

STANDARD OPERATING PROCEDURE

Cribbing & Blocking Equipment

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CRIBBING & BLOCKING EQUIPMENT

						<i>Tammy Siver</i>
2	APP	OCT 22, 2025	Approved	Andre Brule	Lisa Norris	Tammy Siver
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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 cribbing and blocking equipment.

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.

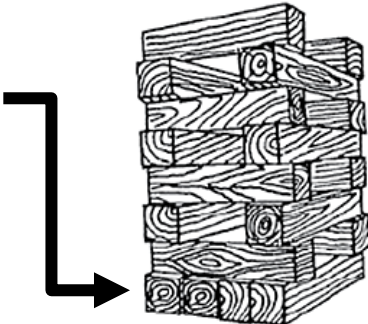
3.0 HAZARDS AND CONTROLS

- Cribbing/blocking failing under load, resulting in injury and/or property damage.
 - Know the weight of the equipment and/or components to be cribbed.
 - Inspect the blocking condition and ensure it is large enough to support the weight of the equipment or components. Check for any signs of settling, slippage, cracking, bending, crushing, or shear failure. Once the blocking and/or cribbing structure is in place, inspect it as frequently as possible.
 - Corners should be overlapped by four inches to help prevent crush failure.
 - Cribbing structures must be assembled at the time they will be used so that the proper sizing and placement for the intended load can be taken into consideration.
 - When building a cribbing structure, always limit its height to two times the width of the structure. In the case of a non-square cribbing structure, apply this rule using the smallest width.
 - If cribbing makes noise, it should be replaced immediately. The longer the noise persists, the more likely that the cribbing is defective. If you do not address the issue, the cribbing could split or shatter, resulting in injury and/or property damage.
 - Place the component edge across the grain and not with the grain. If the edge is in line with the grain of the wood, it can split the wood and cause it to collapse.
 - When constructing cribbing, only a single type of wood should be used. If softwood is used in conjunction with a hardwood, the softwood could start to roll or become deformed, leading to crib failure. Any cribbing that is constructed with mixed hardwood will typically provide only 70% of the load-bearing capacity when compared to cribbing that is constructed entirely with oak.

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- Being crushed or caught in between the blocking and the equipment.
 - Keep limbs out of pinch points and line of fire hazards (e.g., between equipment and cribbing stack).
 - Ensure all ground personnel are clear of cribbing structure or blocking before lowering the equipment and/or components.
 - Unintentional movement of the equipment, components, blocking, and/or cribbing structure.
 - All equipment shall be locked out to protect against accidental or inadvertent operation/movement.
 - Employees authorized to perform a lockout will lock out the equipment prior to performing the task.
 - Before any lifting takes place, all rubber-tired equipment must be chocked to help prevent any unwanted and unplanned movement.
 - Lower all attachments and insert cable end locking devices or blocking brackets into the appropriate hydraulic cylinders.
 - Cribbing structure or blocking must be positioned on a flat, firm level surface, and make sure the ground is clear of any debris that may prevent the weight of the load from resting evenly on the foundation.
 - The crib stack is to be level before placing the load on it.
- NOTE:** If you must place cribbing on sand or any other soft material, place a piece of steel plate at least 1 inch thick, or a large wood support, underneath to ensure the load's weight is evenly distributed.
- Cribbing blocking must be placed directly beneath the appropriate frame position and be adequately stacked in order to avoid slippage (see Appendix A).
 - Never use blocking that is round, triangular, or has a smooth surface.
- 
- Exceeding personal limitations when manually lifting, holding, or positioning cribbing or blocking.
 - Stretch before completing the task and ensure muscles are warmed up.
 - Utilize proper body mechanics when lifting and positioning cribbing and blocking (i.e., shoulders and feet square to the load, lift with your legs from a squat position, keep back straight, and use proper footing).
 - Do not lift any load greater than 50 lbs. without assistance from another person or a mechanical lifting aid. Follow 962C-SOP-009 Manual Lifting and Carrying Heavy Objects.
 - Inspect travel route prior to moving cribbing/blocking and/or jacks into position; remove tools, dunnage, cords/cables, and other tripping hazards from travel area.

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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.**

5.0 DEFINITIONS

5.1 Blocking

Providing a solid foundation for a machine, attachment, or component that prevents unexpected or unwanted movement. Using jack stands or placing blocks on a solid concrete floor under a machine are examples of blocking.

5.2 Company

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

5.3 Company Personnel

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

5.4 Cribbing

Placing blocks or timbers in a cross pattern to support a machine, attachment, or component when there is no solid surface available. Cribbing involves the building of temporary wooden structures to support heavy machinery.

5.5 Ground Conditions

The load-bearing capacity of the ground that is being used to support the machine, component, or attachment.

5.6 HSE

Refers to the Health, Safety & Environment department.

6.0 PROCEDURE

- 1) Complete a hazard assessment (i.e., FLRA) for the task. Notify supervision if unsure of the task or if there are hazards outside of the worker's control.
- 2) Isolate all hazardous energy (lockout/tagout equipment).
- 3) Read and understand the recommended blocking and cribbing procedure in the equipment manual.
- 4) When selecting a ground surface to support the blocking, ensure it is firm and level before building a cribbing structure.

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- 5) Inspect blocking for defects (cracking, bending, rounded corners, etc.)
- 6) Ensure blocking is appropriate in size and capable of supporting the weight of the intended load (see Table 1, Appendix B for examples).
- 7) Determine the required crib spacing and height.

