

ENVIRONMENTAL HEALTH & SAFETY
THE UNIVERSITY OF TEXAS AT TYLER



PROGRAM FOR CRANE
SAFETY

2023

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Introduction:

The University of Texas at Tyler Environmental Health and Safety department has developed this Crane Safety Program to ensure a safe work environment and to protect the health and safety of University Staff and any contractors or vendors working on University property. This program was written with guidance from OSHA guidelines, the University of Texas System Construction Safety Program, and on-site Job Hazards Analyses.

Purpose:

This program establishes written procedures to be followed when operating a crane on UT Tyler campus to protect all employees from hazards. This document contains requirements for practices and procedures on how to properly establish a safe environment on campus when a crane is used, and to prevent incidents associated with this equipment.

Application:

This program applies to work performed by any UT Tyler employee, student, or contractor performing work that involves the use of a crane. This includes, but are not limited to, the following: articulating cranes; cranes on barges; crawler cranes; dedicated pile drivers; derricks; floating cranes; locomotive cranes; mobile cranes; overhead and gantry cranes; pedestal cranes; portal cranes; service/mechanic trucks; side boom cranes; and/or tower cranes.

Notice:

Employees and outside contractors shall not operate a crane until the following requirements have been met:

- The crane has been inspected and tagged by EH&S;
- Workers operating the crane show proof of training from a national recognized organization.
- Workers who will be assisting the operator (spotting) show proof of proper crane communication hand signals.
- All other employees working on the job site have a clear understanding of their responsibilities on the site.
- Proper personal protective equipment (PPE) has been selected and issued to affected employees

A crane may not be operated until every single requirement is met. If the following conditions cannot be met, the crane will be restricted to employees and others by erecting barriers, installing locks (LOTO), and/or posting warning signs until the requirements have been met.

Definitions:

Allowable Ground Bearing Pressure: The maximum permissible pressure, typically expressed in pounds per square foot (psf) or Pascal's (Pa), that may be imposed on the supporting surface. This value may be equal to the Soil Bearing Capacity divided by a suitable safety factor or it may be a lesser value as limited by other considerations, such as the strength of the subsurface pipes. See Ground Bearing Pressure; see Soil Bearing Capacity.

A/D Director: (Assembly/Disassembly director) means an individual who meets this subpart's requirements for an A/D director, irrespective of the person's formal job title or whether the person is non-management or management personnel.

Assembly/Disassembly: Means the assembly and/or disassembly of equipment covered under this standard. With regard to tower cranes, "erecting and climbing" replaces the term "assembly" and "dismantling" replaces the term "disassembly". Regardless of whether the crane is initially erected to its full height or is climbed in stages, the process of increasing the height of the crane is an erection process.

Average Ground Bearing Pressure (AGBP): $\text{Force/Area} = \text{AGBP}$. The average pressure exerted onto the ground under a specified area.

Bending Stress: Stress created in a load supporting member due to a bending action of that member, as opposed to tensile or compressive action.

Blocking: Material used to support equipment or a component and distribute loads to the ground. It is typically used to support lattice boom sections during assembly/disassembly and under outrigger and stabilizer floats. Also called dunnage, cribbing, pads, and mats.

Bumper Outrigger: A hydraulic cylinder or manual jack located on the front bumper of a truck crane carrier to provide additional stability and extend the crane's working range over the front of the carrier.

Competent Person: An individual designated by the employer to be responsible for the immediate supervision, implementation, and monitoring of the employer's managed fall protection program who, through training and knowledge, is capable of identifying, evaluating, and addressing existing and potential fall hazards, and who has the employer's authority to take prompt corrective action with regard to such hazards.

Crane Mat: An assembly of structural members arranged to distribute the loads from a crane's tires, outriggers, or crawler tracks over a large area in order to reduce the ground bearing pressure and minimize settlement.

Crane Pad: An area of compacted or otherwise specially prepared soil, concrete, mats, steel plate or other materials designed to support a mobile crane.

