CRANES AND HOISTS SAFETY PROGRAM

1. Purpose

1.1. This program guides the safe operation, inspection, maintenance, and use of overhead cranes, gantry cranes, hoists, and associated rigging equipment used at the University of Notre Dame. This program helps employees comply with applicable OSHA regulations.

2. Scope

2.1. This policy applies to all University personnel who operate overhead cranes, gantry cranes, and hoists.

2.2. This program applies to:

- Overhead bridge cranes
- Gantry cranes
- Monorail hoists
- Electric chain hoists
- Wire rope hoists
- Fixed lifting systems installed on buildings or structures
- Rigging equipment used with covered cranes and hoists

2.3. This program does not apply to:

- Forklifts
- Powered pallet jacks
- Electric walkie stackers
- Aerial lifts
- Mobile cranes
- Engine hoists
- Portable shop cranes
- Manual stackers
- Lift tables
- Portable material lifts
- Drum handling equipment
- Other manually operated lifting-assist devices

3. Roles and Responsibilities

3.1. Environmental Health and Safety (EHS)

3.1.1. Maintains this program.

3.1.2. Provides training material per regulatory requirements.
3.1.3. Provides technical guidance.
3.1.4. Reviews incidents and trends.
3.1.5. Supports departments with compliance assistance.
3.1.6. Provides appropriate training information in accordance with regulatory requirements.

3.2. Departments
3.2.1. Verify employees receive training before operating equipment.
3.2.2. Ensure inspections occur at the required frequency.
3.2.3. Remove unsafe equipment from service.
3.2.4. Maintain inspection and training records.

3.3. Operators
3.3.1. Complete the required training before using the equipment.
3.3.2. Complete pre-use inspections.
3.3.3. Follow approved operating procedures.
3.3.4. Use equipment within rated capacities.
3.3.5. Report defects immediately.
3.3.6. Stop using equipment that appears unsafe.

4. Definitions

4.1. **Crane -** 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.
4.2. **Designated Person –** A person assigned specific duties under this program by the department.
4.3. **Gantry Crane -** a crane similar to an overhead crane except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or another runway. (Appendix A)
4.4. **Hoist -** an apparatus that may be a part of a crane, exerting a force for lifting or lowering.
4.5. **Overhead Crane -** a crane with a movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway structure.
4.6. **Pendant –** control suspended from an electric hoist.
4.7. **Rated Load -** The maximum load for which a crane or individual hoist is designed and built by the manufacturer and shown on the equipment nameplate(s).
4.8. **Reeving –** to pass (a rope or similar item) through a hole, ring, or similar item.
4.9. **Sling -** an assembly that connects the load to the material handling equipment. (Appendix A)

4.10. **Trolley -** the unit that travels on the bridge rails and carries the hoisting mechanism.

5. Design Requirements

5.1. All cranes and hoists shall be installed according to the manufacturer's specifications and applicable regulations.

5.2. Cranes and hoists may be modified or re-rated at any time as long as the modifications and associated structure are analyzed and approved by a qualified engineer or the crane manufacturer.

5.3. The rated load capacity of the crane and/or hoist and the associated structure shall be plainly marked on each side of the crane and be visible from the floor in a conspicuous location.

6. General Requirements

6.1. Cranes and hoists shall only be operated by the following designated personnel:
- 6.1.1. Trained operators.
- 6.1.2. Trainees are under the direct supervision of a designated person.
- 6.1.3. Authorized contractors completing maintenance and/or repairs.

6.2. The crane controller shall be located within convenient reach of the operator.

6.3. The trolley travel control shall be located so that the operator can readily face the direction of travel.

6.4. Push buttons shall automatically return to the "off" position when released by the operator.

6.5. Suspended loads shall be kept clear of all obstructions.

6.6. All employees shall be kept clear of loads about to be lifted and of suspended loads.

6.7. All hooks shall be equipped with a safety latch.

6.8. Slings
- 6.8.1. Slings that are damaged or defective shall not be used.
- 6.8.2. Slings shall not be shortened or lengthened by knotting or twisting.
- 6.8.3. Sling legs shall not be kinked.
- 6.8.4. Slings used in a basket hitch shall have the loads balanced to prevent slippage.
- 6.8.5. Slings shall be securely attached to their loads.
- 6.8.6. Slings that may come into contact with edges, corners, or protrusions shall be protected with a material of sufficient strength, thickness, and construction to prevent damage.
- 6.8.7. A sling shall not be pulled from under a load when the load is resting on the sling.

6.8.8. Slings shall not be loaded in excess of their recommended safe working load as prescribed by the sling manufacturer on the identification markings permanently affixed to the sling.

