CRANE SAFETY PROGRAM

1.0 POLICY STATEMENT

Employees and other employees contracted to perform work at LBCC - installation, set-up, and/or use of any crane - must do so in compliance with this program.

Manufacturer recommendations must be reviewed prior to installation/set-up and use of a crane. Furthermore, all manufacturer recommendations must be complied with.

All new overhead and gantry cranes must meet the design specifications of the American National Standard Safety Code for Overhead and Gantry cranes, ANSI B30.2.0.

Note: A "crane" is defined by OSHA (29 CFR § 1910.179) as a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine. Cranes whether fixed or mobile are driven manually or by power.

2.0 PURPOSE & SCOPE

This program has been designed to provide LBCC employees with guidance pertaining to use of cranes and to provide an overview of the Occupational Safety and Health Administration (OSHA) standards regarding crane use.

3.0 APPLICABLE FORMS & DOCUMENTS

- OSHA Standard 29 CFR **§** 1910.179
- OSHA Standard 29 CFR **§** 1910.180
- OSHA Standard 29 CFR **§** 1910.181
- ANSI B30

4.0 RESPONSIBILITIES

- Departments:
    - Departments must notify Safety & Loss Prevention (541-917-4940 or 4309) when hiring a contractor that uses a crane on campus.
    - For the work they oversee, managers and supervisors must read all applicable manufacturer recommendations for crane use.
    - Read this program and, when applicable, follow the guidance set forth in this program.

- College Employees:
    - Use cranes and hoists in accordance with manufacturer recommendations and all applicable requirements found in this program; and
    - Do not use damaged equipment.

- Safety & Loss Prevention Department:
    - When requested, provide guidance regarding crane use; and
    - Oversee and revise this program, as needed.

5.0 GETTING STARTED

Read this program and the manufacturer recommendations pertaining to the model of crane(s) being used.

6.0 CORE REQUIREMENTS

This section applies to overhead and gantry cranes.

6.1 General Requirements

- Installation/set-up must meet manufacturer recommendations, and current ANSI B30, and OSHA 29 CFR 1910.179 requirements.
- New and altered cranes must be tested to insure proper hoisting and lowering, trolley travel, bridge travel, and proper function of limit switches, locking and safety devices. A rated load test must also be performed. The testing must be performed in accordance with OSHA 29 CFR § 1910.179(k) (1) & (2) and OSHA 29 CFR § 1910.180(e) (1) & (2).
- Modifications are only allowed if the manufacturer has approved the modification and the approval is documented in written form, a qualified engineer has checks the new rated load, and the new rating is posted on the crane and supporting structure.
- The rated load of a crane must be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist must have its rated load marked on it or its load block and the marking must be clearly legible from the ground or floor.
- Overhead and Gantry Cranes – Minimum clearance of 3-inches overhead and 2 inches laterally must be provided and maintained between the crane and obstructions. Where passageways or walkways are provided obstructions must not be placed so that movements of the crane will jeopardize safety of personnel. If runways of two cranes are parallel, and there are no intervening walls or structure, there must be adequate clearance provided and maintained between the two bridges.
- Crawler and Wheel Mounted Cranes – Persons must stay outside the swing radius of the boom when the crane engine is in operation.
- Except for floor-operated cranes, a gong or other effective warning signal must be provided for each crane equipped with a power traveling mechanism.
- All hooks must be equipped with a safety latch to prevent loads from bouncing off the hook.
- If a load is supported by more than one part of rope, the tension in the parts must be equalized.
- Rope clips attached with U-bolts must have the U-bolts on the dead or short end of the rope (“never saddle a dead horse”). Spacing and number of all types of clips must be in accordance with the clip manufacturer’s recommendations. Clips must be dropforged steel in all sizes manufactured commercially.
- Swaged or compressed rope fittings must be applied as recommended by the rope or crane manufacturer.
- Rope socketing must be done in the manner specified by the manufacturer of the assembly.
- Wherever exposed to temperatures, at which fiber cores would be damaged, rope having an independent wire rope or wire-strand core or other temperature-damage resistant core must be used.
- Wherever exposed to temperatures, at which fiber cores would be damaged, rope having an independent wire rope or wire-strand core or other temperature-damage resistant core must be used.
- When two or more cranes are used to lift a load one qualified responsible person must be in charge of the operation. This person must analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

