critical or additional risks above and beyond the norm 7. Lifting operations utilizing another crane to tilt up or tilt down a load (also known as "tailing") 8. Any lift over 100,000 lbs. **Note:** At the LTA's discretion, the critical lift plan for tilt up/tilt down operations (tailing) may be waived.
A.15 D/d Ratio	The ratio of the diameter (D) of the item being picked or connector to the diameter (d) of the sling or rigging used to pick it. D/d minimum = 1 for wire rope slings to obtain the full single cable vertical capacity of the sling.
A.16 Dedicated Spotter (power lines)	Is a qualified signal person with the sole responsibility to ensure no portion of the crane or load encroaches upon the prohibited zone.
A.17 Encroachment	Where any part of the crane, load line or load (including rigging and lifting accessories) breaches a minimum clearance distance that is required to be maintained from a power line or other electrical hazards.
A.18 Escort	An escort is a person in a vehicle, on a bicycle or a walking flagman at a minimum distance of 20 feet in front of the vehicle. Escorts are necessary at the front and rear of the vehicle. The escort shall guide cranes greater than 15 tons, equipment with restricted turning radius, or limited visibility and cranes/equipment with suspended loads to insure safe passages, adequate overhead and side clearances on roadways in the refinery.
A.19 Fall Zone	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.
A.20 Flexible Intermediate Bulk Container (FIBC)	An industrial container made of flexible fabric that is designed for storing and transporting dry products such as catalyst. FIBCs are also called super sacks.
A.21 GISO	General Industry Safety Orders; refers to the CAL/OSHA regulations outlined in Title 8, subchapter 7, Group 13. This regulation shall be followed for routine maintenance lifts.

A.22 Ground Conditions	Means the ability of the ground to support the equipment (including slope, compaction and firmness).
A.23 Grounding & Bonding	**Grounding** is a method to give an electrical current a place to dissipate (i.e., connecting to a grounding rod or the refinery grounding grid) **Bonding** is a method used to ground a piece of equipment by running a wire (bonding cable) from a grounded component to a non-grounded component, in order to equalize voltage (i.e., applying a bonding cable from on piece of equipment to another piece of equipment or structure that is grounded to the grid or rod)
A.24 Hitch	Method of attaching a sling to a load, i.e., choke, basket, double wrap, etc.
A.25 Kink	A deformation of wire rope so severe that the wires or strands are pushed out of their original position permanently deforming the wire rope by locking wires and strands, thereby preventing them from sliding and adjusting to properly take the load. It represents irreparable damage and is cause for replacement of the wire rope.
A.26 Lifting / Hoisting Equipment	Means mobile cranes, derricks, tower cranes, overhead cranes, chain falls, air winches (tuggers), forklift, etc.
A.27 Lifting Technical Authority	The Single Point of Accountability (SPA) who shall "have overall accountability for lifting practices on Site and provision of technical advice and assurance to ensure the Site practices and procedures are followed."
A.28 Lift Director	The qualified person that is directly in charge of the work crew performing the task/lift.
A.29 Lift over live process	Is any lift of equipment or material in which the object being lifted passes over pressurized or energized process equipment.
A.30 Lift Plan	Is a plan that is made prior to a lift to assure the lift at maximum radius and boom length does not exceed the capacity of the crane for the specified conditions during the lift.
A.31 Load	Refers to the object(s) being hoisted.
A.32 Load Chart	A chart of the crane's capacity for various operational modes as listed in the capacity chart notes. The load chart shall be maintained in the crane cab. The load chart shall be specific to the crane and contain the crane's serial number.
A.33 Non-Conductive	Due to the nature and condition of the materials and the conditions of use (including environmental conditions and condition of the material), the object in question cannot be energized.
A.34 Operational Aids	Devices that assist the operator in the safe operation of the crane by providing information or automatically taking control of a crane function. These include, but are not limited to, the devices such as Anti-2 Block, boom angle indicator, LMI, etc.
A.35 Power Lines	Electric transmission and distribution lines.