Note: Any material used in the cribbing structure should extend NO MORE than 12 to 18 inches beyond the support area. As the length of the timbers increases, the strength at the center point decreases.

Note: If the timbers are too short, the structure will not have enough contact surface to adequately support the weight of the equipment or material.

- 8) Wedges or shims can be used when needed to make sure that the load is completely supported at its blocking points.
- 9) When constructing the cribbing structure, use the same type of wood.

Note: If softwood is used in conjunction with hardwood, the softwood may start to roll or deform, leading to crib failure. Any cribbing that is constructed with mixed hardwood will typically provide only 70% of the load-bearing capacity.

- 10) Place the component edge across the grain and not with the grain.
- 11) Clean up the area when the task is complete, inspect the blocking, and remove any damaged blocks. Stack blocking and store in a safe area.

6.1 Lincoln Log Stack / Full Stack

- 1) When building a Lincoln Log Stack or full stack, the height of the blocking stack must not exceed two times its width.
- 2) Start with building the base. **Note:** On soft ground, use a piece of metal at least 1 inch thick, or fill the bottom layer with blocking.
- 3) Lincoln stack - stack the blocking as seen in figure 1, make sure the corners overlap by 4 inches to help prevent crush failure.
- 4) Full Stack – stack the blocking as seen in Figure 2.

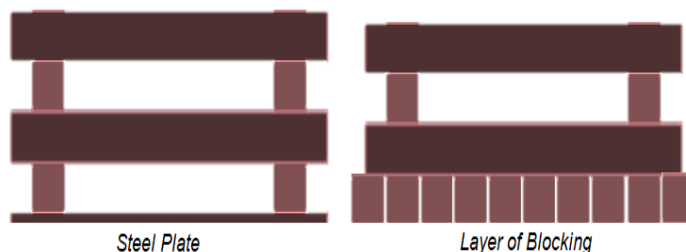


Figure 1

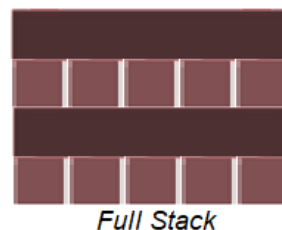


Figure 2

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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 Act, Regulation and Code – {Part 6, Sections 59, 61-73, 88, 89-92.2, 3-95.1, Cranes, Hoists and Lifting Devices}
- Alberta Occupational Health and Safety Act, Regulation and Code – {Part 15, Sections 212(1), 212(2), 213, 214, 215, Managing the Control of Hazardous Energy}
- 950C-C-022 General Housekeeping Code
- 950C-C-028 Hazardous Energy Isolation Code
- 950C-C-049 PPE - General Code
- 960C-SOP-004 Flagging, Tagging, and Barricading Hazardous Areas
- 960C-SOP-019 Slip Trip and Fall Hazard Prevention
- 960C-SOP-020 Mechanical Lifting Aids
- 962C-SOP-009 Manual Lifting and Carrying Heavy Objects

9.0 APPENDICES

- Appendix A – Placing & Setting up Blocking
- Appendix B – Mechanical Properties of Common Wood

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Appendix A Placing & Setting up Blocking

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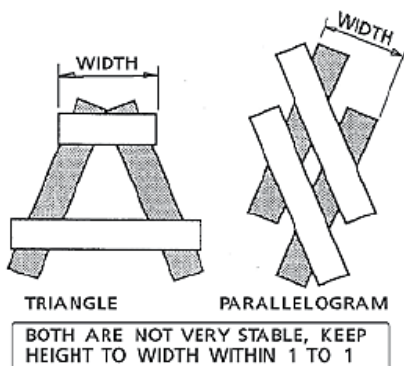
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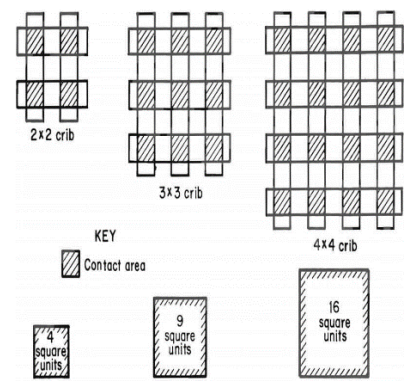
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3 x 3 configuration, properly spaced



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Appendix B Mechanical Properties of Common Wood

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Wood species	Compressive strength, ¹ psi	Average hardness, ² lb
Hardwood:		
Yellow birch ³	723	1,020
Rock elm	1,012	1,130
Black locust	1,886	1,635
Black maple ³	997	1,010
Red maple	686	825
Northern red oak ³ . . .	987	1,145
Pin oak	1,179	1,290
White oak	1,109	1,210
Yellow poplar	470	490
Softwood:		
Douglas fir	773	585
Western larch	867	670
Jack pine	575	485
Lodgepole pine ³	443	405
Ponderosa pine	597	390
Tamarack	699	485

Table 1

Table 1: documents the compressive strength and hardness of common wood species used for crib construction. Higher-strength wood provides proportionally greater capacity and stiffness. Since the weakest timber determines crib response, cribs should be constructed from wood of the same species or similar compressive strength and hardness.

Strength - is a measure of load capacity and typically refers to the maximum support capacity or its ultimate strength.

Stiffness - is a measure of how much resistive force will be developed by the support in response to the displacement of the support structure. A stiffer support will react to a larger force than a less stiff support for the same displacement.

Stability - is a measure of the capability of a support structure to maintain equilibrium through the action of internal forces or moments. A loss of load-carrying capability is generally associated with instability.