Cribbing: Blocking materials that are used to increase the bearing area and height.

Critical Lift: A crane lifting operation judged to involve an exceptional level of risk, due to factors such as load weight, lifting height, procedural complications, or proximity to situational hazards. Critical lifts may be identified by conditions exceeding a specified percentage of the crane's rated capacity; however, many more complex issues may be involved.

Crush Rating: The allowable amount of pressure that an outrigger pad, crane outrigger pad, cribbing or crane pad is rated to carry, based on the strength of the material.

Deflection: The bending of supporting materials as downforce is applied.

Derrick: A lifting device consisting of a vertical mast secured at the top by guy lines or braces and utilizing hoist machinery and operating ropes. A derrick may or may not utilize a boom.

Derricking: Operation of changing boom angle by varying the length of the boom suspension ropes.

Displacement: The difference between the unloaded horizontal positions of the outrigger pad, compared with the fully loaded horizontal position of the outrigger pad.

Downforce: The force that is generated in a downward direction from the outriggers through the outrigger float and onto the outrigger pads.

Dunnage: Loose materials used to support, separate, and protect equipment, parts, and accessories during storage and stabilization.

Effective Bearing Area: The area in full contact that is effective in distributing the applied load to the underlying surface.

Flex Modulus (Bending Stiffness): The ratio of stress to strain that determines the tendency of a material to bend.

Float: The rigid pan-like structural component that attaches to the outer end of a mobile crane's outrigger to provide some load spreading of the outrigger load to the supporting surface. The floats are provided by the crane manufacturer. Also commonly called outrigger float, outrigger pad, outrigger pan, foot, or pad.

Ground Bearing Pressure (GBP): The pressure, typically expressed in pounds per square foot (psf) or Pascal's (Pa), that a crane imposed on the supporting surface. See Allowable Ground Bearing Pressure.

Ground Bearing Capacity (GBC): The strength of the ground, or its ability to support a pressure.

Ground Conditions: The ability of the ground to support the equipment (including slope, compaction, and firmness) (29 CFR 1926.1402).

Grounding Mat: Grounding device used when a crane will be working in a relatively fixed location which is near electrical hazards. Equipment is placed on that mat and bonded to it. The grounding mat area is usually enclosed with a fence to prevent personnel from stepping on and off the mat during operation of the machine.

Grounding Rod: Grounding device used when a crane will be working in a relatively fixed location which is near electrical hazards. The ground lead is connected to the rod and to the machine, with the rod placed as close to the machine as possible.

Lifting Capacity: The maximum gross load weight that a crane manufacturer has determined a crane can safely handle under specified conditions of counterweight, level, outrigger position, boom length, radius, etc. Lifting capacities are published in tables known as capacity charts. The lifting capacity is NOT the maximum load that a crane can lift before it begins tipping or collapses.

Mat: Individual timbers fastened together into units, steel plates, or woven wires placed under crawler tracks, wheels, or outrigger pads to prevent sinking by increasing the bearing area contacting the ground thereby reducing bearing pressures.

Maximum Load: The heaviest load that a crane's capacity chart shows it is capable of lifting in a given configuration.

Maximum Load Radius Limit: The longest distance from the crane's centerline of rotation (radius) at which a crane with a given boom length can lift any load.

Maximum Outrigger Reaction Force: The maximum amount of weight that the equipment can exert through its outriggers.

Maximum Radius: The longest distance from the crane's centerline of rotation (radius) where a maximum load can be lifted within the crane's rated capacity. The shortest distance from the crane's centerline of rotation (radius) at which a crane with a given boom length can lift any load.

On Outriggers: (1) The condition where a crane operates with all outriggers fully extended and set to level the crane body with its tires or crawlers free of the ground. (2) Rated capacities for a crane which are applicable when the crane is operating with all outriggers fully extended and set to level the crane body with its tires or crawlers free of the ground. Related: On Rubber.

On Rubber: (1) The condition where a crane operates with any of its tires in contact with the ground. (2) Rated capacities for a crane which are applicable when the crane is operating with any of its tires in contact with the ground. Also: On tires. Related: On Outriggers.

