

Crane Safety

Crane Accidents

Support Failure (31%)

- Ground giving way beneath outriggers
- Soft footing with crawler crane
- Outrigger blocking fails
- Crane slips off blocks

Failure to Use Outriggers (22%)

- Machine setup
- Lifting boom without outriggers
- Changing boom and counterweight without outriggers

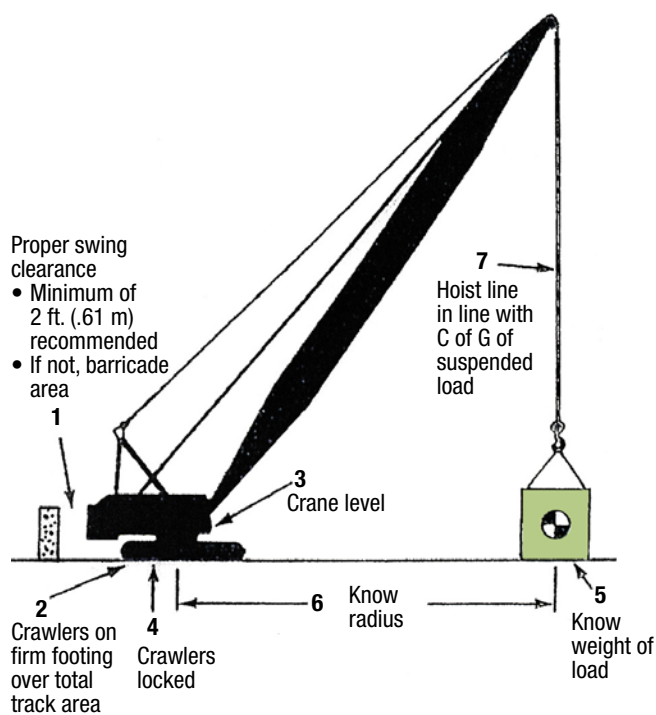
Mobile Crane Safety Absolutes

- Plan the lift
- Assign qualified lift supervisor and operator
- Complete and document crane inspection
- Calculate the total lifted load weight which includes adding auxiliary lifting devices and rigging weights
- Ensure the crane and rigging capacity exceeds total load weight for crane configuration and lift radius
- Evaluate the site conditions
- Configure the crane to lift over or towards its greatest capacity
- Extend the outriggers fully and place them on stable auxiliary pads (matting)
- Lift the crane's wheels clear of the ground and level the crane
- Barricade the crane swing radius
- Locate the hoist line directly above the load's center of gravity
- Ensure the load is properly rigged and signaled