A.36 Prohibited Zone	The area immediately surrounding power lines in which no lifting operations or other work is allowed. The Prohibited Zone is an imaginary sphere around an Electrical Hazard, the radius of which is determined based on the voltage of the Hazard.
A.37 Qualified Crane Operator	An experienced person authorized and trained by the Employer in the safe operation of mobile cranes; 1) May operate cranes with a lifting capacity of less than 15,000 pounds or a maximum main boom length of 25 feet. 2) After November 10, 2017, may only operate cranes with a lifting capacity of 2,000 pounds (1 Ton) and less for Construction type lifts. (See CAL/OSHA CSO 1618.1).
A.38 Qualified Person	Means 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 and work.
A.39 Qualified Rigger	A rigger who meets the criteria for a Qualified person.
A.40 Qualified Signalperson	Shall be designated (documented) and knowledgeable in all crane signals and have a basic understanding of equipment operation and limitations. Shall complete an oral or written test and a practical test, as administered by a qualified signal person evaluator.
A.41 Radius	The horizontal distance from a projection of the axis of rotation to the supporting surface before loading, to the center of the vertical hoist line or tackle with the load applied.
A.42 Rated Capacity/Load	The maximum allowable working load established by the rigging hardware manufacturer. The terms “rated capacity”, capacity, safe working load (SWL), and “working load limit” are commonly used to describe rated load.
A.43 Reeving	A rope system in which the rope travels around drums and/or sheaves.
A.44 Routine Maintenance Lift	Generally, the task will be replacement in kind or repairs.
A.45 Shackle	A U-shaped load bearing rigging connection device designed for use with a removable screw pin or bolt.
A.46 Side Load	Forces applied to the boom when the center of gravity of the load is not centered vertically under the boom tip.
A.47 Signal Person(s)	Individual(s) assigned to signal the hoisting equipment during rigging and hoisting operations. Only one signal person at a time will have authority to directly signal the lifting equipment operator.
A.48 Site Lift Foreman	Individual responsible for ensuring that the area for the crane is adequately prepared.

A.49 Sling	An assembly used for lifting when connected to a lifting device or hoisting equipment. The upper portion is connected to the lifting device or hoisting equipment and the lower end supports the load made from materials, e.g., wire rope, synthetic materials like polyester and nylon webbing, and metal mesh.
A.50 Softener	An appropriately sized member used to protect the choker, load or cable from damage while making a lift and may also prevent the load from slipping.
A.51 Sorting Hook	Hook with a long tip that is designed for sorting material. To be used only at ground level and only for sorting material since they do not have a latch.
A.52 Suspended Personnel Platform	A device suspended from a crane for the express purpose of lifting people. (Refer to HSS 603)
A.53 Swing/Crush Hazard Area	Accessible areas in which the Crane equipment's rotating superstructure poses a hazard of: (A) Striking and injuring an employee; or (B) Pinching/crushing an employee against another part of the equipment or another object.
A.54 Synthetic Sling Shackle	A wide body shackle designed to be used with synthetic slings to prevent bunching or pinching of the sling material, which reduces the rated load, and which could cause additional stress on the edges or center of the webbing.
A.55 Tandem Lift	Using two or more cranes to pick a load.
A.56 Tilt up or tilt down operation	Raising/lowering a load from the horizontal to vertical or vertical to horizontal.
A.57 Total Gross Load	Refers to the object(s) being hoisted and/or the weight of the object(s); both uses refer to the object(s) and the load-attaching equipment, such as, the load block, ropes, slings, shackles, and any other ancillary attachment.
A.58 Two-blocking	A condition in which the lower load block or hook assembly comes into contact with the upper load block or boom point sheave assembly. This binds the system and continued application of power can cause failure of the hoist rope or other component.
A.59 Vehicle Spotter	An individual with the knowledge and skills to guide and assess overhead and side clearances for a vehicle or motorized equipment inside process unit boundaries or operating near overhead power lines and pipe racks.
A.60 Wire rope	A flexible rope constructed by laying steel wires into various patterns of multi-wired strands around a core system to produce a helically wound rope.
A.61 Work Zone	The area 360 degrees around the equipment, up to the equipment's maximum working radius.