6.8.9. Slings without affixed and legible identification markings shall not be used.

6.8.10. Sling Inspections shall be performed each day before being used. The sling and all fastenings and attachments shall be inspected for damage or defects by a competent person.

7. Crane Operation Requirements

7.1. Pre-use inspection – At the start of each work shift (on a day when the crane will be used), operators shall complete a pre-use inspection in accordance with the steps listed in Appendix C or a document of similar format.

7.2. Rigging a load – When attaching a load to a crane, the following safety requirements shall be followed:

7.2.1. Determine the appropriate size and number of slings and associated components.

7.2.2. Pad sharp edges on loads being lifted/lowered to prevent wear on slings.

7.2.3. Ensure slings and hooks are in proper working condition with no excessive wear.

7.2.4. Determine the load's center of gravity and ensure rigging maintains the load in a level position during movement.

7.2.5. Once slings are in place, lift the load slightly to test the rigging and balance. Re-work the rigging if necessary.

7.2.6. Use a tag line when loads must traverse long distances or be otherwise controlled.

7.3. Lifting and lowering a load – During equipment moving operations, the following safety requirements shall be followed:

7.3.1. Only designated personnel may operate a crane.

7.3.2. The crane operator and signal person shall be able to communicate at all times. If audio (voice/radio) communication between the operator and the signal person is not possible, hand signals shall be used. A list of standard hand signals is provided in Appendix B.

7.3.3. Ease the load up/down to prevent a shock load on the crane. Shock load can occur when a suspended load is accelerated/decelerated quickly.

7.3.4. Lift loads only high enough to clear the tallest obstruction in the travel path.

7.3.5. Employees shall not be on the load when the load is being hoisted, lowered, or is traveling.

7.3.6. Employees shall stand clear of all overhead loads. Employees shall not pass under a suspended load.

7.3.7. Operators shall not carry loads over employees and shall ensure that the area of travel remains clear at all times during travel.

7.3.8. Never leave suspended loads unattended. In an emergency, if a load must remain suspended, ensure the area is clearly marked with signage and blocked on all four sides to prevent unauthorized access.

7.4. Parking a crane/hoist – Once loads are moved and the crane is out of operation for the shift, it shall be properly parked.

7.4.1. Remove all slings and accessories from the hook and return rigging devices to designated storage locations.

7.4.2. Raise the hook at least 7 feet above the floor.

7.4.3. Store the pendant away from aisles and work areas, or raise it at least 7 feet above the floor.

7.4.4. Place the emergency stop switch in the off position and place the controller in the designated storage location to prevent unauthorized use.

7.5. Signal Persons

7.5.1. A signal person must be used if any of the following conditions exist:

7.5.1.1. The load travel pathway or the area near or at load placement is not in full view of the operator.

7.5.1.2. View of the travel pathway is obstructed.

7.5.1.3. The operator or the person handling the load determines that it is necessary due to site-specific safety concerns.

7.6. All signal persons shall wear appropriate head, foot, and hand protection.

7.7. Standard hand signals (Appendix B) shall be used by the signal person unless voice communication (e.g., telephone, radio, or equivalent) is utilized for lifts.

7.7.1. Special operations may require additions or modifications to standard signals. They shall be agreed upon and understood by the signal person and the operator.

7.8. All communications shall be discernible or audible to the operator.

8. Inspections

8.1. Initial Inspection: New, repaired, or modified cranes and hoists shall be inspected by a qualified person before initial use in accordance with Periodic Inspection as described in Section 8.3.

8.2. Pre-use Inspection:

8.2.1. Shall be conducted before each shift or each use, whichever occurs first.

8.2.2. Hazards identified during a pre-use inspection shall be reported immediately.

8.3. Periodic Inspection:

8.3.1. A documented inspection that includes observations of crane and hoist operation.

8.3.2. A documented inspection that includes the observations of alloy steel chain slings.

8.3.3. Shall be performed by an authorized contractor.

8.3.4. Shall be performed annually unless otherwise determined by the authorized contractor performing maintenance or the manufacturer's recommendations.

8.4. Inspections for Returning an Idle Crane to Service

8.4.1. If a crane or hoist is idle for a period of 1 to 6 months, a documented pre-use inspection shall be performed on the crane before it is placed back in service.

8.4.2. If a crane or hoist is idle for a period of over 6 months, a documented periodic inspection shall be performed on the crane before it is placed back in service.

9. Maintenance

9.1. A preventative maintenance program based on the crane manufacturer's recommendations shall be established.

9.2. Before maintenance begins:

9.2.1. The crane shall be run to a location where it will limit or prevent interference with surrounding operations and any cranes that may be located in the area.