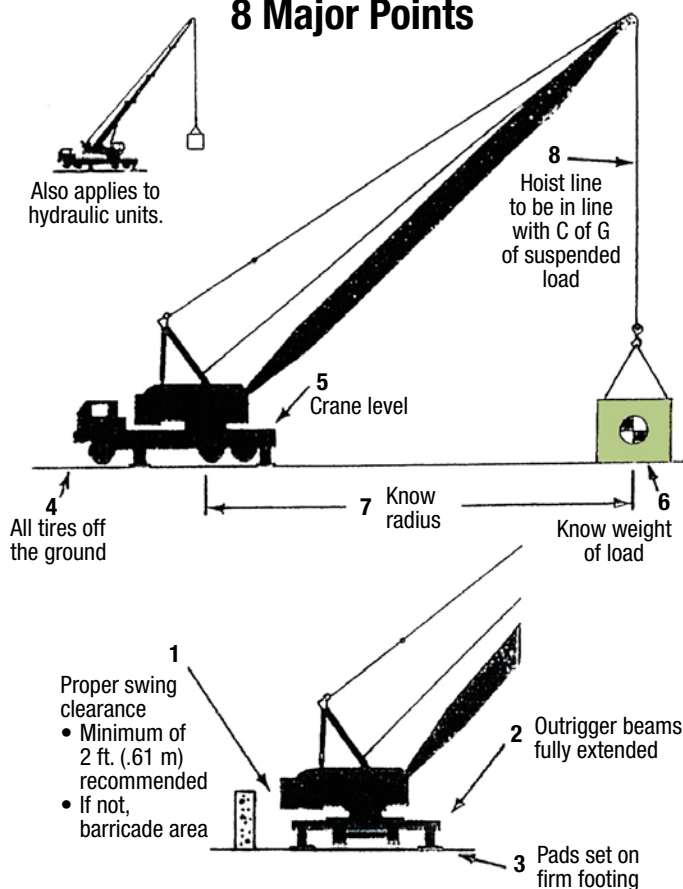


Setting Up

CRAWLERS 7 Major Points



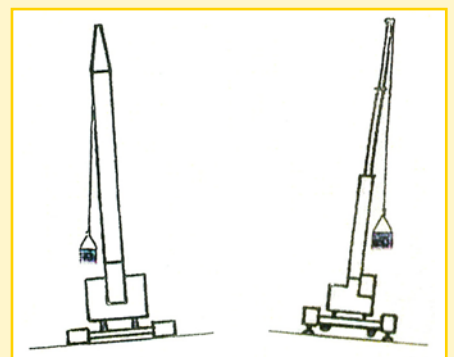
RUBBER-TIRED MOBILES 8 Major Points



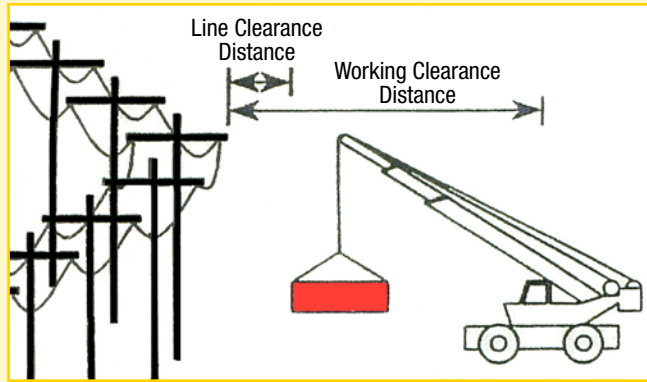
Effect of Out of Level

The chart below shows the reduction in capacity as calculated by one manufacturer for a lattice boom.

Boom Length and Lift Radius	Chart Capacity Lost When Crane Out of Level By		
	1°	2°	3°
Short Boom, Minimum Radius	10%	20%	30%
Short Boom, Maximum Radius	8%	15%	20%
Long Boom, Minimum Radius	30%	41%	50%
Long Boom, Maximum Radius	5%	10%	15%



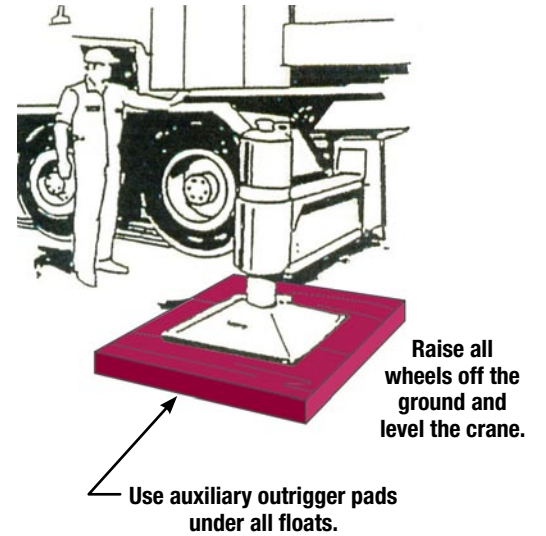
Electrical Safety



Power Line Clearance Distances	
Voltages	Distance from Power Lines
≤ 50 kV	10 feet
200 kV	15 feet
350 kV	20 feet
500 kV	25 feet
650 kV	30 feet
800 kV	35 feet

- Move equipment/activity to the safe working distance from power lines
 - Have utility de-energize and visibly ground power lines
 - Have utility move power lines to the safe working distance
 - Have utility install insulated sleeves on power lines*
 - Install flagged warning lines to mark horizontal and vertical power line clearance distances
 - Use non-conductive tools and materials
 - Use a Wire Watcher*
 - Use an insulated link, if applicable*
 - Use a boom cage guard, if applicable*
 - Use a proximity device, if applicable*
 - Install rider posts or goal posts under power lines
 - Install warning signs at driver's eye level
- * These options do not allow the operator to work closer than the line clearance distance.

Auxiliary Outrigger Pad



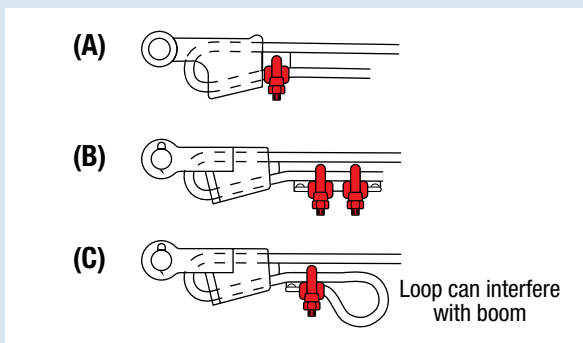
Formula for Sizing Auxiliary Outrigger Pads

