Cranes: Swinging Object Struck-by Hazards

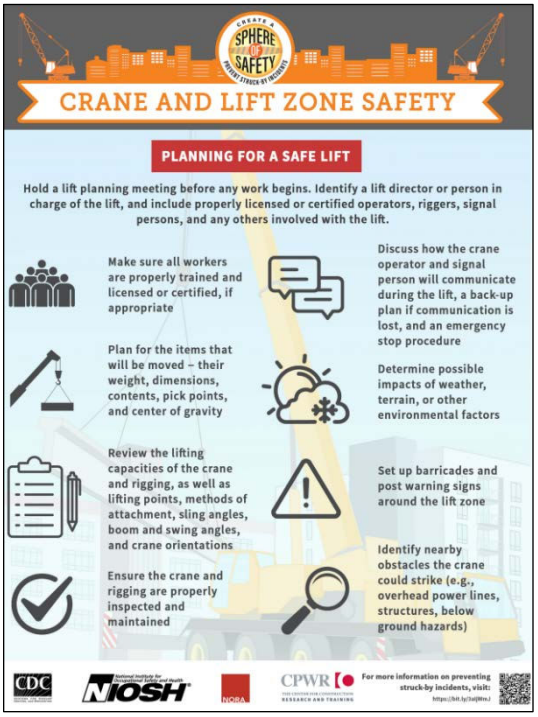
When materials are lifted by a crane, they have the potential to swing or twist. This movement can catch workers by surprise, and they could be hit by the load. Windy conditions are especially hazardous because the load will swing more.

Protect workers by:

- Making sure all workers involved in the lift are properly trained and licensed/certified, if appropriate.
- Planning how items will be moved – their weight, dimensions, contents, pick points, and center of gravity.
- Reviewing the lifting capacity of the crane and rigging, as well as lifting points, methods of attachment, sling angles, boom and swing angles, and crane orientations.
- Establishing a load swing path and ensuring all personnel are positioned clear of the path.
- Ensuring the crane and rigging are properly inspected and maintained.
- Checking to make sure the crane's outriggers are properly extended and supported.
- Prior to the lift, discussing how the operator and signal person will communicate during the lift, including a back-up plan if communication is lost, and an emergency stop procedure.
- Determining possible impacts of weather (e.g., wind speeds), ground conditions, and other environmental factors.
- Never lifting a load that exceeds the lifting capacity of the crane or rigging.
- Setting up barricades and posting warning signs around lift zones.
- Identifying nearby obstacles the crane could strike (e.g., overhead power lines).
- Testing the load by raising it a few inches and holding, verifying the capacity and balance, and testing the brake system.
- Requiring the use of personal protective equipment, such as hard hats and high-visibility clothing.
- Always keeping the load under control. Using tag lines and push sticks to prevent uncontrolled motion.

Planning Resources

- Job Hazard Analysis
- Building Information Modeling (BIM) for Safety Planning
- CPWR's Head Protection Webpage
- OSHA Competent Person Resources
- What's the Risk? Best Practices to Reduce the Likelihood of Struck-By Injuries From Heavy Equipment and Crane Activities: Play Recording; PDF of Slides
- Cranes & Lifting – Avoiding Struck-By Incidents Under the Hook: Play Recording; PDF of Slides
- NIOSH Science Blog: Preventing Struck-by Injuries in Construction: Lift Zone Safety



Training Resources

- Toolbox Talks:
  - Lift Zone Safety: Planning a Lift (English, Spanish)
  - Tower Crane Safety (English, Spanish)
  - Head Protection (English, Spanish)
- Hazard Alert Cards:
  - Preventing Head Injuries (English, Spanish)
- Posters/Infographics:

- Crane and Lift Zone Safety: Planning for a Safe Lift (English PDF & PNG; Spanish PDF & PNG)
- Best Practices for Safe Crane Lifts (English PDF & PNG; Spanish PDF & PNG)
- Head Protection (English PDF & JPEG)
- In 1 Strike You Could Be Out (English PDF & JPEG)

- Webinars:
  - What's the Risk? Best Practices to Reduce the Likelihood of Struck-By Injuries From Heavy Equipment and Crane Activities: Play Recording; PDF of Slides
  - Cranes & Lifting – Avoiding Struck-By Incidents Under the Hook: Play Recording; PDF of Slides

Relevant Standards

- OSHA Standard 29 CFR - https://www.osha.gov/laws-regs/regulations/standardnumber/1926
  - 1926 Subpart C - General Safety and Health Provisions
    - 1926.20 - General safety and health provisions.
    - 1926.21 - Safety training and education.
    - 1926.22 - Recording and reporting of injuries.
    - 1926.23 - First aid and medical attention.
    - 1926.25 - Housekeeping.
    - 1926.26 - Illumination.
    - 1926.28 - Personal protective equipment.
    - 1926.29 - Acceptable certifications.
  - 1926 Subpart E - Personal Protective and Life Saving Equipment
    - 1926.95 - Criteria for personal protective equipment.
    - 1926.96 - Occupational foot protection.
    - 1926.100 - Head protection.
    - 1926.102 - Eye and face protection.
  - 1926 Subpart G - Signs, Signals, and Barricades
    - 1926.200 - Accident prevention signs and tags.
    - 1926.201 - Signaling.
  - 1926 Subpart H - Materials Handling, Storage, Use, and Disposal
    - 1926.251 - Rigging equipment for material handling.
  - 1926 Subpart R - Steel Erection
    - 1926.752 - Site layout, site-specific erection plan and construction sequence.
    - 1926.753 - Hoisting and rigging.
    - 1926.754 - Structural steel assembly.
    - 1926.757 - Open web steel joists.
    - 1926.758 - Systems-engineered metal buildings.
    - 1926.761 - Training.
  - 1926 Subpart CC - Cranes and Derricks in Construction
    - 1926.1400 - Scope.
    - 1926.1401 - Definitions.
    - 1926.1402 - Ground conditions.
    - 1926.1403 - Assembly/Disassembly—selection of manufacturer or employer procedures.
    - 1926.1404 - Assembly/Disassembly—general requirements (applies to all assembly and disassembly operations).
    - 1926.1405 - Disassembly—additional requirements for dismantling of booms and jibs (applies to both the use of manufacturer procedures and employer procedures).
    - 1926.1406 - Assembly/Disassembly—employer procedures--general requirements.
    - 1926.1407 - Power line safety (up to 350 kV)—assembly and disassembly.
    - 1926.1408 - Power line safety (up to 350 kV)—equipment operations.

