

STANDARD OPERATING PROCEDURE

Lifting With Excavators

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LIFTING WITH EXCAVATORS

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The following is a step-by-step procedure on how to complete a specific task or meet a facility specific requirement. Standard Operating Procedures (SOPs) are written for all identified critical tasks. By virtue of the hazard or complexity associated with critical tasks it is paramount that the SOP be followed as written. SOPs contain a listing of high-level hazards associated with the task, for detailed hazard analysis reference the applicable Task Hazard Assessments. SOPs do not replace the requirements contained in the company Standards, Codes, and Processes nor does it replace the need to comply with required legislation. Section 8.0 references documentation that the worker shall understand before work commences.

1.0 PURPOSE

- To establish a company standard to safely and effectively carry out work as it applies to lifting with excavators.

2.0 SCOPE AND APPLICATION

- This document applies to all company Heavy Construction Mining operations. Ensure all site-specific requirements are being met or exceeded before performing the task.

3.0 HAZARDS AND CONTROLS

- Unstable ground conditions causing personal injury and / or equipment damage.
 - Supervision and excavator operator will inspect ground conditions for soft and uneven areas prior to positioning excavator.
 - Before lifting, unacceptable ground conditions will be corrected by supervisors, through repositioning, adequate matting and / or other acceptable methods.
 - Ensure the machine is on level ground as load capacities will vary depending on the machine's position.
 - Excavator operator will perform a function test to ensure the equipment is on stable ground. The function test will consist of swinging the cab / boom section one full rotation before lifting any material.
- Inadequate lifting equipment causing personal injury and / or equipment damage.
 - Only approved lifting eyes shall be used for lifting. Bucket teeth and / or excavator booms / sticks are not acceptable. Review the manufacturer's specifications for approved lifting eyes (see Appendix A for examples).
 - Supervision will verify the excavator has a manufacturer approved lifting eye with a valid magnaflux certification before conducting any lifting activities.
 - Supervision and excavator operator will visually inspect the lifting components for any deficiencies, abrasions, damages, cracks, etc. prior to lifting.
 - Supervision will confirm the weight of the load to be lifted including any rigging involved.
 - Loads will not exceed the limits specified on the load chart for the model of excavator being used. Load charts are found in the cab of equipment or through the manufacturer.
 - Lift capacity will decrease the further the boom and stick are extended from the machine. For best stability, the load will be carried close to the machine and the ground.
 - A lift calculation must be completed for any lift exceeding 75% of the excavator's rated capacity.

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- A critical lift plan must be developed when using multiple excavators for lifting in tandem or simultaneously. Refer to 950C-C-008 Cranes, Hoists and Rigging Code and 999C-F-034 Lift Plan Calculations – Critical Lift Form.
- Only use lifting equipment; slings, shackles, spreader bars, etc. rated for the load. Inspect all lifting equipment prior to task per 950C-C-008 Cranes, Hoists and Rigging Code.
- Company certified lifting eyes (i.e. Hitachi and Komatsu models) must have a bell cover in place when not being used for lifting.
 - Do not lift with an eye that has not had a bell cover on during excavating activities. If a bell cover is not present, have the eye re-certified prior to being used for lifting purposes.
- Inadequate assembly of rigging causing rigging failure and / or personal injury.
 - When attaching rigging to the lifting eye, ensure that the slings and their attachments are able to always hang free (see illustration in Appendix B).
 - Personnel assembling rigging (the rigger) will be adequately trained and competent for the task or under the direct supervision of a competent person.
 - The rigger will inspect the rigging after tension is applied to ensure shackles and other lifting components are in a safe position and there is no twist in the slings.
 - Softeners will be applied over any sharp corners /edges to prevent rigging failure.
- Personnel caught between or under a load causing personal injury.
 - No worker shall stand or pass under a suspended load.
 - At no time shall there be direct physical contact between workers and a load suspended by an excavator.
 - Loads will not be hoisted over cabs of other equipment and / or ground personnel.
 - Taglines will be always used to control loads.
 - Workers will maintain a safe distance from suspended loads to prevent becoming caught between or under a load in the event of rigging or equipment failures.
 - A signal person will be designated and identified to communicate with and direct the excavator operator. Hand signals will be reviewed with all personnel prior to the task.
 - The excavator operator will immediately stop the equipment if they lose sight of the signal person.
 - The excavator operator will immediately stop the equipment if they receive an emergency stop signal from any person.
 - Flag, barricade or install signage to prevent unauthorized access to area.

4.0 CHECKLIST

- ☐ Attend all preparatory meetings (IE: daily PSI; job scope; review of JSA's and SOP's for the job).
- ☐ Complete FLRA cards before starting the work.
- ☐ Ensure all personnel involved in the task are aware of the hazards and the controls to be used, as identified in the SOP's; JSA's; and FLRA's.
- ☐ Conduct a pre-job inspection of all equipment to be worked on and tools to be used.
- ☐ **Standard of Training required for working on this job: On-the job training.**

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5.0 DEFINITIONS

5.1 Company

Means North American Construction Group Ltd. (NACG) and all directly or indirectly owned subsidiary companies, including joint ventures.

