A LIFT PLAN FOR EVERY LIFT

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TEN QUESTIONS THAT MUST BE ANSWERED BEFORE ATTEMPTING ANY LIFT
When attempting any lift, regardless of how small or seemingly insignificant, there is some basic information that must be known and confirmed before you begin.
TEN QUESTIONS THAT MUST BE ANSWERED BEFORE ATTEMPTING ANY LIFT

As an industry, we do a great job planning critical and super lifts. These major lifts are executed with precision and are successful when the plan is carefully followed.

We don’t do as well on the everyday routine or standard lifts.
In most cases there is little or no planning and when things go wrong, accidents result.

The majority of crane accidents occur with lifts that are classified as standard when in fact there is nothing standard about any lift.
TEN QUESTIONS THAT MUST BE ANSWERED BEFORE ATTEMPTING ANY LIFT

It has been shown that when a lift plan is required for every lift, the supervisors, operators and riggers catch mistakes before they happen.
THE TEN QUESTIONS

1. What is the weight of the load?
2. What is the maximum radius?
3. What is the rigging capacity and weight?
4. What are the capacity chart deductions?
5. What is the crane net capacity?
6. What is the percent of the cranes capacity?
7. Is the crane on firm level ground?
8. Are there power lines in the load path of the crane?
9. Are there obstructions in the load path of the crane?
10. Will the load contact the crane or boom during the lift?
1. WHAT IS THE "VERIFIED" WEIGHT OF THE LOAD?

It is not possible to make a safe lift when the weight of the load is not known or verified.

Many loads can be easily calculated; such as a bucket of concrete or a steel beam. Most loads are shipped to the work site by truck; the trucking company weight ticket is a good source for weight information.

In any case, the load weight is critical and must be known and verified.
2. WHAT IS THE MAXIMUM RADIUS?

- The radius must be measured
- A dry run can be performed by placing the empty hook over the pick and set locations; measuring radius for each case

Calculate the lift according to the longest radius
3. WHAT IS THE RIGGING CAPACITY AND WEIGHT?

- Calculate the capacity of the rigging assembly
- The system is only as strong as the weakest link
- Consider the effect of sling angles on the rigging

<table>
<thead>
<tr>
<th>Leg Angle</th>
<th>Load Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>1.000</td>
</tr>
<tr>
<td>85°</td>
<td>1.003</td>
</tr>
<tr>
<td>80°</td>
<td>1.015</td>
</tr>
<tr>
<td>75°</td>
<td>1.035</td>
</tr>
<tr>
<td>70°</td>
<td>1.064</td>
</tr>
<tr>
<td>65°</td>
<td>1.103</td>
</tr>
<tr>
<td>60°</td>
<td>1.154</td>
</tr>
<tr>
<td>55°</td>
<td>1.220</td>
</tr>
<tr>
<td>50°</td>
<td>1.305</td>
</tr>
<tr>
<td>45°</td>
<td>1.414</td>
</tr>
<tr>
<td>40°</td>
<td>1.555</td>
</tr>
<tr>
<td>35°</td>
<td>1.743</td>
</tr>
<tr>
<td>30°</td>
<td>2.000</td>
</tr>
</tbody>
</table>
3. WHAT IS THE RIGGING CAPACITY AND WEIGHT?

Make sure the load is balanced in the rigging system

Calculate the effective weight of the rigging system and record it on the plan

The weight of the entire rigging system is deducted from the crane chart gross capacity.
4. WHAT ARE THE APPLICABLE CAPACITY CHART DEDUCTIONS?

Don’t forget to include deductions for attachments that are mounted on the boom and not used; such as jibs or boom extensions.

Everything hanging under the boom top is considered part of the load.