Appendix B: Critical Lift Plan

B.1 Critical Lift Plan

CRITICAL LIFT PLAN

PERMIT #

EVERYONE HAS THE AUTHORITY AND OBLIGATION TO STOP UNSAFE WORK

COMPANY /CRAFT:	PHONE #	RADIO CH:
LOCATION:	CRITICAL ☐Tailing ☐Tandem lift LIFT TYPE: ☐ Over 75% ☐Working near Power lines	
LIFT DESCRIPTION:		

SECTION A- LOAD INFORMATION

LOAD WEIGHT:	LBS	☐ ESTIMATED	☐ WEIGHED	☐ MFR. PROVIDED	☐ ENGINEERED DRAWINGS
LOAD CALCULATIONS BY:	DATE:		CALCULATIONS VERIFIED BY:	DATE:	
LOAD WEIGHT ON CRANE 1:	LBS		LOAD WEIGHT ON CRANE 2:	LBS	

SECTION B - CRANE 1/LIFT CRANE

CRANE MANUFACTURER:	MODEL:	RATED CAP:	Tons	SERIAL # :

SUPPORT MECHANISM

☐ CRAWLER ☐ OUTRIGGERS ☐ SUPER LIFT

% EXTENDED | SPREAD DIMENSIONS: x ft

CRANE CONFIGURATION

COUNTERWEIGHT:	lbs	FULLY EXTENDED ☐ YES	☐ NO	☐ NA
BOOM: ☐ Main Boom Length:	ft	☐ Boom Extension Length:	ft	
☐ Fixed Jib Length:	ft	☐ Luffing Jib Length:	ft	Jib Offset (if applicable) °
WIRE ROPE: Diameter:	☐in. ☐mm	Single Part of Line Cap.:	lbs	Parts of Line Used for Lift:
BLOCK: Capacity:	lbs	Headache ball capacity:	lbs	

SOIL BEARING AND MAT ANALYSIS

ALLOWABLE GBP	☐ 1,000 LB/FT² SOIL ☐ 2,000 LB/FT² ASPHALT ☐ 3,000 LB/FT² CONCRETE	MAXIMUM OUTRIGGER PRESSURE: lbs MATTING TYPE: ☐ Wood ☐ Steel ☐ Synthetic ☐ other MATTING DIMENSIONS: X X Min Surface Area: ft²				
GPR REQUIRED: ☐ YES ☐ NO		GPR REPORT ATTACHED: ☐ YES ☐ N/A				
GPR SURVEY OK: ☐ YES ☐ N/A		GPR AREA SURVEYED (crane 1): ft X ft				

LIFT SPECIFICATION

1	CRANE OPERATING RADIUS: Min. ft Max ft QUADRANT: ☐ 360° ☐ Over the front ☐ Over the rear ☐ Over the side			
2	BOOM LENGTH USED: ft	BOOM ANGLE AT PICK: °	BOOM ANGLE AT SET: °	
3	BOOM/ JIB RATED CAPACITY AT MAX RADIUS: lbs	PARTS OF LINE CAPACITY: lbs		
4	CRANE DEDUCTIONS (4A TOTAL): lbs			
5	RIGGING & ATTACHMENTS WEIGHT (5A TOTAL): lbs			
6	LOAD WEIGHT (6A TOTAL): lbs			
7	TOTAL GROSS LOAD WEIGHT (add 4 + 5 + 6): lbs			
8	CRANE RATED CAPACITY (Lowest of line 3): lbs			
9	PERCENT RATED CAPACITY (7 divided by 8): %			

4A CRANE DEDUCTIONS WEIGHT			5A RIGGING AND ATTACHMENTS WEIGHT			6A LOAD WEIGHT (e.g. Pump, turbine, tower...)
Main Block	☐ n/a	lbs	Slings	☐ n/a	lbs	lbs
Headache Ball	☐ n/a	lbs	Shackles	☐ n/a	lbs	lbs
Auxiliary Head	☐ n/a	lbs			lbs	lbs
Jib stowed/erected	☐ n/a	lbs			lbs	lbs
		lbs			lbs	lbs
Total		lbs	Total		lbs	Total lbs

10 SLINGS

	Type	Configuration	Capacity lbs	Applied load	% Capacity
a.					
b.					
c.					
d.					
e.					
f.					
g.					
h.					
i.					
j.					

