## **Lifting Precautions**

Your Precast Concrete Redi-Rock manufacturer supplies blocks to you with lifting anchors permanently cast into the concrete. These lifting anchors are load rated with a safety factor of four to one to safely handle the load of the precast blocks. However, these lifting anchors can still be overloaded, and you, the installing contractor and personnel have control over several variables which dramatically effect the loads imposed on the lifting anchors.

# Short choking of chains and cables increases the load applied to the chains, cables and lifting anchors to many times more than the weight of the block being lifted. Think of it as reverse leverage.

The picture to the right depicts an actual event that occurred. The workers hooked the chain as tight as possible between the two lifting anchors resulting in a load of ten times or more of the block itself being applied to the chains and lifting anchors causing failure.



#### Chains/cables shall be as long as possible forming as shallow of an angle down from the vertical as possible.



3 D view of typical proper rigging

Angle Down	Load
From Vertical	Multiplier
30°	1.16
45°	1.42
60°	2
75°	4
85°	11.5
90°	$\infty$ infinite



Typical proper rigging.

Keep your chains or cables as long and straight up as possible to prevent additional loading due to short choking.

## Proper hook size is extremely important.



Proper hook size - full range motion

Hooks shall be rated to handle the load and shall have full movement without any binding by hand movement. Too large of a hook will react against the concrete and lifting anchor just like a toggle or pry bar with tremendous leverage, enough to cause failure.



Too large of hook - will pry against concrete and lifter, destroying lifter.

#### Muddy ground and frozen ground

The bottom surface of a typical large Redi Rock block has an area approaching 1,700 square inches. When a block is sitting on a muddy surface the load multipliers are tremendous. With a mud suction of just 10 P.S.I. nearly 17,000 pounds of weight is added to the lift. The 60 inch block has a surface area of nearly 2,100 in<sup>2</sup>, at 10 P.S.I. mud suction this adds 21,000 pounds to the lift.

The same type of problem happens when a block is frozen to the ground. That large surface area will increase the load tremendously when frozen to the ground.

#### Keep transport speed low over rough terrain.

When blocks are carried over rough or frozen ground (especially at higher speed) it will cause the blocks to swing, rise and drop which causes an impact load on the lifting anchor which can lead to failure. This is particularly pronounced with rubber tired articulating bull dozers or high lifts that have a long boom for setting the blocks. The long boom amplifies any movement adding impact loading to the lifting anchor. Impact loading can lead to failure of the anchor and chains or cables. **The above is increased on rough or frozen ground particularly at higher speed.** 

### Never allow anyone to place their feet nor any portion of their body under a lifted block.



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