- Replacement rope must be the same size, grade and construction as the original rope furnished by the crane manufacturer, unless otherwise recommended by a wire rope manufacturer due to actual working condition requirements.
- When a newly installed rope has been in operation for an hour, all nuts on the clip bolts must be re-tightened.
- Loads must be attached to hooks by means of slings or other approved devices.
- All operations near overhead lines **must** be done in accordance with 29 CFR 1910.333(c) (3) requirements.
- Crawler & wheel-mounted cranes - must not be operated without the full amount of any ballast or counterweight in place as specified by the maker, but truck cranes that have dropped the ballast or counterweight may be operated temporarily with special care and only for light loads without full ballast or counterweight in place. The ballast or counterweight in place specified by the manufacturer must not be exceeded.

6.2 Required Inspections

- All cranes must be inspected prior to initial use, prior to each days use, monthly, and annually.
- All new and altered cranes must be inspected prior to initial use. The inspection will insure that the crane meets all applicable manufacturer, ANSI, and OSHA requirements. Use Appendix A, B & C criteria and the manufacturer's recommendations when performing crane inspections.
- Using the checklist found in Appendix A, all cranes must receive an inspection prior to each days use.
- All cranes must receive an inspection at least annually using the checklist found in Appendix C or be inspected annually by a contracted crane maintenance company. Any deficiencies must be corrected prior to use.

Required Inspection Frequency, Based Upon Crane Use:
Daily – When crane is to be used, complete the daily checklist found in Appendix A.
Monthly – Cranes in regular use (used at least once/month) must be inspected at least monthly using the checklist found in Appendix B.
Prior to Use – A crane idle for one month or more but less than six must be inspected using the checklist in Appendix B before using.
Combo, Prior to Use – A crane idle for six months or more must be inspected using the checklist from Appendix C prior to use.

6.3 Maintenance Requirements

- A preventative maintenance program based on the crane manufacturer's recommendations must be established.
- The following procedures must be followed when performing maintenance:
    - The crane to be repaired must be located where it will cause the least interference with other cranes and operations in the area.
    - All controllers must be at the off position.
    - The main or emergency switch must be open and locked-out in the open position.
    - Warning or out-of-order signs must be placed on the crane and on the floor beneath or on the hook where visible from surface level.
    - All guards must be reinstalled, safety devices reactivated and maintenance equipment removed prior to placing the crane back into operation.
    - Overhead and Gantry Cranes - Where other cranes are in operation on the same runway, rail stops or other suitable means must be provided to prevent interference with the idle crane.

6.4 Adjustment and Repair Requirements

- Any unsafe conditions disclosed by the inspection requirements of section 6.2 must be corrected before operation of the crane is resumed. Only a contracted employee that is qualified to work on the crane must do adjustments and repairs.
- All adjustments must be made in a manner that maintains the correct functioning of components, such as but not limited to:
    - All functional operating mechanisms
    - Limit switches

  - Control systems
  - Brakes
  - Power plants
- Cranes needing to have any critical component repaired or replaced must not be used.

6.5 Additional Requirements for Crawler/Wheel Mounted Crane Use

The margin of stability for determination of load ratings, with booms of stipulated lengths at stipulated working radii for the various types of crane mountings, are established by taking a percentage of the loads that will produce a condition of tipping or balance with the boom in the least stable direction, relative to the mounting. The load ratings must not exceed the following percentages for wheel-mounted cranes, with the indicated types of mounting under conditions stipulated in the paragraphs below the following chart:

Locomotive, using outriggers	
Locomotive, using outriggers	80
Crawler, without outriggers	75
Crawler, using outriggers	85
Truck and wheel mounted without outriggers or using outriggers fully extended	85

1. Unless this results in less than 30,000 pound-feet net stabilizing moment about the rail, which must be minimum with such booms.