11 SHACKLES

	Type	Quantity/size	Capacity lbs	Applied load	% Capacity
a.					
b.					
c.					
d.					

12 MISCELLANEOUS LIFTING DEVICES

	Type	Configuration	Capacity lbs	Applied load	% Capacity
a.					
b.					
c.					
d.					

Appendix B Critical Lift Plan (cont.)

CRITICAL LIFT PLAN

PERMIT #

SECTION C- TANDEM / TAIL CRANE

CRANE MANUFACTURER:	MODEL:	RATED CAP: Tons	SERIAL #:

SUPPORT MECHANISM

☐ CRAWLER ☐ OUTRIGGERS ☐ SUPER LIFT

% EXTENDED | SPREAD DIMENSIONS: x ft

CRANE CONFIGURATION

COUNTERWEIGHT: lbs FULLY EXTENDED ☐YES ☐NO ☐NA

BOOM: ☐Main Boom Length: ft ☐Boom Extension Length: ft
☐Fixed Jib Length: ft ☐Luffing Jib Length: ft Jib Offset (if applicable) °

WIRE ROPE:	Diameter: ☐in. ☐mm	Single Part of Line Cap.: lbs	Parts of Line Used for Lift:
BLOCK:	Capacity: lbs	Headache ball capacity: lbs	

SOIL BEARING AND MAT ANALYSIS

ALLOWABLE GBP: ☐ 1,000 LB/FT² SOIL ☐ 2,000 LB/FT² ASPHALT ☐ 3,000 LB/FT² CONCRETE

MAXIMUM OUTRIGGER PRESSURE: lbs
MATTING TYPE: ☐ Wood ☐ Steel ☐ Synthetic ☐ other
MATTING DIMENSIONS: X X Min Surface Area: ft²

GPR REQUIRED: ☐ YES ☐ NO | GPR REPORT ATTACHED: ☐ YES ☐ N/A
GPR SURVEY OK: ☐ YES ☐ N/A | GPR AREA SURVEYED (crane 1): ft X ft

CRANE SPECIFICATION

1	CRANE OPERATING RADIUS: Minimum ft	Maximum ft		
	QUADRANT: ☐ 360°	☐ Over the front	☐ Over the rear	☐ Over the side
2	BOOM LENGTH USED: ft	BOOM ANGLE AT PICK: °	BOOM ANGLE AT SET: °	
3	BOOM/ JIB RATED CAPACITY AT MAX RADIUS: lbs	PARTS OF LINE CAPACITY: lbs		
4	CRANE DEDUCTIONS (4A TOTAL): lbs			
5	RIGGING & ATTACHMENTS WEIGHT (5A TOTAL): lbs			
6	LOAD WEIGHT (6A TOTAL): lbs			
7	TOTAL GROSS LOAD WEIGHT (add 4 + 5 + 6): lbs			
8	CRANE RATED CAPACITY (Lowest of line 3): lbs			
9	PERCENT RATED CAPACITY (7 divided by 8): %			

4A CRANE DEDUCTIONS WEIGHT			5A RIGGING AND ATTACHMENTS WEIGHT			6A LOAD WEIGHT (e.g. Pump, turbine, tower..)	
Main Block	☐n/a	lbs	Slings	☐n/a	lbs		lbs
Headache Ball	☐n/a	lbs	Shackles	☐n/a	lbs		lbs
Auxiliary Head	☐n/a	lbs			lbs		lbs
Jib stowed/erected	☐n/a	lbs			lbs		lbs
		lbs			lbs		lbs
Total		lbs	Total		lbs	Total	lbs

10 SLINGS

	Type	Configuration	Capacity lbs	Applied load	% Capacity
a.					
b.					
c.					
d.					
e.					
f.					
g.					
h.					
i.					
j.					

11 SHACKLES

	Type	Quantity/size	Capacity lbs	Applied load	% Capacity
a.					
b.					
c.					
d.					

12 MISCELLANEOUS LIFTING DEVICES

	Type	Configuration	Capacity lbs	Applied load	% Capacity
a.					
b.					
c.					
d.					