9.2.2. All controllers shall be switched to the off position.

9.2.3. The main or emergency switch shall be locked in the open position in accordance with the University's Lock, Tag, Try procedure.

9.2.4. Warning or "out of order" signs shall be posted on the crane and hook where it is visible from the floor.

9.3. Any unsafe conditions identified during pre-use and/or periodic inspections shall be corrected before resuming crane operation. Only authorized contractors shall make any adjustments or repairs.

10. Personal Protective Equipment

10.1. All persons working in proximity to a crane or hoist shall wear personal protective equipment in accordance with their completed PPE Hazard Assessment.

11. Training

11.1. Trainees may operate a crane/hoist only under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence, and only where such operation does not endanger the trainee or other employees.

11.2. The trainee shall be provided sufficient practical training exercises and time under the direct supervision of a qualified trainer/mentor.

11.3. At a minimum, training shall include:

11.3.1. Classroom/online training, including General Crane Safety.

12. Record Retention

12.1. Records required by this procedure shall be retained for a minimum of three (3) years. This includes:

12.1.1. Pre-use inspection documents.

12.1.2. Periodic inspection documents.

12.1.3. All maintenance records.

13. Procedure Evaluation

13.1. EHS shall conduct a documented audit of the Overhead Cranes, Gantry Cranes, and Hoists program once every three years.

13.2. The audit shall include:

13.2.1. Review of crane/hoist inspection records,

13.2.2. Verification that procedures are appropriate, understood, and implemented.

13.3. Review records for a representative sample of cranes and hoists to assess compliance with required maintenance activities and applicable annual and periodic inspection requirements.

13.4. Revisions to the program or training process shall be made as a result of the audit as necessary.

14. Resources

14.1. The Occupational Safety and Health Administration, 29 CFR 1910.179. *Overhead and Gantry Cranes*.

14.2. The Occupational Safety and Health Administration, 29 CFR 1926.1419. *Signal-General Requirements.*

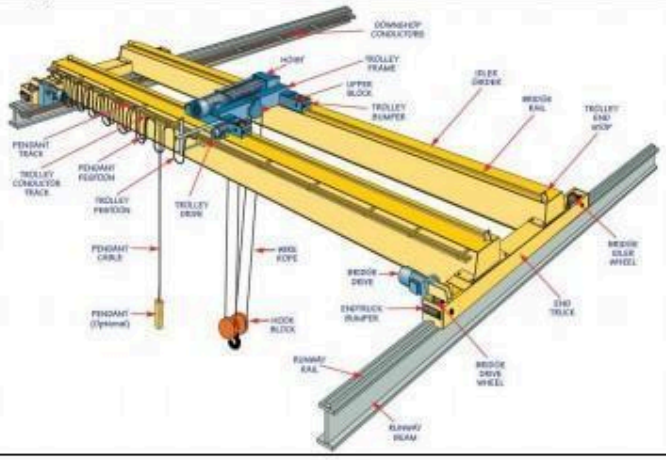
14.3. The Occupational Safety and Health Administration, 29 CFR 1910.184. *Slings.*

Revision History Table

History	Effective Date
Created	March 2020
Approved	June 2020
Added section 8.3.2 to include the periodic inspection requirements on alloy steel chain slings.	July 2021
Added 6.9.10 Updated record retention 12.1 to a specific time frame. Updated Appendix B images. Updated Appendix C verbiage, duplicated in Qualtrics for areas completing the electronic Pre-Use inspection form.	June 2023
Updated 1.1. Purpose statement. Updated 2. Scope to provide a more comprehensive list of what type of equipment is covered by this program. Minor updates to 4. Definitions. Updated Risk Management and Safety (RMS) to Environmental Health and Safety (EHS).	June 2023

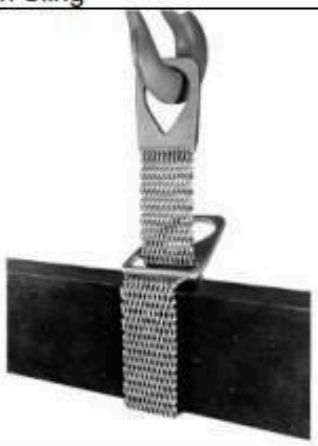
Appendix A.
Different Types of Cranes, Hoists, and Slings on Campus

Gantry Crane	Semi-Gantry Crane
	

Floor-Operated Crane	Bridge Crane
	

Electric Powered Hoist	Manual Hoist (Lever, chain fall, come along)
	