CAPACITY DEDUCTIONS FOR AUXILIARY LOAD HANDLING EQUIPMENT

<table>
<thead>
<tr>
<th>Load Handling Equipment</th>
<th>Weight (Lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary Head Attached</td>
<td>100</td>
</tr>
<tr>
<td>40 Ton Quick Reeve 4 Sheave Hook Block (See Hook Block For Actual Weight)</td>
<td>720</td>
</tr>
<tr>
<td>60 Ton Quick Reeve 4 Sheave Hook Block (See Hook Block For Actual Weight)</td>
<td>1100</td>
</tr>
<tr>
<td>70 Ton Quick Reeve 5 Sheave Hook Block (See Hook Block For Actual Weight)</td>
<td>1400</td>
</tr>
<tr>
<td>8.5 Ton Hook Ball (See Hook Ball For Actual Weight)</td>
<td>360</td>
</tr>
</tbody>
</table>

Lifting From Main Boom With:

<table>
<thead>
<tr>
<th></th>
<th>Weight (Lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>39.5 Ft. Or 67 Ft. Fly Stowed On Base (See Operation Note 4)</td>
<td>0</td>
</tr>
<tr>
<td>39.5 Ft. Offset Fly Erected But Not Used</td>
<td>4100</td>
</tr>
<tr>
<td>67 Ft. Offset Fly Erected But Not Used</td>
<td>8200</td>
</tr>
</tbody>
</table>

Lifting From 39.5 Ft. Offset Fly With:

<table>
<thead>
<tr>
<th></th>
<th>Weight (Lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.5 Ft. Fly Tip Erected But Not Used</td>
<td>PROHIBITED</td>
</tr>
<tr>
<td>27.5 Ft. Fly Tip Stowed On 39.5 Ft. Offset Fly</td>
<td>PROHIBITED</td>
</tr>
</tbody>
</table>
5. WHAT IS THE CRANE “NET” CAPACITY AFTER DEDUCTIONS?

Very often accidents occur because the operator relies solely on the “gross” capacity from the crane chart.

All deductible items must be subtracted from the “gross” capacity to establish the “net” capacity.
6. WHAT IS THE RATIO OF CRANE CAPACITY TO NET LOAD?

Calculate the percent of load to chart capacity. When a crane is nearing capacity everything has to be exactly right. If anything goes wrong it happens fast and there is little chance to recover.

Require the completion of a more comprehensive “Critical Lift” plan when the “Ten Question” plan indicates the lift has met the criteria for critical lift.
7. IS THE CRANE ON FIRM LEVEL GROUND?

Many crane accidents are a result of loss of stability caused by ground failure.

Be sure to investigate the ground and assure it will support the crane.
7. IS THE CRANE ON FIRM LEVEL GROUND?

- Use Proper matting under the outriggers or crawlers.
- Appropriate matting should always be used.
- Beware of recently backfilled excavations.

Right

Wrong
7. IS THE CRANE ON FIRM LEVEL GROUND?
7. IS THE CRANE ON FIRM LEVEL GROUND?
7. SIMPLE GROUND PRESSURE CALCULATION

Outrigger pressure 10,000 lbs

Outrigger pad 1 sq. ft.

1' Thick Mat

Pressure goes down @ 45 degree angle in all directions

Area under outrigger pad 1 sq ft, ground pressure = 10,000 lbs. psf  \( \frac{10,000}{1} = 10,000 \)

Affected area under mat 3 x 3 = 9 sq. ft.

Ground pressure under mat = 1,111 lbs psf  \( \frac{10,000}{9} = 1,111 \)
8. ARE THERE POWER LINES ANYWHERE IN THE PATH OF THE LOAD OR CRANE ATTACHMENTS?

See the OSHA Power Line Rule found in the 1926.1400 standard at www.osha.gov for more information.

Note power line locations and record them on the lift plan. Discuss the lift plan with all persons involved so that everyone is aware of the potential hazard.
8. ARE THERE POWER LINES ANYWHERE IN THE PATH OF THE LOAD OR CRANE ATTACHMENTS?
8. NOTICE THE ELECTRICAL ARC AT THE RIGHT REAR WHEEL
8. THE ENERGY GOING TO GROUND CAUSES THE CONCRETE SLAB TO EXPLODE
8. THE ELECTRICITY IS GOING TO GROUND
8. MASSIVE 46,000 VOLT ARC TO GROUND
8. THE CRANE OPERATOR ESCAPED WITH MINOR INJURIES
8. THE ESCAPE PLAN IS TO JUMP FROM THE CRANE AND HOP AWAY FROM THE CRANE TO SAFETY
9. ARE THERE OBSTRUCTIONS ANYWHERE IN THE PATH OF THE LOAD OR CRANE ATTACHMENTS?