SECTION D- APPROVALS

ROLE	NAME (PRINT)	SIGNATURE	DATE	TIME
LIFT AUTHORITY (LTA)				
LIFT DIRECTOR				
CRANE OPERATOR				
SAFETY MANAGER				

SECTION D- RIGGING PLAN DIAGRAM

SECTION E- LIFTING PLOT PLAN

Appendix B Critical Lift Plan (cont.)

CRITICAL LIFT CHECKLIST

EVERYONE HAS THE AUTHORITY & OBLIGATION TO STOP UNSAFE WORK

1.	Crane operator meets certification requirements for the state of California for the crane being used	☐ YES ☐ NA
2.	Crane operator has completed the daily crane inspection prior to the lift	☐ YES ☐ NA
3.	Crane has current annual inspection by California State Certified Inspector	☐ YES ☐ NA
4.	Crane is equipped with a boom length indicator	☐ YES ☐ NA
5.	Crane is equipped with a working boom angle indicator	☐ YES ☐ NA
6.	Crane anti-two block device has been inspected, tested and its operational	☐ YES ☐ NA
7.	Crane requires extra support for outriggers	☐ YES ☐ NA
8.	Crane has adequate wire rope to reach the ground with boom fully extended and highest boom angle	☐ YES ☐ NA
9.	Crane exceeds the required distance from the prohibited zone of overhead power lines	☐ YES ☐ NA
10.	Crane is level within 1% of grade and located on firm footing with outriggers extended per manufacturer	☐ YES ☐ NA
11.	If this is a tandem lift, has the lift calculations been completed for all equipment	☐ YES ☐ NA
12.	Equipment is set up according to the Lift Plan	☐ YES ☐ NA
13.	Site Ground conditions have been assessed and deemed adequate for the lift by appropriate parties	☐ YES ☐ NA
14.	Load connecting and disconnecting plans are in place	☐ YES ☐ NA
15.	Weather conditions are acceptable for the lift Wind speed | Wind Direction | Time	☐ YES ☐ NA
16.	Slings and rigging hardware have been inspected for defects and are acceptable for use including softeners	☐ YES ☐ NA
17.	Tag lines attached to the load are sufficient length, size, and material	☐ YES ☐ NA
18.	Lift Area is barricaded and cleared of all non-essential personnel	☐ YES ☐ NA
19.	The signal person & lift director have been assigned **Name(s)**	☐ YES ☐ NA
20.	Pre-lift meeting has been conducted and the toolbox talk has been signed by all personnel	☐ YES ☐ NA

COMMENTS:

DAY OF APPROVALS

ROLE	NAME (PRINT)	SIGNATURE	DATE	TIME
LIFT AUTHORITY (LTA)				
LIFT DIRECTOR				
CRANE OPERATORS				

Appendix B Critical Lift Plan (cont.)

Critical Lift Checklist for Proximity of Power Lines ONLY

- **Lifts over power lines are prohibited.**
- **Power lines are presumed to be energized unless the utility owner/operator confirms that the power line has been and will continue to be de-energized and visibly grounded at the worksite.**
- **Prohibited Zone – an invisible boundary around an Electrical Power Line, the radius of which is determined based on the voltage of the Power Line. (see table below)**
- **The voltage within the refinery perimeter has been determined to be:**
  - **LAR-Wilmington <50kV**
  - **LAR-Carson >175kV to <350kV**
- **Entry into the Prohibited Zone is Strictly Prohibited!**

TIME: **DATE:**

MINIMUM CLEARANCE DISTANCE FROM POWER LINES (WORK ZONE)

Voltage (nominal, kV, alternating current)	*Distance (feet)*
Up to 50	10
Over 50 to 175	15
Over 175 to 350	20
Over 350 to 550	27
Over 550 to 1,000	45
Over 1,000	As established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution

Answer the following questions. If any answer is No, contact Operations to address the problems before executing the task.	**YES**	**NO**	**N/A**
Has the on-site pre-lift meeting been held with everyone involved in the lift?			
Are tag lines to be used?			
If tag lines are to be used, are they clean, dry, and made of non-conductive material? **MATERIAL TYPE:**			
While moving towards powerline(s), restricted or prohibited area(s) during a lift, will the Crane Operator lose sight of these area(s)? • If yes, a Spotter will be required			
Has a spotter been assigned?			
Does the Spotter understand that it is their sole responsibility to verify that the required clearance is maintained?			
Has the minimum approach been measured and clearly demarcated for the Crane Operator and Spotter?			