Stipulations governing the application of the values in the chart found above for crawler, truck, and wheel-mounted cranes must be in accordance with Crane Load-Stability Test Code, Society of Automotive Engineers (SAE) J765.

The effectiveness of these preceding stability factors will be influenced by such additional factors as freely suspended loads, track, wind, or ground conditions, condition and inflation of rubber tires, boom lengths, proper operating speeds for existing conditions, and, in general, careful and competent operation. The user must take all of the variable conditions into consideration.

"Load rating chart." A substantial and durable rating chart with clearly legible letters and figures must be provided with each crane and securely fixed to the crane cab in a location easily visible to the operator while seated at his control station.

7.0 TRAINING

Only designated trained persons are allowed to operate a crane.

Training for designated crane operators must consist of a review of this program and manufacturer information related to the specific equipment being used and all of the following requirements:

7.1 Handling the Load

- The crane must not be loaded beyond its rated load except for test purposes as instructed by the manufacturer.

- Hoist chains or ropes must be free from kinks or twists and must not be wrapped around the load.
- The load must be attached to the load block hook by means of slings or other approved devices.
- For crawler and wheel mounted cranes – when loads that are limited by structural competence rather than by stability are to be handled, it must be ascertained that the weight of the load has been determined within plus or minus 10% before it is lifted.

7.2 Moving the Load – Overhead and Gantry Cranes

- The load must be well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.
- Before starting to hoist a load the following conditions must be met:
    - Hoist rope must not be kinked.
    - Multiple part lines must not be twisted around each other.
    - The hook must be brought over the load in such a manner as to prevent swinging.
- During hoisting care must be taken so that:
    - There is no sudden acceleration or deceleration of the moving load.
    - The load does not contact any obstructions.
- Cranes must not be used for side pulls except when specifically authorized by a responsible person who has determined that the stability of the crane is not thereby endangered and that various parts of the crane will not be overstressed.
- While any employee is on the load or hook, there must be no hoisting, lowering, or traveling.
- Do not carry loads over people.
- Do not leave the controls when the load is suspended.
- The brakes must be tested each time a load approaching the rated load is handled. The brakes must be tested by raising the load a few inches and applying the brakes.
- The load must not be lowered below the point where less than two full wraps of rope remain on the hoisting drum.
- When the load or hook approaches personnel, the warning signal must be sounded.

7.3 Moving the Load –Crawler & Wheel Mounted Cranes

Assure that:

- The crane is level and where necessary blocked properly.
- The load is well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.

Before starting to hoist, the following conditions must be noted:

- Hoist rope must not be kinked.
- Multiple part lines must not be twisted around each other.
- The hook must be brought over the load in such a manner as to prevent swinging.

During hoisting care must be taken that:

- There is no sudden acceleration or deceleration of the moving load.
- The load does not contact any obstructions.

Side loading of booms must be limited to freely suspended loads. Cranes must not be used for dragging loads sideways.

No hoisting, lowering, swinging, or traveling may be done while anyone is on the load or hook.

On truck-mounted cranes, no loads must be lifted over the front area except as approved by the crane Manufacturer.

The operator must test the brakes each time a load approaching the rated load is handled by raising it a few inches and applying the brakes.

Outriggers must be used when the load to be handled at that particular radius exceeds the rated load without outriggers as given by the manufacturer for that crane. Where floats are used, they must be securely attached to the outriggers. Wood blocks used to support outriggers must:

- Be strong enough to prevent crushing.
- Be free from defects.
- Be of sufficient width and length to prevent shifting or toppling under load.

Neither the load nor the boom must be lowered below the point where less than two full wraps of rope remain on their respective drums.

Before lifting loads with locomotive cranes without using outriggers, means must be applied to prevent the load from being carried by the truck springs.

When two or more cranes are used to lift one load, one designated person must be responsible for the operation. He must be required to analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

In transit, the following additional precautions must be exercised:

- The boom must be carried in line with the direction of motion.
- The superstructure must be secured against rotation, except when negotiating turns when there is an operator in the cab or the boom is supported on a dolly.
- The empty hook must be lashed or otherwise restrained so that it cannot swing freely.