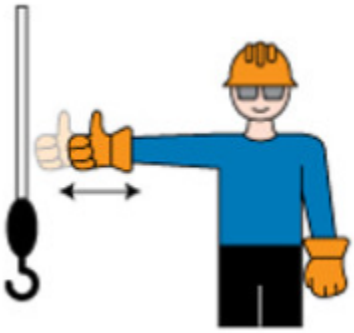
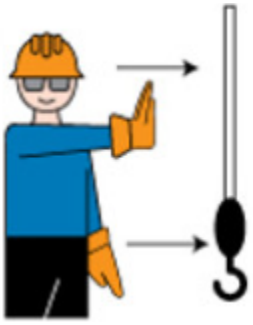
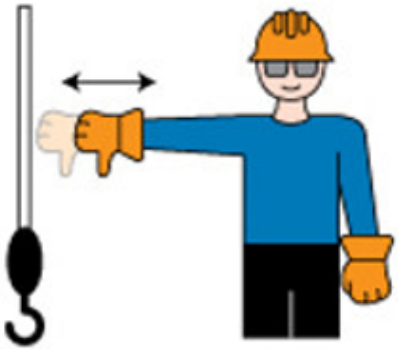
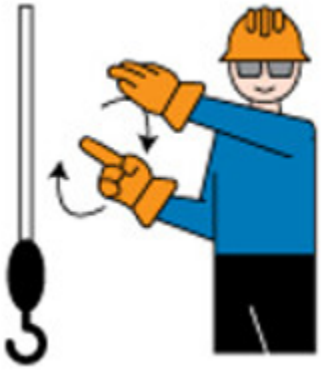
Pneumatic Powered Hoist	Chain Sling
	

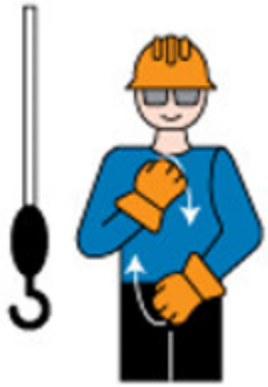
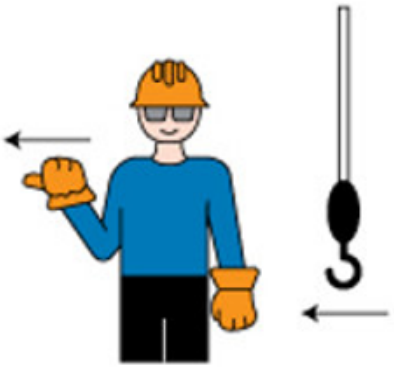
Metal Mesh Sling	Wire Rope Sling
	

Synthetic Web Sling	Fiber Rope Sling
	

Appendix B.
Signal Person Hand Signals

 **STOP -** With arm extended horizontally to the side, palm down, arm is swung back and forth.	 **EMERGENCY STOP -** With both arms extended horizontally to the side, palms down, arms are swung back and forth.	 **HOIST -** With upper arm extended to the side, forearm and index finger pointing straight up, hand and finger make small circles.
 **RAISE BOOM -** With arm extended horizontally to the side, thumb points up with other fingers closed.	 **SWING -** With arm extended horizontally, index finger points in direction that the boom is to swing.	 **RETRACTING TELESCOPING BOOM -** with hands to the front at waist level, thumbs point at each othe with other fingers closed.

 **RAISE THE BOOM & LOWER THE LOAD -** With arm extended horizontally to the side and thumb point up, fingers open and closed while load movement is desired.	 **DOG EVERYTHING -** Hands held together at waist level.	 **LOWER -** With arm and index finger pointing down, hand and finger make small circles.
 **LOWER BOOM -** With arm extended horizontally to the side, thumb points down with other fingers closed.	 **EXTEND TELESCOPING BOOM -** With hands to the front at waist level, thumbs point outward with other fingers closed.	 **TRAVEL/TOWER TRAVEL -** With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.
 **LOWER THE BOOM & RAISE THE LOAD -** With arm extended horizontally to the side and thumb	 **MOVE SLOWLY -** A hand is placed in front of the hand that is giving the action signal.	 **USE AUXILLARY HOIST (whipline) -** With arm bent at elbow and forearm vertical, elbow is tapped with other

pointing dow, fingers open and close while load movement is desired.		hand. Then regular signal is used to indicate desired action.
 **CRAWLER CRANE TRAVEL, BOTH TRACKS -** Rotate fists around each other in front of body; direction of rotation away from body indicated travel forward; rotation towards body indicates travel backward.	 **USE MAIN HOIST -** A hand taps on top of the head. Then regular signal is given to indicate desired action.	 **CRAWLER CRANE TRAVEL, ONE TRACK -** Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel.
	 **TROLLEY TRAVEL -** With palm up, fingers closed and thumb pointing in direction of motion, hand is jerked horizontally in direction trolley is to travel.	

Appendix C.

Pre-Use Inspection Survey