Authorization for Critical Lift Checklist	**Name (Print)**	**Signature**
Crane Operator		
Lift Director		
Unit Operator		
Spotter, if required		

Appendix B Critical Lift Plan (cont.)

CRITICAL LIFT CHECKLIST WITH POWER LINES

EVERYONE HAS THE AUTHORITY & OBLIGATION TO STOP UNSAFE WORK

CRITICAL LIFT CHECKLIST

1.	Crane operator meets certification requirements for the state of California for the crane being used	☐ YES ☐ NA
2.	Crane operator has completed the daily crane inspection prior to the lift	☐ YES ☐ NA
3.	Crane has current annual inspection by California State Certified Inspector	☐ YES ☐ NA
4.	Crane is equipped with a boom length indicator	☐ YES ☐ NA
5.	Crane is equipped with a working boom angle indicator	☐ YES ☐ NA
6.	Crane anti-two block device has been inspected, tested and its operational	☐ YES ☐ NA
7.	Crane requires extra support for outriggers	☐ YES ☐ NA
8.	Crane has adequate wire rope to reach the ground with boom fully extended and highest boom angle	☐ YES ☐ NA
9.	Crane exceeds the required distance from the prohibited zone of overhead power lines	☐ YES ☐ NA
10.	Crane is level within 1% of grade and located on firm footing with outriggers extended per manufacturer	☐ YES ☐ NA
11.	If this is a tandem lift, has the lift calculations been completed for all equipment	☐ YES ☐ NA
12.	Equipment is set up according to the Lift Plan	☐ YES ☐ NA
13.	Site Ground conditions have been assessed and deemed adequate for the lift by appropriate parties	☐ YES ☐ NA
14.	Load connecting and disconnecting plans are in place	☐ YES ☐ NA
15.	Weather conditions are acceptable for the lift Wind speed / Wind Direction / Time	☐ YES ☐ NA
16.	Slings and rigging hardware have been inspected for defects and are acceptable for use, including softeners	☐ YES ☐ NA
17.	Tag lines attached to the load are sufficient length, size, and material	☐ YES ☐ NA
18.	Lift Area is barricaded and cleared of all non-essential personnel	☐ YES ☐ NA
19.	The signal person & lift director have been assigned **Name(s)**	☐ YES ☐ NA
20.	Pre-lift meeting has been conducted and the toolbox talk has been signed by all personnel	☐ YES ☐ NA

WORKING NEAR OVERHEAD POWER LINES

All attempts must be made to de-energize the electrical power lines and/or equipment prior to making the lift. If the lines or equipment cannot be de-energized, then all requirements in HSS-602 shall be met and this section shall be completed.

MINIMUM ACCEPTABLE APPROACH DISTANCE (WORK ZONE)		**MINIMUM CLEARANCE DISTANCE WHILE TRAVELING WITH NO LOAD**	
NOMINAL VOLTAGE, kV (PHASE TO PHASE)	**MINIMUM REQUIRED CLEARANCE DISTANCE**	**NOMINAL VOLTAGE, kV (PHASE TO PHASE)**	**MINIMUM REQUIRED CLEARANCE DISTANCE**
The value "to" is up to and includes that value. For example, over 250kV to 370kV means up to and including 370kV			
UP TO 50	10 FEET	UP TO 0.60	4 FEET
OVER 50 TO 175	15 FEET	OVER .60 TO 50	6 FEET
OVER 175 TO 350	20 FEET	OVER 50 TO 345	10 FEET
OVER 350 TO 550	27 FEET	OVER 345 TO 750	16 FEET
OVER 550 TO 1,000	45 FEET	OVER 750 TO 1,000	20 FEET
OVER 1,000	As established by the utility owner/operator or registered professional engineer who is qualified person with respect to electrical power transmission and distribution	OVER 1,000	As established by the utility owner/operator or registered professional engineer who is qualified person with respect to electrical power transmission and distribution