Make a dry run through the full swing path of the proposed lift and observe clearance to any obstructions.

Don’t forget to check behind the crane to see if the counterweights will contact anything.

Survey the work area for obstructions.
Always use non-conductive tag lines to control the load.

If a load contacts a loaded boom, the boom could collapse.
A LIFT PLAN FOR EVERY LIFT

It should be understood that there are many things that affect the safety of a lift.

The ten-question lift plan is intended to inspire creative thinking and assure the most vital parameters are considered.

It does not, in any way, relieve the crane operator or rigging crew from their responsibilities to consider everything that may affect the safety on any lift.
**Routine Lift Plan Form - Sample**

**Date and Time:**

**Location of the Lift:**

**Operator Name:**

**Crane Make and Model:**

**Operator Signature:**

**Crane Serial Number:**

**Lift Supervisor Name:**

**Load Description:**

**Lift Supervisor Signature:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the verified weight of the load?</td>
<td>lbs.</td>
</tr>
<tr>
<td>2. The weight is verified by what means?</td>
<td></td>
</tr>
<tr>
<td>Shipping document, calculation, certified scale ticket, manufacturer's id tag? Consult the Lift Supervisor when in doubt.</td>
<td></td>
</tr>
<tr>
<td>3. What is the maximum radius for the lift?</td>
<td>ft.</td>
</tr>
<tr>
<td>(Measured from the center of rotation of the crane to the center of gravity of the load)</td>
<td></td>
</tr>
<tr>
<td>4. What is the rigging capacity and combined weight?</td>
<td>lbs.</td>
</tr>
<tr>
<td>• Add everything between the hook and load</td>
<td></td>
</tr>
<tr>
<td>• The rigging is only as strong as the weakest link</td>
<td></td>
</tr>
<tr>
<td>• Reduce the sling capacity for low sling angles</td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
</tr>
<tr>
<td>5. What are the applicable crane capacity chart deductions?</td>
<td>lbs.</td>
</tr>
<tr>
<td>Include all rigging and applicable crane attachments.</td>
<td></td>
</tr>
<tr>
<td>6. What is the &quot;net&quot; crane capacity after deductions?</td>
<td>lbs.</td>
</tr>
<tr>
<td>(Subtract the total deductions from the gross capacity of the crane chart to find the net capacity)</td>
<td></td>
</tr>
<tr>
<td>7. What is the percent of capacity of the crane chart?</td>
<td>%</td>
</tr>
<tr>
<td>(Divide the load weight by the crane net capacity)</td>
<td></td>
</tr>
<tr>
<td>Over 80% Requires Lift Supervisors Signature</td>
<td></td>
</tr>
<tr>
<td>Over 90% Requires a Critical Lift Plan be completed, approved and signed</td>
<td></td>
</tr>
<tr>
<td>8. Is the crane on firm level ground and outrigger mats in place?</td>
<td>YES NO</td>
</tr>
<tr>
<td>9. Are there power lines anywhere in the path of the load or crane attachments?</td>
<td>YES NO</td>
</tr>
<tr>
<td>10. Is an electrical proximity permit required, completed, approved and signed?</td>
<td>YES N/A</td>
</tr>
<tr>
<td>11. Are there obstructions anywhere in the path of the load or crane attachments?</td>
<td>YES NO</td>
</tr>
<tr>
<td>12. Can the load contact the boom or jib at anytime during the lift?</td>
<td>YES NO</td>
</tr>
<tr>
<td>Always use tag lines!</td>
<td></td>
</tr>
<tr>
<td>13. Are tag lines of proper length and capacity used?</td>
<td>YES NO</td>
</tr>
<tr>
<td>14. Has a pre-lift meeting been conducted?</td>
<td>YES NO</td>
</tr>
<tr>
<td>All persons involved in the lift must have a clear understanding of what the plan is and what they are supposed to do.</td>
<td></td>
</tr>
<tr>
<td>15. Have all required permits been issued and approved?</td>
<td>YES NO</td>
</tr>
</tbody>
</table>