Outrigger: A beam which extends from the lower works of a crane to increase the crane's stability. The beams may be either extendible/retractable or fixed length and typically utilize some type of pad to distribute loads to the ground surface.

Outrigger Beam: The part of an outrigger system which extends horizontally from the outrigger box to support the vertical outrigger jack.

Outrigger Jack: The hydraulic cylinder on the outrigger beam which extends vertically to raise and lower the crane.

Outrigger Pad/Float/Foot: The metal pan structure supplied by the equipment manufacturer that distributes the total load from the outrigger to the underlying blocking and ground surface. Typical shapes are round, square, rectangular or octagonal. SEE: Float.

Outrigger Pad: A wood, metal, or synthetic structural element that is placed on the supporting surface and on which bears the crane's float that is used to distribute the outrigger load over a larger area.

Outrigger Pin System: A hydraulic system available to facilitate outrigger box removal by means of hydraulic cylinders used in place of the standard outrigger box mounting pins.

Pad: Compacted soil, concrete, wooden timbers or mats, or steel plates assembled into a system for supporting a crane with minimal settlement.

PSA: Project Safety Assistant

PSC: Project Safety Coordinator

Qualified Person: A person with a recognized degree or professional certificate and with extensive knowledge, training, and experience in the fall protection and rescue field who is capable of designing, analyzing, evaluating and specifying fall protection and rescue systems to the extent required by these standards.

Identifying Parts on a Crane:

1. Boom:

- An inclined spar, strut, or other long structural member which supports the upper hoisting tackle on a crane or derrick. Typically, the length and vertical angle of the boom can be varied to achieve increased height and reach when lifting loads. Booms can usually be grouped into general categories of hydraulically extendible, cantilevered type, latticed section, cable supported type or articulating type.

2. Boom Pendants:
 - Pendants are typically used in a latticed boom crane system to easily change the length of the boom suspension system without completely changing the rope on the drum when the boom length is increased or decreased. Pendants includes both wire and bar types.
3. Center of Gravity:
 - The center of gravity of any object is the point in the object around which its weight is evenly distributed. If you could put a support under that point, you could balance the object on the support.
4. Jib Mast:
 - Jib arm is the horizontal or near horizontal beam used to support the load clear of the main support. The jib arm is attached to a vertical mast or tower to an inclined boom for support.
5. Main Block:
 - Is the assembly of hook, swivel, bearing, sheaves, pins, and frame and is suspended by hoisting ropes or load chains. It is used to lift or move objects up to a specific lifting capacity.
6. Jib Runner:
 - Is used for raising, lowering, shaping, and controlling the rig. It is supported by the "Jib Mast".
7. Carrier:
 - A truck-mounted crane has two parts: the carrier, often referred to as the lower.
8. Outrigger:
 - Outriggers are crucial to a successful lift with a mobile crane. Outriggers provide a solid base for the crane. Their purpose is to improve the stability of the crane during operation.
9. Headache Ball:
 - The hook block and headache ball are the pieces of equipment that connect the rigging from the load to the crane. The headache ball is the simplest form of a crane hook.
10. Bridle or Bridle harness:
 - A contrivance of rings, hooks, and chains or ropes serving to attach heavy loads to a crane.
11. Crane Pad:
 - An area of compacted or otherwise specially prepared soil, concrete, mats, steel plate or other materials designed to support a mobile crane.
 - Cribbing: Blocking materials that are used to increase the bearing area and height.
12. Gantry or A-Frame
 - A gantry crane is a type of overhead crane that is similar to a bridge crane, but instead of moving on suspended runways, the crane uses legs to support the bridge,

trolley, and hoist. These legs travel on tires or on rails that are embedded in the floor or ground structure.