$$\text{MINIMUM AREA FOR PAD (sq ft)} = \frac{\text{CRANE CAPACITY (tons)}}{5}$$

$$6 \text{ Sq. Ft.} = \frac{30 \text{ TON}}{5}$$

$$20 \text{ Sq. Ft.} = \frac{100 \text{ TON}}{5}$$

Wedge Socket Terminations



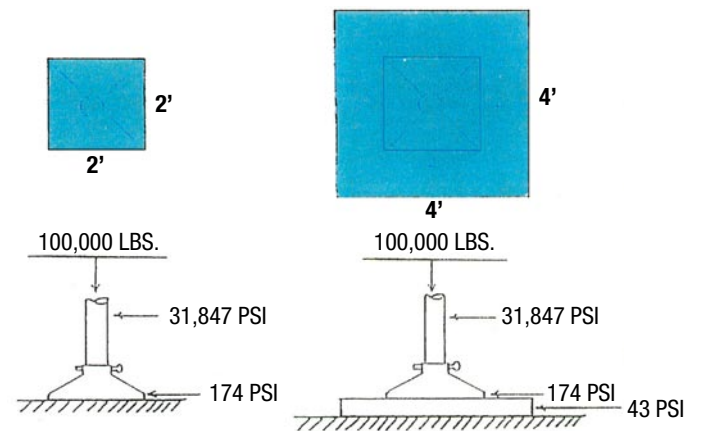
Three methods of securing the dead end of wire rope are shown.

- A)** the Crosby Terminator Device
- B)** a short stub of rope is clipped to the dead end with one or two clips.
- C)** a method which is in many safety regulations, but creates a problem in that the loop can interfere with the boom and can snag on projections in confined spaces.

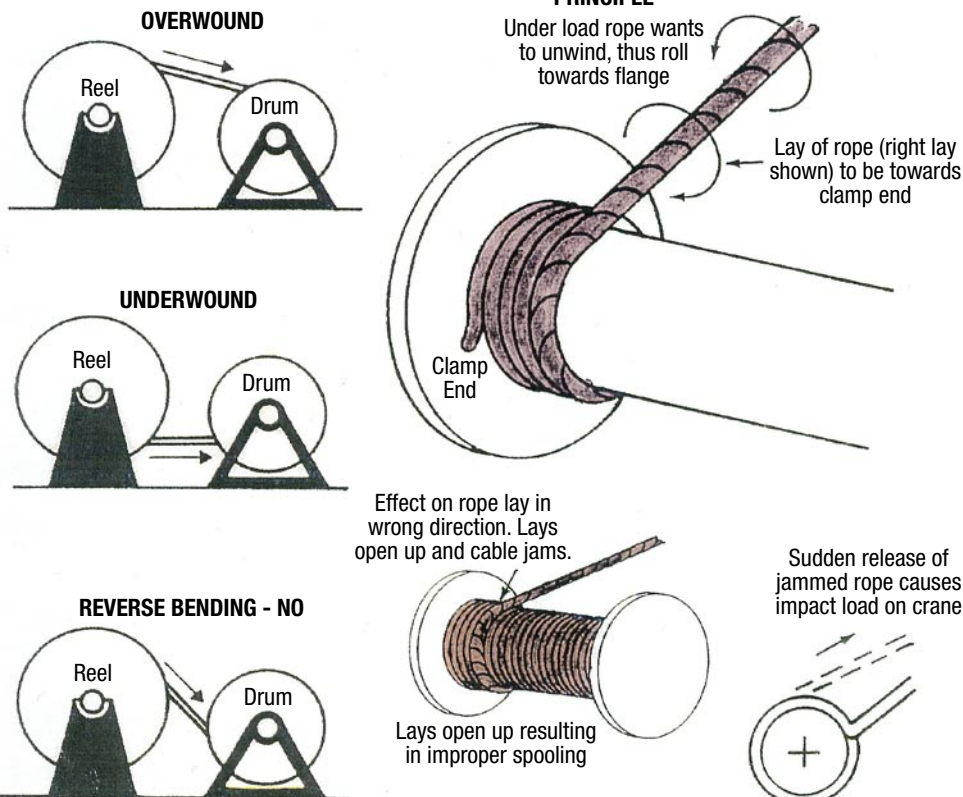


Mobile Cranes

OUTRIGGER vs. AUXILIARY OUTRIGGER PAD LOADS
100,000 LBS. on 2' x 2' float - Ram 4" DIA.



Rope Installation



APPROXIMATE SOIL BEARING CAPACITIES		
SOIL TYPE		APPROX. BEARING CAPACITY
Hardpan - cemented sand & gravel		135 PSI
Gravel - sand & gravel	Compact	110 PSI
	Firm	81 PSI
	Loose	54 PSI
Sand - coarse to medium	Compact	81 PSI
	Firm	60 PSI
	Loose	40 PSI
Sand - fine, silty, or with trace of clay	Compact	54 PSI
	Firm	40 PSI
	Loose	27 PSI
Silt	Compact	40 PSI
	Firm	33 PSI
	Loose	27 PSI
Clay	Compact	54 PSI
	Firm	33 PSI
	Loose	13 PSI