        - 1926.1409 - Power line safety (over 350 kV).
        - 1926.1410 - Power line safety (all voltages)—equipment operations closer than the Table A zone.
        - 1926.1411 - Power line safety—while traveling.
        - 1926.1412 - Inspections.
        - 1926.1413 - Wire rope—inspection.
        - 1926.1414 - Wire rope—selection and installation criteria.
        - 1926.1415 - Safety devices.
        - 1926.1416 - Operational aids.
        - 1926.1417 - Operation.
        - 1926.1418 - Authority to stop operation.
        - 1926.1419 - Signals—general requirements.
        - 1926.1420 - Signals—radio, telephone or other electronic transmission of signals.
        - 1926.1421 - Signals—voice signals—additional requirements.
        - 1926.1422 - Signals—hand signal chart.
        - 1926.1423 - Fall protection.
        - 1926.1424 - Work area control.
        - 1926.1425 - Keeping clear of the load.
        - 1926.1426 - Free fall and controlled load lowering.
        - 1926.1427 - Operator training, certification, and evaluation.
        - 1926.1428 - Signal person qualifications.
        - 1926.1429 - Qualifications of maintenance & repair employees.
        - 1926.1430 - Training.
        - 1926.1431 - Hoisting personnel.
        - 1926.1432 - Multiple-crane/derrick lifts—supplemental requirements.
        - 1926.1433 - Design, construction and testing.
        - 1926.1434 - Equipment modifications.
        - 1926.1435 - Tower cranes.
        - 1926.1436 - Derricks.
        - 1926.1437 - Floating cranes/derricks and land cranes/derricks on barges.
        - 1926.1438 - Overhead & gantry cranes.
        - 1926.1439 - Dedicated pile drivers.
        - 1926.1440 - Sideboom cranes.
        - 1926.1441 - Equipment with a rated hoisting/ lifting capacity of 2,000 pounds or less.
        - 1926.1442 - Severability.
        - 1926 Subpart CC App A - Standard Hand Signals
        - 1926 Subpart CC App B - Assembly/Disassembly—Sample Procedures for Minimizing the Risk of Unintended Dangerous Boom Movement
        - 1926 Subpart CC App C - Operator Certification—Written Examination—Technical Knowledge Criteria
- American National Standards Institute (ANSI):
    - ANSI/ American Society of Safety Professionals (ASSP) A10.5-2020: Safety Requirements for Material Hoists
    - ANSI/ASSP A10.42 – 2000 (R2017): Safety Requirements for Rigging Qualifications and Responsibilities
    - ANSI/International Safety Equipment Association (ISEA) Z89.1-2014 (R2019) – Head Protection

Nudges to Improve Planning

- Job Site Posters: *see Training Resources above*
- Text Messages

Target Audience	Texts: General	Texts: Specific
Supervisors and Workers	• Planning prevents struck-by incidents in the lift zone: Plan BEFORE your lift begins. • Plan BEFORE a lift: Protect you and your co-workers by planning to prevent struck-by incidents in the lift zone.	• Hold a lift planning meeting before any work involving a crane begins to discuss items that will be moved, the lifting capacity of the crane and rigging, communication during the lift, obstacles the crane could strike, and the impact of weather and terrain. • Before a lift, plan to prevent struck-by incidents by establishing a load swing path, setting up barricades and warning signs around the lift zone, and confirming all field personnel not involved are aware and clear of the lift.

- Email Messages

Example:

Dear [ ],

As a supervisor, keeping your workers safe is a top priority. If work on your job site includes lifting and moving materials using cranes, remember to hold a lift planning meeting before any work begins, and make sure everyone involved in the lift is present. Be sure to:

- Make sure all workers involved in the lift are properly trained and licensed/certified, if appropriate.
- Plan how items will be moved – their weight, dimensions, contents, pick points, and center of gravity.
- Review the lifting capacity of the crane and rigging, as well as lifting points, methods of attachment, sling angles, boom and swing angles, and crane orientations.
- Establish a load swing path and ensure all personnel are positioned clear of the path.
- Ensure the crane and rigging are properly inspected and maintained.
- Check to make sure the crane's outriggers are properly extended and supported.
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- Identify nearby obstacles the crane could strike (e.g., overhead power lines).
- Test the load by raising it a few inches and holding, verify the capacity and balance, and test the brake system.
- Require the use of personal protective equipment, such as hard hats and high-visibility clothing.
- Always keep the load under control. Use tag lines and push sticks to prevent uncontrolled motion.

CPWR's Struck-by Planning Program can help you create a more detailed plan.

Thanks for helping to instill a safety and health culture here at [company name]. Stay safe!

[Name]

- Stickers

CPWR has a simple “Sphere of Safety” hardhat sticker design that can be downloaded and printed. We also have limited supplies available for free, which can be ordered by contacting Grace Barlet at gbarlet@cpwr.com.

Download Sphere of Safety sticker artwork

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