Crane Requirements:

For every brand and model of crane and motor driven equipment brought onto the project, the using company may be required to transmit to the PSC a list of employees who are trained and authorized to operate the equipment. Copies of all available training and/or certification documents shall be provided. Forklifts and cranes shall only be operated by persons who possess documentation of certification from a training program that carries nationally recognized accreditation. Individuals who possess required credentials shall demonstrate capability for witness by the PSC/A. The PSC/A shall issue cards and insignia as detailed herein to authorize on-site operations of all specified equipment.

For every position that is required to assist crane and motor driven equipment operations, the using company may be required to transmit to the PSC a list of employees who are trained and authorized to perform the functions. Rigging shall only be performed by persons who possess documentation of completion from a training program that carries recognized accreditation.

All workers shall be trained to perform their specific task(s). Employers shall provide formal documentation to support training provided.

Acceptable documentation for all training claimed shall contain organization, name, and title of the trainer(s), date of training, material covered with time spent on each topic, and evaluation process used to determine worker understanding of training. Owner reserves the right to determine acceptability of training being claimed.

Project Safety Management Plan (PSMP):

Crane Operations (set-up/use requirements and limitations).

Initial and Annual inspection of all Cranes and Motor Driven Equipment

- The Contractor shall facilitate safety inspections and written certifications for all hoists, cranes, mobile equipment, motorized scissors and aerial lift platforms, motorized stager platforms, generators, and compressors on the project.
- The contractor shall ensure that all equipment inspections are consistent with the manufacturer's requirements. All initial inspections and certification on proper condition shall be transmitted to PSC before a piece of equipment is allowed to commence operations at the Project.
- The contractor shall select the month that occurs approximately six (6) months after the commencement of construction and announce this as the month for annual re-inspections and re-certifications of all motor driven equipment and cranes that remain

in use at the project. Any equipment that leaves the project will require recertification before it shall be allowed to resume operation at the Project.

Mobile Equipment and Crane Operations Records

Each employer shall submit to the PSC/A, for each operator, a record of training that identifies the trainer and the details that were addressed and successfully demonstrated during the training. The minimum amount of detail shall include the following assurances:

- Pre-start up inspection, travel path issues, and location/set up procedure;
- Start up, operation, intended use, and shut down (normal and emergency)
- Equipment operations manual, Limit chart(s), Motor Plate information, equipment capacities and limitations, alarm features, safety stops, seat belts, roll over protection and preventive manner.
- PPE, Fall protection, environmental and any other related risk or exposures
- Any assembly or disassembly of a tower crane will only be done while activities are monitored by a crane consultant provided by the owner. Prior to any operation, the tower crane assembly/disassembly contractor shall provide a detailed plan for the work. Details of the plan must include at a minimum, all elements in Exhibit L, and the plan must be provided to the ODR as Required. The ODR reserves the right to determine acceptability of the information provided. Submission of this plan in no way relieves the contractor from ensuring all documentation is provided, reviewed for accuracy based on the planned task(s), ensuring that the work is pre-planned and communicated to all affected workers, all workers are properly trained to perform their tasks, and that all work is done according to the agreed to plan. The PSZC is responsible for the review and acceptance for the contractor.

Cranes

Tower cranes (including affiliated transformers and power supply equipment) shall be surrounded by at least a sixteen-foot (16') high, 5/8" inch plywood enclosure with a lock-controlled entrance.

Operators of cranes shall possess certification from a nationally accredited training organization.

Every crane and piece of holstering equipment shall be equipped with an anti-two blocking sensor above each lifting block.

Unless the crane is equipped with sensors that inform the operator for the weight of the load on the hook and the current wind speed, these measurements shall be determined by other means before commencement of each lift.