Before traveling a crane with load, a designated person must be responsible for determining and controlling safety. Decisions such as position of load, boom location, ground support, travel route, and speed of movement must be in accord with his determinations.

A crane with or without load must not be traveled with the boom so high that it may bounce back over the cab.

When rotating the crane, sudden starts and stops must be avoided. Rotational speed must be such that the load does not swing out beyond the radii at which it can be controlled. A tag or restraint line must be used when rotation of the load is hazardous.

When a crane is to be operated at a fixed radius, the boom-hoist pawl or other positive locking device must be engaged.

Ropes must not be handled on a winch head without the knowledge of the operator.

While a winch head is being used, the operator must be within convenient reach of the power unit control lever.

7.4 Hoist Limit Switch

- At the beginning of each operator's shift, the upper limit switch of each hoist must be tried out under no load. Extreme care must be exercised; the block must be "inched" into the limit or run in at slow speed. If the switch does not operate properly, the appointed person (your supervisor) must be immediately notified, and the crane is not to be operated until repaired.

- The hoist limit switch, which controls the upper limit of travel of the load block, must never be used as an operating control.

7.5 Holding the Load – Crawler & Wheel Mounted Cranes

- The operator must not be permitted to leave his position at the controls while the load is suspended.

- No person should be permitted to stand or pass under a load on the hook.

- If the load must remain suspended for any considerable length of time, the operator must hold the drum from rotating in the lowering direction by activating the positive controllable means of the operator's station.

7.6 Other Training Content

Crane operators that have access to a fire extinguisher must receive "Fire Extinguisher Training" provided by Safety & Loss Prevention, or other qualified persons.

Refueling of crawler & wheel mounted cranes, using small portable containers, must be done with an approved safety type can equipped with an automatic closing cap and flame arrester. In addition, cranes must not be refueled while the engine is running.

Training must be documented by creating a training record that contains the name of the trained individuals and the date of training. Retain training records for 3 years.

All operations near overhead lines must be done in accordance with 29 CFR 1910.333(c) (3) requirements – workers must be trained accordingly.

(Prior to Each Daily Use)

Date_____ Time _____ Inspector_____

Crane (Make, Model & SN)_____ Location_____

Locomotive, using outriggers	
Locomotive, using outriggers	80
Crawler, without outriggers	75
Crawler, using outriggers	85
Truck and wheel mounted without outriggers or using outriggers fully extended	85

Item	Pass	Fail	Action Taken
1. Check functional operating / control mechanisms for maladjustment.	☐	☐	
2. Check all control mechanisms for contamination.	☐	☐	
3. Check for deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems.	☐	☐	
4. Visually inspect hooks for deformation and cracks. Hooks having a throat opening in excess of 15% of what it should be, and/or more than a 10 degree twist from the plane of the unbent hook need to be replaced.	☐	☐	
5. Visually check hoist chains, including end connections, for excessive wear, twist, distorted links interfering with proper function, or stretch beyond manufacturer's recommendations.	☐	☐	
6. Utilizing item 6 from the Appendix B form, perform a thorough inspection of any running ropes that have been idle for a period of one or more months.	☐	☐	

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APPENDIX B MONTHLY CRANE INSPECTION CHECKLIST

Date_____ Time _____ Inspector_____

Locomotive, using outriggers	
Locomotive, using outriggers	80
Crawler, without outriggers	75
Crawler, using outriggers	85
Truck and wheel mounted without outriggers or using outriggers fully extended	85

Item	Pass	Fail	Corrective Action
1. All control mechanisms for excessive wear of components.	☐	☐	
2. Check hooks for cracks and a throat opening in excess of 15% of what it should be, and/or more than a 10 degree twist from the plane of the unbent hook. (Keep track of what hooks have been inspected using the form in Appendix D).	☐	☐	
3. Check hoist chains, including end connections, for excessive wear, twist, distorted links interfering with proper function, or stretch beyond manufacturer's recommendations. (Keep track of what hoist chains have been inspected using the form in Appendix D)	☐	☐	
4. Check all functional operating mechanisms for excessive wear of components.	☐	☐	
5. Check rope reeving for noncompliance with manufacturer's recommendations.	☐	☐	
6. Perform a thorough inspection of all running ropes. Any deterioration, resulting in appreciable loss of original strength, must be carefully observed and determination made as to whether further use of the rope would constitute a safety hazard. (Note: Keep track of what running ropes have been inspected by using the form in Appendix D) Some of the conditions that could result in an appreciable loss of strength are the following:			
I. Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.	☐	☐	
II. A number of broken outside wires and the degree of distribution or concentration of such broken wires.	☐	☐	