Version date: 10/5/2018
A lift is considered to be “critical” if it involves any of the following:

a. Any load greater than 6 tons lifted over or near operating facilities that failure during the lift would impact personnel or cause an uncontrolled release of hazardous material

b. Any load that exceeds 75% of the lifting equipment’s load chart

c. Use of two or more cranes to make any lift.
CRITICAL LIFTS

A lift is considered to be “critical” if it involves any of the following:

d. *Assembly of crane boom* "in the air" shall be considered a critical lift

e. Lifts encroaching the Minimum Safe Clearance distances to Power Lines

f. Any lift that involves the suspension of personnel above the ground

g. Any other lift due to its nature or equipment being lifted is deemed as a "critical lift" by any involved party
### CRITICAL LIFT PLAN FORM - EXAMPLE

<table>
<thead>
<tr>
<th>Location</th>
<th>Date of Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Description</td>
<td>Lift Description</td>
</tr>
</tbody>
</table>

#### 1. General Information
- **Weight (lbs.)**
- **Rated Capacity of Sling**
- **Rope Selection**
- **Number of Sling**
- **Number of Shackles**

#### 2. Crane
- **Type of Crane**
- **Crane Capacity**
- **Maximum Design Wind Load (MPH)**
- **Lifting Arrangement**
- **Max Distance - Center of Load**
- **Length of Boom**

#### 3. Jib
- **Jib Stiffened**
- **Does the Job Require a Jib?**
- **Length of Jib**
- **Angle of Jib**

#### 4. Rated Capacity of Jib
- **Rated Capacity of Jib from Chart**

#### 5. Crane Placement
- **List any Deviation from Smooth Solid Foundation**
- **List any Underground Line**
- **List Electrical Hazards in Area**
- **List Obstacles or obstructions to Lift of Swing**
- **Swing Direction and Degree (from swing)**
- **Track, Outrigger Loading or on Rubber**

#### 6. Cable
- **Number of Parts of Cable**
- **Size Cable**

#### 7. Bunting Slinging
- **Sling Selection**
- **Type of Arrangement**
- **Number of Slinging in Hook-Up**

#### 8. Pre-Lift Checklist
- **Outrigger Matting Acceptable**
- **Outrigger Fully Extended**
- **Outrigger Match Load Chart**
- **Crane In Good Condition**
- **Swing Room**
- **Head Room Checked**
- **Max Counterweights Used**
- **Counterclockwise Load Chart**
- **Tag Line Used**
- ** Experienced Operator**
- **Experienced Signalman (designated)**
- **Experienced Rigger**
- **Load Chart in Crane**
- **Counterweight swing barbed**
- **Wind Conditions**
- **Crane Impeded by**
- **Functional Test of Crane by**
CRITICAL LIFT PLAN FORM - EXAMPLE

II. Special Instructions & Diagrams (Prepared by support Engineering)
   A. Special instructions or restrictions for crane, rigging, lift, etc.
   B. Crane/load placement, lifting point and rigging diagram (use separate sheet if necessary).

C. Contingency plan details

D. Communication system to be utilized

III. Authorization
   A. Multiple crane lifts require a separate lift plan for each crane.
   B. Any change in the configuration of the crane, placement, rigging, lift plan, etc., or changes in any calculations will require a new lift plan.

   Suspended personnel baskets shall be used when there is no safe alternative means of access to the work area such as ladder or erection of scaffolding. A pre-lift meeting with all personnel involved in the lift must be held before the initial lift.

D. Signatures

   Lift Director
   Crane Operator
   Crane Supervisor
   CHS Safety Department Representative
   CHS Lift Supervisor (SUI)
   Work Crew Members (sign on back of form)

* Authorization can be given by a designee when specified approver is unavailable. Authorization is voided if crane is relocated.
QUESTIONS AND ANSWERS
THANK YOU