When outriggers are used on cranes, they shall be fully extended. Float pads shall be landed onto leveled and properly designed and size slabs or cribbing. Where steel plate is used for cribbing, welding or bolted cleats shall be attached to upper surface to prevent float pads from moving horizontally. For cranes of up to and including 35-ton capacities, wooden cribbing shall be minimum of four inches (4") in thickness. For cranes over 35-ton capacities and up to 150-ton capacities, cribbing shall be a minimum of eight inches (8") in the thickness. For a;; cranes up to 150-ton capacity, the minimum size of the surface ("foot print") of the cribbing assembly shall be determined by the following formula: the capacity of the crane in tons, divided by 5 equals the minimum square footage required . Properly sized circular crib pads are acceptable. Side dimensions for rectangular crib pads shall be equal to each other or differ by no more than one foot. For cranes larger than 150-ton capacities, a qualified person shall design the cribbing. "Sandwich" units of cribbing are allowed as long as the plywood on bottom and on top is at least one inch in thickness.

For "pick and move" operations, the pick shall be made directly in front of the crane with the boom as near vertical as possible. Move at walking speed with a "spotter" in front of the load and another behind the crane. Guy wire cables that secure the load to the body (to prevent lateral force loading of the boom) of the crane shall be required if the grade slope is more than (3) degrees or the terrain is uneven. Only rubber-tired cranes shall be allowed to perform the operation without a "critical lift" plan and the load must be under 50% of the "on rubber" chart limit.

Critical lifts shall include, but not limited to: (1) tandem lifts, (2) Lifts greater than 75% of the Load Chart, (3) Crane suspended Personnel Hoists, (4) Non-Conventional Outrigger placements and (5) "blind" picks and/or placements. All of these events shall require submittal of customs designed plans by qualified persons.

Multiple lift operations ("Christmas Treeing") shall be not be permitted.

All cranes operators on rig rated for more than five (5) tons of capacity shall submit to a physical examination prior to conducting any work on the Project and, if still on the project, at least every twenty-four (24) months thereafter. The physician's written declarations of fitness shall be submitted to and maintained by the PSC/A in Project files.

Only the designated rigger and/or signal persons shall issue lift instructions to the operator. The only exception shall be an emergency stop signal, which may be delivered by anyone on the Project who knows how to alert the operator.

All loads lifted more than six feet (6') above ground elevation shall have a tag line attached that is long enough to all control of load spin without place any part of the body directly below the load. When "shake out" hooks are used, the load must never be elevated above five feet (5') over the surrounding surface and workers must stay at least five feet (5') horizontally away from the suspended load.

For any load that may be elevated and moved directly above workers, a means for worker notification must be in place. The crane operator may perform this notification by horn if the load can be seen at all times. If the crane operator will lose sight of the load at any time, notification must be made by a designated individual who can maintain sight of the load. Notification must be accomplished by some means that attracts the attention of all workers.

Assembly/Disassembly (A/D)

Cranes will not be assembled/disassembled on UT Tyler campuses with proper authorization from EH&S.

Vertical Drop Zone:

1. Only employees essential to the operation are permitted in the vertical drop zone (VDZ).
2. Vertical drop zones must be tapped off or barricaded to control entry. Vertical drop zone should be set by using a 45-degree angle from the load, lifts, or working overhead. Ex. A load 15 feet in the air, must have an area of 15 feet in all directions tapped off.
3. No employee must be directly under the load, NO EXCEPTIONS!
4. An employee is essential to the operation if the employee is conducting one of the following operations and the employer can demonstrate it is infeasible for the employee to perform that operation from outside the fall zone:
 - Physically guide the load;
 - closely monitor and give instructions regarding the load's movement;
 - Either detach it from or initially attach it to another component or structure (such as, but not limited to, making an initial connection, or installing bracing).
5. HARD HATS MUST BE WORN AT ALL TIME WHEN INSIDE THE VERTICAL DROP ZONE!

Ground Conditions:

1. The equipment must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met. The requirement for the ground to be drained does not apply to marshes/wetlands.
2. The controlling entity must:
 - Inform the user of the equipment and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) that are in the possession of the controlling entity (whether at the site or off-site) or the hazards are otherwise known to that controlling entity.
 - Ensure that ground preparations necessary to meet the requirements in paragraph (1) of this section are provided.