5.2 Company Personnel

Includes the Company's employees, officers, directors, agents, associates, consultants/contractors, temporary employees and third-party processors.

5.3 HSE

Refers to the Health, Safety & Environment department.

6.0 PROCEDURE

- 1) Supervisor will ensure excavator operator, rigger and signalers are adequately trained and competent to undertake their roles in lifting operations.
- 2) Supervisor will review scope of work and applicable hazard assessment (JSA, THA) with the excavator operator and ground personnel prior to lift.
- 3) Everyone involved in the task will complete an individual hazard assessment (i.e. FLRA) prior to commencing work.
- 4) Supervisor and excavator operator will inspect the ground conditions for soft spots prior to placement of excavator.
- 5) Excavator operator will perform a pre-operation inspection and function test to ensure all controls are working and the equipment is safe to operate.
- 6) Conduct a pre-lift inspection of equipment / material to be hoisted prior to each period of continuous use.
- 7) Ensure the maximum load rating is legibly marked on rigging.
- 8) Supervisor will ensure lifting components on the excavator are certified prior to hoisting material.
- 9) Calculate load weight. Reference attached load chart to ensure load weight is within the acceptable limits for the excavator to be used for the lift. Prepare lift calculations and critical lift plans are required.
- 10) Inspect rigging for deficiencies and ensure all rigging and lifting components are certified and safe prior to use.
- 11) Attach adequate rigging. Use a competent, trained worker or supervisor to ensure rigging is adequate for load and assembled correctly.
- 12) Designate primary spotter, review hand signals and establish communication plan. Follow 962C-SOP-008 Signaling Equipment.
- 13) Before lifting with the excavator, the swing area must be identified using flagging, barricades and / or signs in place to indicate the swing radius.
- 14) Report any unsafe conditions or hazardous situations encountered to a supervisor immediately.

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7.0 NOTES

If this task is to be done by a method different than described in this SOP, the work must **STOP** and the alternate method must be **DOCUMENTED** with an adequate hazard assessment tool such as a JSA. The document must be **APPROVED** by a supervisor before such procedures are implemented.

8.0 REFERENCES

- Alberta Occupational Health and Safety Code – Part 21 Rigging
- Alberta Occupational Health and Safety Code – Part 6 Cranes, Hoists and Lifting Devices
- 950C-C-008 Cranes, Hoisting and Rigging Code
- 962C-SOP-008 Signaling Equipment
- 999C-F-034 Lift Plan Calculations – Critical Lift Form

9.0 APPENDICES

- Appendix A – Maximum Eye Loads – Excavators
- Appendix B – Attaching Rigging to Lifting Eye

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Appendix A Maximum Eye Loads – Excavators

Hitachi (Z-axis)

EX120 -	1,000Kg (2,200lbs)
EX200 -	2,700Kg (5,940lbs)
EX230 -	2,300Kg (5,060lbs)
EX270 -	2,700Kg (5,940lbs)
EX330 -	3,100Kg (6,820lbs)
EX370 -	3,100Kg (6,820lbs)
EX450 -	3,200Kg (7,040lbs)
EX550 -	4,050Kg (8,910lbs)
EX600 -	4,535Kg (9,977lbs)
EX700 -	4,500Kg (9,900lbs)
EX750 -	5,100Kg (11,220lbs)
EX800 -	3,800Kg (8,360lbs)
EX1100 -	6,000Kg (13,200lbs)
EX1200 -	4,200Kg (9,240lbs)
EX1800 -	9,000Kg (19,800lbs)
EX1900 -	7,300Kg (16,060lbs)
EX2500 -	10,000Kg (22,000lbs)

Note: The maximum lifting capacities referenced on the load chart included in this document have been established for excavators equipped with a Company engineered and certified (magna-fluxed) lifting eye.

The limits identified for each machine are not to be exceeded under any circumstances.

Manufacturer installed and approved lifting eyes on excavators may be used as per the manufacturer's instructions and within the manufacturer's rated lifting capacities.

Komatsu

PC95L-1 -	650Kg (1,433lbs)
PC200LC-6 -	2,200Kg (4,900lbs)

Caterpillar

- 349 Excavator – Refer to lifting chart located in the cab of the excavator & to the note below to determine the appropriate manufacture lifting capacity.
- 390 Excavator – Refer to lifting chart located in the cab of the excavator & to the note below to determine the appropriate manufacture lifting capacity.

NOTE: For lifting that is to be conducted using a Caterpillar excavator reference the Caterpillar Service Information System (SIS) for model specific information. All lifts are affected by the length, reach, counterweight, and bucket size.

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Appendix B Attaching Rigging to Lifting Eye

Bad Rigging Practice



(Hitch tilted backwards with master link subject to bending)



(Hitch tilted backwards with master link subject to twisting)

Good Rigging Practice



(Rigging and master link can hang freely without obstruction)