How To Plan A Crane Lift

By Frank Kazenske, Director of Labor Relations AGC of Illinois

I have been asked to write a safety article for the AGCI Quarterly Magazine. In my thought process and with all the talk about the new OSHA cranes and derricks safety regulations being published, I decided to use the opportunity to put together something that could be of value to members that perform crane lifts in our line of work. I have 25 years of experience not only in labor relations but also as a crane operator and as a department head in charge of operations safety. In those last two capacities, I have had extensive experience with and responsibility for initiating crane lift plans, crane sizing, site preparation, crane assembly and disassembly, crane lift and critical crane lift approval, as well as directing the crews for these lifts in a safe and efficient manner. I’m excited about the opportunity to share my experience with the members of AGC of Illinois.

Cranes are one of the most versatile pieces of equipment working on many heavy and highway construction sites. When used correctly with a trained and competent crew, cranes are one of the safest pieces of equipment.

When broken down into stages, the planning of a safe lifting plan, no matter how complex, can be straightforward.

Know your limitations

Once you’ve decided on the need for a crane, you must decide whether to use company-owned equipment or rent a crane from a third-party crane rental company. The number one question is: do you have the proper equipment and competent staff in-house to put together a plan and crew necessary to make a safe lift? If the answer is no, or if you have reservations about your answer, you should look to a third-party crane rental company that can help by providing the necessary planning and competent people to make a safe lift for you. It’s important to bear in mind that employing a third-party crane rental company does not relieve you of your share of responsibility for safety throughout the lifting process.

In both cases, a single competent person should be assigned to take full control and total responsibility for the planned lift. A “competent person” is a person with sufficient training, technical knowledge and experience to develop a safe plan of work for lifting operations, in order to satisfy the needs of the contractor.

Site visit

In my opinion, there is never enough time given to the site visit. In many instances, assumptions are made in the estimating process about site conditions. The person assigned to create the lifting plan should make arrangements to visit the site to gain all the information needed to ensure the lift can be made from a specific location and that ground conditions are suitable for supporting the weight of a crane and the materials to be lifted. The competent person should also plan for the best possible access and egress for the assembly and disassembly of the crane and the materials to be lifted. Existing proximity to hazards and any ongoing construction work which may develop during the planning phase should be of particular interest when developing the lift plan.

Once a rough sketch of the area has been made and some detailed notes taken, the competent...
person can start considering the other aspects of the lifting process. Detailed written information regarding the load or loads must be obtained. This information should include such items as:

- **Description**  What type of load will you be lifting – forms, precast deck panels, or bridge deck girders?
- **Weight**  Are the net and gross load weights known? Did you remember to factor in the weight of a crane load block; jib; rigging; hook, ball, and swivel; all cable below boom point; and other accessories?
- **Contents**  Are there any hidden contents that could affect load weight and stability, or that could be hazardous if spilled? Is the center of gravity marked on the load?
- **Nearby collision hazards**  Is the crane site suitable? Is the crane next to a haul road? Can the crane’s superstructure rotate 360° without coming into contact with any object creating a trapping point between the counterweight and the fixed object? Can the crane be assembled and disassembled with outriggers or crawlers fully extended in accordance with manufacturer’s specifications
- **Ground conditions**  Is the ground on which the crane is to sit firm and level? Is it capable of withstanding the ground-bearing pressure of an outrigger jack or a crawler crane track with the load suspended over the corner of the track or outrigger? Are there any hollow structures under the crane pad? Are crane mats needed to stabilize any soft ground conditions? Information on ground-bearing pressures can be obtained from the crane supplier and manufacturer.

**The crane**  After considering the loads and the location of the crane, the competent person should choose a crane. For example, if the crane is needed for an extended period and the ground conditions are too soft for a mobile truck crane, the competent person may opt for a crawler crane. The competent person needs to know cranes well. In particular:

- The capacity and limitations of each crane type
- The methods of work the crane can perform
- The crane’s safe working loads from the load chart
- The dimensions and weight of the crane, both in transit and after being fully set up
- If necessary, the outrigger or crawler crane track ground-bearing pressures (available from the supplier or manufacturer).
- The competent person should also check with local agencies for any restrictions or limitations on crane operations in the area.
- If renting a crane for the lift, request crane annual inspection certificate and maintenance records. Cranes are becoming more and more complex and technologically sophisticated. For technical questions, refer to the operator’s manual, the crane supplier and the manufacturer.
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Accessories
Choosing the right accessory is just as important as the site visit, load calculations and crane choice. Commonly-used accessories include wire rope slings, single chain slings, pin shackles, manmade fiber flat belts and round endless slings, eyebolts and multiple leg slings, just to name a few. Accessories must be in good order and free of common, easily-identifiable faults and defects. The competent person is responsible for the choice of lifting accessories most suitable for the lifting operation. This decision may depend on including and consulting with others and relying on the manufacturer’s instructions and guidance. When choosing lifting accessories, the competent person must pay particular attention to:

- The safe working loads or working load limits of the accessories
- The number and type needed
- The number of legs required
- The suitability to and compatibility of accessories with each other and lifting points
- Most importantly, the calculation of angles between slings and accessory legs

Lifting accessory manufacturers provide the user with a large amount of technical information on their proper use. Much of this is designed with the user in mind and is simplified to ensure that the user has a full understanding of their safe and efficient use.

The competent person also needs to visually inspect all accessories prior to use. This inspection will identify the most common faults that may occur during use. These include:
- Cuts and tears

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- Deformity
- Discoloration
- Stretching, distortion and elongation of links and components
- Hard and soft areas on manmade slings
- Rust and corrosion
- Missing items such as safety catches and pins
- Missing markings such as identity numbers and working load limit markings

**Personnel**

The competent person may in certain circumstances delegate duties to an equally-competent superintendent or crane operator. The superintendent or crane operator’s role is similar to the competent person’s but is more hands-on: implementing the competent person’s instructions rather than issuing them. The superintendentqualified rigger, certified signal person and the operator’s most important role is to stop the lift if:

- He or she does not understand what is required
- Unplanned changes to the lifting operation have occurred
- There are doubts about the continued safety of the lift or crew involved

The competent person will direct the lift with the assistance of the crane operator, certified signal person, or qualified rigger, and the operator, signal person, or rigger shall be responsible for the attachment and removal of lifting accessories. The basic criteria to remember is that all people involved must be competent. All personnel involved with the lifting operation must be able to work together as a team. Each is equally responsible for the safety and well-being of the others.

The key to this team involvement is that the competent person must bring together information and people from several areas to ensure that the lift is planned properly, supervised appropriately, and carried out safely.

On pages 24 and 25 I have included a sample of a lift plan worksheet as a model for companies’ individual use. The worksheet is a basic template that can easily be modified for unique or specialized lifts not covered by this worksheet, such as two-crane critical lifts.

This information is only a guideline to a successful lift. All lifts are different and require attention to detail by all companies involved in the art of cranes and lifting. With the new OSHA regulations in effect, it is my hope that more construction managers will get on board and take the time necessary to become more familiar with cranes and the lifting process.

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