3. There are five variables when checking for proper ground conditions, they include the following:
- Visual inspection of area
 - Degree of level
 - Bearing Capacity of soil
 - Controlling entity identification
 - Evaluate ground preparation

Power Line Safety:

1. Identify the cranes work zone:
 - Work Zone = Marking boundaries or 360 degrees around crane up to maximum working radius.
 - Determine 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. If so, the employer must meet the requirements in the following statement:
2. Operation below power lines are generally prohibited unless:
 - Employer confirms utility owner/operator has de-energized the power line and visibly grounded the power line or;
 - Highest point of the boom, even when it is completely extended and vertical is less than the required minimum distance.
 - Meets Table A requirements:

Table A	
Minimum Clearance Distances	
Voltage (nominal, kV, alternating current)	Minimum Clearance Distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 700	35
over 750 to 1000	45
over 1000	(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

3. Training:

- Danger of electrocution if person simultaneously touches the equipment and ground.
- Importance of the operator's safety of remaining inside the cab except when there is imminent danger of fire, explosion, or other emergency that necessitates leaving cab.

4. Traveling under or near power lines:

- Boom mast lowered
- Effects of speed and terrain
- Dedicated spotter
- Follow poor visibility requirements
- Follow Table T Requirements:

Table T Minimum Clearance Distances While Traveling with No Load	
Voltage (nominal, kV, alternating current)	While Traveling - Minimum Clearance Distance (feet)
up to 0.75	4
over .75 to 50	6
over 50 to 345	10
over 345 to 750	16
over 750 to 1000	20
over 1000	(as established by the utility owner/ operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

Safety Devices:

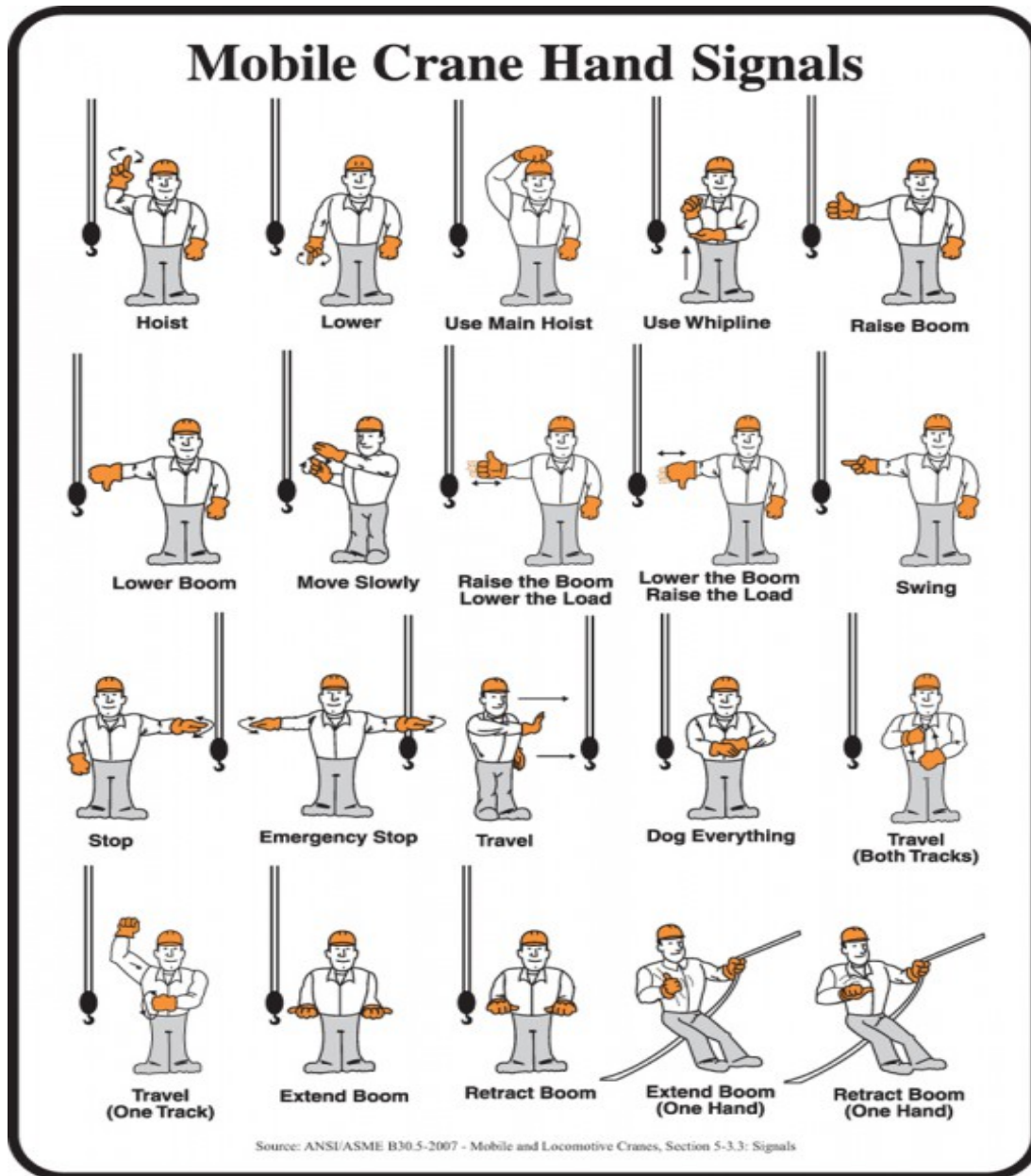
- Crane level indicator
- Boom stops
- Jib stops
- Foot pedal brake locks
- Holding device/check valve
- Rail clamps/stops
- Boom hoist limiting device
- Luffing jib limiting device
- Automatic anti two-blocking device
- Automatic or warning-type anti two-blocking device
- Boom angle or radius angle
- Jib angle indicator
- Boom length indicator
- Load weighting device
- Outrigger/Stabilizer position sensor/monitor
- Hoist drum rotation indicator