NOTE: Voltage within the refinery perimeter has been determined to be: <50Kv at Wilmington and >175kV to 350Kv at Carson

1.	Has the on-site pre-lift meeting been held with everyone involved in the lift	☐ YES ☐ NA
2.	If tag lines are to be used, are they clean, dry, and made of non-conductive material **TYPE:**	☐ YES ☐ NA
3.	Has a spotter been assigned? **NAME:**	☐ YES ☐ NA
4.	Does the spotter understand that their sole responsibility is to verify that the required clearance is maintained	☐ YES ☐ NA

NOTE: LIFTING LOADS OVER ENERGIZED POWER LINES IS **PROHIBITED**

APPROVALS

ROLE	NAME (PRINT)	SIGNATURE	DATE	TIME
LIFT AUTHORITY				
LIFT DIRECTOR				
CRANE OPERATOR				

Appendix B Critical Lift Plan (cont.)

	GROUND PENETRATING RADAR SURVEY REPORT	PERMIT #

EVERYONE HAS THE AUTHORITY AND OBLIGATION TO STOP UNSAFE WORK

COMPANY CRAFT:	PHONE #	RADIO CH:
LOCATION:		
DESCRIPTION:		

EQUIPMENT INFORMATION

CONTROL UNIT: SIR 3000	MODEL: 653	CART TYPE: COMPACT
ANTENNA: 400 Mhz	MODEL: 5103A	DEPTH RANGE: 0 - 12 ft

EXECUTIVE SUMMARY

AREA SURVEYED:	ft X	ft	for secondary crane if applicable	ft X	ft
AREA GRID SIZE:	ft X	ft	AREA DEPTH SURVEYED:		ft
LINEAR DISTANCE ANALYZED:					
DATA EVALUATION:	☐ ONSITE BY UNIT DISPLAYED		☐ GPR SOFTWARE		

SURVEY AREA DRAWINGS / PICTURE

SIGNATURE

ROLE	PRINT NAME	SIGNATURE	DATE	TIME
SURVEYOR				

Appendix B Critical Lift Plan (cont.)

CRITICAL LIFT PLAN LESSONS LEARNED

Critical Lift Type: ☐ Over 75% ☐ Tailing ☐ Tandem Lift ☐ Personnel Lift ☐ Working Near Power lines

WO #:	**Risk Assess Form #**	**Permit #**

Location:

Lift Description:

Issues Found:

How was it Addressed:

Future Recommendations:

Appendix B Critical Lift Plan (cont.)

MARATHON	**MOBILE CRANE LOAD TEST OVER 75%**	**PERMIT #**

EVERYONE HAS THE AUTHORITY AND OBLIGATION TO STOP UNSAFE WORK

COMPANY /CRAFT:		**PHONE #**		**RADIO CH:**	
LOCATION:			**LOAD TEST TYPE:**	☐ AFTER REPAIRS ☐ QUADRENNIAL	
LIFT DESCRIPTION:					

SECTION A- CRANE 1/LIFT CRANE

CRANE MANUFACTURER:	**MODEL:**	**RATED CAP:**	**SERIAL #**

SUPPORT MECHANISM

☐ CRAWLER	☐ OUTRIGGERS	☐ SUPER LIFT	☐ RUBBER
% EXTENDED		**SPREAD DIMENSIONS:**	**X** **ft**

SOIL BEARING AND MAT ANALYSIS

ALLOWABLE GBP	☐ 1,000 LB/FT² SOIL ☐ 2,000 LB/FT² ASPHALT ☐ 3,000 LB/FT² CONCRETE	**MATTING TYPE:** ☐ Wood ☐ Steel ☐ Synthetic ☐ Other **MATTING DIMENSIONS:** x x **Min Surface Area:** ft²

GPR REQUIRED: ☐ YES ☐ NO	**GPR REPORT ATTACHED:** ☐ YES ☐ N/A	**GPR AREA SURVEYED (crane 1):**

TYPE OF TEST PERFORMED:	**TEST 1**	**TEST 2**	**TEST 3**	**TEST 4**
QUADRANT				
BOOM LENGTH	ft	ft	ft	ft
BOOM ANGLE	o	o	o	o
BOOM RADIUS	ft	ft	ft	ft
PROOF LOAD	lbs	lbs	lbs	lbs
RATED LOAD	lbs	lbs	lbs	lbs
CAPACITY %	%	%	%	%
OUTRIGGERS	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO

LOAD CALCULATIONS

BLOCK / HEADACHE BALL	lbs	lbs	lbs	lbs
RIGGING AND ACCESSORIES	lbs	lbs	lbs	lbs
SPREADER BAR	lbs	lbs	lbs	lbs
TEST WEIGHT	lbs	lbs	lbs	lbs
OTHER	lbs	lbs	lbs	lbs
TOTAL CALCULATED WEIGHT	lbs	lbs	lbs	lbs

COMMENTS/ REMARKS

SEE PAGE 2 FOR RIGGING DIAGRAMS

APPROVALS

ROLE	NAME (PRINT)	SIGNATURE	DATE	TIME
LIFT AUTHORITY (LTA)				
LIFT DIRECTOR				
SAFETY MANAGER				

Appendix B Critical Lift Plan (cont.)

RIGGING PLAN DIAGRAM

LIFTING PLOT PLAN

Revision History

Document Revision History

Complete the following table for each document revision.

Rev. No.	Description of Change	Author	Approved By	Rev. Date	Effective Date
1	NEW! Integrated LAR H&S Standing Instruction; Replaces SAF-061 Cranes, Hoists & Rigging, FS 590 Mobile Crane Safety, and FS 593 Mobile Crane Assembly/Disassembly	Christine Tenazas	Mark Bennett	04/22/15	04/22/15
2	Proximity to electrical hazard update. Changes to standing instruction, MRA, and critical lift checklist forms	Christine Tenazas	Michael Chambers	04/13/16	04/13/16
3	1. Added that any lift over 100,000 pounds is a critical lift. 2. Added definition for escort and vehicle spotter and associated requirements. 3. Added two requirements for A/D Director. 4. Added two requirements for Crane Operator. 5. Added two requirements for Contract Companies. 6. Added a new requirement in the Plan Changes section. 7. Added a new requirement in the Environmental Conditions section. 8. Added requirements for maintaining inspection records. 9. Added a new section titled 10. Alternate Lifting Equipment.	Alek Hamparian	Mike Kulakowski	03/28/19	03/28/19

4	1. Added a new section to describe the requirements for flexible intermediate bulk container or bulk bag (FIBC) use at LAR. 2. Updated the responsibilities of the Assembly/Disassembly (A/D) Director to include the following: "communicate with the crew their tasks, the hazards associated with their tasks, and the hazardous positions and locations to avoid. 3. "During the Pre-Lift meeting, the A/D Director shall discuss with the crew the crane's load chart and limitations during the A/D Operation." 4. The Pre-Lift Meeting section was updated to state: "For a Critical Lift, at a minimum, the meeting shall be attended by the LTA (or designee), Permit Cosigner, Crane Operator, work crew, and Owning Department Representative." 5. The Plan Changes section was updated with the following: "Upon starting the job, any change to the lifting plan requires the crew to stop the job and hold a team meeting." 6. The A/D Safety section was updated with the following: "For assembly/disassembly, at a minimum, the meeting shall be attended by the A/D Director, Marathon Rigging Foreman or designee, Crane Operator, and work crew. The A/D Director will review the Load Chart information with the crew during the pre-lift meeting as part of the Toolbox Talk." 7. An exception was added that allows boom trucks greater than 15 tons rated capacity to not require two escorts. 8. Added a requirement to the Crane Setup section, "Before verifying counterweight clearance, the Crane Operator is responsible to ensure enough spotters are available to cover all areas of close clearance and that the spotters have established radio communication with the Crane Operator.	Alek Hamparian	Mike Kulakowski	01/27/20	01/27/20
5	Converted to Marathon format	Brian Quinn	Connie Lema	06/25/22	07/01/22
6	Added; Marathon Engineering shall approve ground bearing pressures that exceed the limitations in 4.1.2.	Brian Quinn	Connie Lema	08/27/24	08/27/24