III. Worn outside wires.			
IV. Corroded or broken wires at end connections.			
V. Corroded, cracked, bent, worn, or improperly applied end connections.			
VI. Severe kinking, crushing, cutting, or unstranding.			
7. All safety devices for malfunction.			
8. Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.			

Locomotive, using outriggers	
Locomotive, using outriggers	80
Crawler, without outriggers	75
Crawler, using outriggers	85
Truck and wheel mounted without outriggers or using outriggers fully extended	85

Locomotive, using outriggers	
Locomotive, using outriggers	80
Crawler, without outriggers	75
Crawler, using outriggers	85
Truck and wheel mounted without outriggers or using outriggers fully extended	85

Item	Pass	Fail	**Action Taken**
1. Check functional operating / control mechanisms for maladjustment.	☐	☐	
2. Check all control mechanisms for contamination.	☐	☐	
3. Check for deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems.	☐	☐	
4. Visually inspect hooks for deformation and cracks. Hooks having a throat opening in excess of 15% of what it should be, and/or more than a 10 degree twist from the plane of the unbent hook need to be replaced.	☐	☐	
5. Visually check hoist chains, including end connections, for excessive wear, twist, distorted links interfering with proper function, or stretch beyond manufacturer's recommendations.	☐	☐	
6. Utilizing item 6 from the Appendix B form, perform a thorough inspection of any running ropes that have been idle for a period of one or more months.	☐	☐	

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APPENDIX B MONTHLY CRANE INSPECTION CHECKLIST

Date_____ Time _____ Inspector_____

Crane (Make, Model & SN) _____
Location_____

Note: Items in parenthesis apply only to locomotive, crawler and wheel mounted cranes.

APPENDIX D SHEAVE & ROPE INSPECTION GUIDANCE

The following requirements have been obtained from 29 CFR 1910. Additional inspection criteria must be included to the inspection regimen based upon manufacturer recommendations.

SHEAVES

- Sheave grooves must be smooth and free from surface defects which could cause rope damage.
- Sheaves carrying ropes which can be momentarily unloaded must be provided with close-fitting guards or other suitable devices to guide the rope back into the groove when the load is applied again.
- The sheaves in the bottom block must be equipped with close-fitting guards that will prevent ropes from becoming fouled when the block is lying on the ground with ropes loose.
- Pockets and flanges of sheaves used with hoist chains must be of such dimensions that the chain does not catch or bind during operation.
- All running sheaves must be equipped with means for lubrication. Permanently lubricated, sealed and/or shielded bearings meet this requirement.

ROPES

- In using hoisting ropes, the crane manufacturer's recommendations must be followed. The rated load divided by the number or parts of rope must not exceed 20% of the nominal breaking strength of the rope.
- Rope must not be secured to the drum as follows:
    - No less than two wraps of rope must remain on the drum when the hook is in its extreme low position.
    - The rope end must be anchored by a clamp securely attached to the drum, or by a socket arrangement approved by the crane or rope manufacturer.
- Rope clips attached with U-bolts must have the U-bolts on the dead or short end of the rope ("never saddle a dead horse"). Spacing and number of all types of clips must be in accordance with the clip manufacturer's recommendations. Clips must be drop-forged steel in all sizes manufactured commercially.
- Swaged or compressed fittings must be applied as recommended by the rope or crane manufacturer.
- Heavy wear and/or broken wires may occur in sections in contact with equalizer sheaves or other sheaves where rope travel is limited, or with saddles. Particular care must be taken to inspect ropes at these locations.
- Particular care must be taken when inspecting non-rotating rope.