Employee qualifications:

1. Operators qualifications:
 - Must be certified and tested on the following criteria:
 - Controls/performance characteristics
 - Calculate capacity
 - Preventing power line contact
 - Ground conditions and equipment support
 - Use and locate information in operating manual
 - Operator certification can be provided by four options:
 - Accredited testing organization
 - Audited employer organization
 - U.S. military
 - State/local government license
2. Signal Person (spotter) qualifications:
 - Know and Understand signals.
 - Competent in using signals.
 - Basic understanding of crane operation.
 - Know and understand standard.
 - Oral or written test plus practice test.
3. Maintenance Personnel
 - Maintenance and repair personnel will meet definition of qualified person with respect to equipment and maintenance/repair tasks they perform.
4. Rigger qualifications
 - Know and understand requirements of applicable ASME standards.
 - Example = B30.9, Slings and B30.26, Rigging Hardware
 - Know and understand type of sling and hitches used including removal criteria for rigging gear.
 - Be competent in application of the type of hitches used.
 - Have a basic understanding of applicable slings, rigging hardware, winch, below-the-hook lifting devices and their limitations.
 - Know and understand rigging related conditions, such as load weight estimation, center of gravity, effect of angles on rigging components and basic hand signals, as applicable.

Communication:

Communication can come in three different forms including, but not limited to; Hand signals, voice signals, audible signals which must be hands-free.



Included above are basic hand signals, before a crane is used the operator and signal personnel must have a briefing to go over hand signals and what each signal means. This is to be done before each job, and each time a new signal person is appointed.

Inspections:

1. Cranes must be inspected by EH&S before the job can start
 - If the crane passes inspection, EH&S will leave an inspection form on the crane. This inspection form will be good for the remainder of the job, unless the job last more than three months.
 - If the job last more than three months, the crane will need to be re-inspected and tagged by a competent EH&S employee.
2. Cranes must be inspected each shift by the operator.
3. Each crane must be inspected annually by a qualified person. This inspection should be documented and stored with the crane.

Hoists/Gantry Cranes

Cranes/hoist should be inspected for the following:

1. Functional operating mechanisms for excessive wear
2. Hooks with deformation or cracks
3. Hoist chains and end connections for excessive wear, twist or distortion interfering with proper function, or stretch beyond manufacturer's recommendations
4. Running Rope and end connections for wear, broken strands, etc.
5. Deformed, cracked or corroded members
6. Loose bolts or rivets
7. racked or worn sheaves and drums
8. Worn, cracked or distorted parts, such as pins, bearings, shafts, gears, rollers, locking and clamping devices.
9. Excessive wear on brake-system parts, linings, pawls and ratchets
10. Inaccuracies in load, wind and other indicators
11. Electric , gasoline, diesel, or other types of motors for improper performance
12. Excessive wear of chain drive sprockets and excessive chain stretch
13. Deteriorated electrical components, such as pushbuttons, limit switches or contactors

In addition to the initial inspection all new and altered crane-functions are tested for:

1. Hoisting and lowering
2. Trolley travel
3. Bridge travel
4. Limit switches, locking and safety devices

Slings/Straps

1. Wire rope slings, inspect for:
 - a. Excessive broken wires, for strand-laid and single part slings, ten randomly distributed broken wires in one rope lay or five broken wires in one strand in one rope lay
 - b. Severe localized abrasion or scraping, kinking, crushing, bird caging

- c. Any other damage resulting in damage to the rope structure
- d. Severe corrosion of the rope or end attachments
- 2. Chain slings, inspect for:
 - a. Cracks or breaks
 - b. Excessive wear, nicks or gouges
 - c. Stretched chain links or components
 - d. Bent, twisted or deformed chain links or components
 - e. Excessive pitting or corrosion
 - f. Lack of ability of chain or components to hinge freely
- 3. Web slings, inspect for:
 - a. Acid or caustic burns
 - b. Melting or charring of any part of the sling
 - c. Holes, tears, cuts or snags
 - d. Broken or worn stitching in load bearing splices
 - e. Excessive abrasive wear
 - f. Discoloration and brittle or stiff areas on any part of the sling, which may mean chemical or ultraviolet/sunlight damage
- 4. Round slings, inspect for:
 - a. Acid or caustic burns
 - b. Evidence of heat damage
 - c. Holes, tears, cuts, abrasive wear or snags that expose the core yarns
 - d. Broken or damaged core yarns
 - e. Weld splatter that exposes any core yarns
 - f. Discoloration and brittle or stiff areas on any part of the slings, which may mean chemical or other damage

Remove any sling from service and tag the cord "Dangerous Do Not Use" if any of the above problems are found during the inspection.

Record-Keeping

A crane pre-operation inspection will be completed, signed, and dated by a designated member of the Environmental Health and Safety department. EH&S shall maintain the original permit on file for a minimum of three years. A copy of the Crane Inspection will be forwarded to any department which required a permit.

Crane/Hoist and Sling Inspections

A quarterly inspection will be completed, signed and dated by a designated member of the Environmental Health and Safety department. EH&S shall maintain the inspections on file for a minimum of three years. A copy of the inspections will be forwarded to any department which required a copy.

Training

Training must be completed prior to any use of a crane or hoist. Training shall include the following:

- Characteristics of safe crane and hoist operation
- Inspection procedures
- Basic load handling considerations
- Operator responsibilities
- Communication used during crane and hoist operation
- Sling/Strap Inspection

Annual Compliance Review

The Safety Organization will review the program annually to determine how the program can be improved. EH&S will strive to keep all programs up to date, with accurate information that employees, and outside contractors can rely on.

Revisions

Date	Author/Reviewer	Description/Reason for Change
5/3/2021	T Bay/ P Tate	Reviewed for latest revision/updated year/added revision section
7/5/2021	T Bay/ P Tate	Added crane/hoist & sling inspection information
1/3/2022	T Bay/P Tate	Updated information regarding crane assembly/disassembly that occurs on campus
7/7/2023	T Bay/K Stapp	Reviewed, updated logo, date, & formatting