“Think Safety Before You Place Concrete”

Presented By:
Brundage-Bone Concrete Pumping, Inc.
Safety Department

Concrete Pump Trucks...
Concrete Pump Trucks…

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Concrete Pump Trucks…

- Hydraulic reciprocating pumps.

- Components: Two cylinders (differential cylinders), two materials cylinders, a water box, and a concrete valve. (Rock valve, S valve, Gate valve, etc.)

Cycling the Pump…
High Pressure Hydraulic Lines…

Concrete Pump Hopper…
Rear Transition Cover…

Rear Transition Cover…
Grate (covers the agitator and concrete valve)...

Augers (agitator) and Concrete Valve...
Concrete Pump Trucks...

- Concrete pressure during pumping operations generally from 600 psi to 1233 p.s.i.
- Concrete can be pumped up to 213 yards per hour.
- Operator controls the pump functions through wireless radio remote or hardwire remote.

Radio Remote Control Box….
Wired Remote Control Box…

Job-Site Conditions Checklist…

- Before any concrete pour begins, the following items should be checked off to ensure a safe start to your concrete placement operations.

- Person-In-Charge (PIC) has been identified.
Job-Site Conditions Checklist…

- Pump operators must have 17’ clearance away from all energized power lines before operations can begin or,
- Power lines have been de-energized or relocated to prevent accidental contact.
How Close Are They?

Overhead lines - The Three Types...

- Transmission lines
- Distribution lines
  - 7,200 volts, phase to ground, is most common
- Service drops
  - 220 volts average; 440 in some industrial settings
Service Drop – 220-440 Volts...

Distribution Lines – 7,200 to 100,000 Volts...

- The most hazardous to concrete pumpers!
  - Familiarity breeds complacency
  - May be as low as 18 feet
Transmission Line 50,000 to 1,000,000 Volts…

Paths to Ground…

If the pump becomes energized, everything that touches the pump is also energized.
An Example of “Path-To-Ground”…
An Example of “Path-To-Ground”...

Electrical Burn...

- Most Common Exit Wound
Why/How Contact With Lines Occurs…

- Working in area below lines - pump operator tries to reach over lines

Why/How Contact With Lines Occurs…

- Wires behind work area, but contacted when boom is moved
Look Up and Live!!…

➢ Florida, January 2006
➢ 1 Fatality
Look Up and Live!!!…

Look Up and Live!!!…
Look Up and Live!!!…

Maintain a MINIMUM distance

17 Feet!
Control Measures…

- Site survey ahead of time
- Positioning the Pump to avoid power lines

Control Measures…

- De-energize lines
Electrical Awareness Barrier (Cone Policy)…

If Contact With Lines Occurs…

- Stay away until you know for certain the power is off
- If you’re in the vehicle, stay put if you can
- If you have to get out, jump!
  - Never step down or touch the ground and vehicle at the same time.
- If you’re standing near by, shuffle away - taking very small steps
Job-Site Conditions Checklist…

➢ Adequate access and egress routes for Ready-Mix trucks have been established.
Job-Site Conditions Checklist…

- A staging area has been established for ready-mix trucks.
Job-Site Conditions Checklist…

- A clean out area for the ready-mix and pump truck has been established.

Job-Site Conditions Checklist…

- Adequate lighting has been provided.
Job-Site Conditions Checklist…

- Ground Stability has been considered:
  - Soils Condition - Will the ground support the weight of a pump truck and ready-mix truck?
  - Compaction - Has the ground been properly prepared?
  - Rain & Weather - Has the weather affected the ground conditions?

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Ground Stability…

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Load Bearing Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virgin Ground</td>
<td>22 PSI</td>
</tr>
<tr>
<td>Asphalt</td>
<td>29 PSI</td>
</tr>
<tr>
<td>Compressed crushed stone</td>
<td>36 PSI</td>
</tr>
<tr>
<td>Clay/silt soil, firm</td>
<td>43 PSI</td>
</tr>
<tr>
<td>Mixed granular soil</td>
<td>51 PSI</td>
</tr>
<tr>
<td>Firm compacted gravel</td>
<td>58 PSI</td>
</tr>
<tr>
<td>&quot; &quot; (more compacted)</td>
<td>72 PSI</td>
</tr>
<tr>
<td>&quot; &quot; (more compacted, class 5)</td>
<td>109 PSI</td>
</tr>
<tr>
<td>Brittle weathered rock</td>
<td>145 PSI</td>
</tr>
<tr>
<td>Concrete (unknown mix)</td>
<td>1000 PSI</td>
</tr>
</tbody>
</table>
Ground Stability…

➢ Example of virgin soil w/ inadequate cribbing

Ground Stability…

➢ Virgin soil ALWAYS needs extra cribbing
**Ground Stability...**

**52m Outrigger**
- Exerts 60,000 lbs of downward force

<table>
<thead>
<tr>
<th>Surface Area</th>
<th>Pressure (p.s.i.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14” x 14” pad</td>
<td>306</td>
</tr>
<tr>
<td>24” x 24” Pad</td>
<td>104</td>
</tr>
<tr>
<td>5ft x 5ft Steel Plate</td>
<td>16.7</td>
</tr>
<tr>
<td>8ft X 10ft Steel Plate</td>
<td>5.2</td>
</tr>
<tr>
<td>200 lb man standing on one foot with a size 10 shoe</td>
<td>5.5</td>
</tr>
</tbody>
</table>

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**Ground Stability...**

![Image of outrigger in mud]

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Ground Stability…

Ground Stability…
Ground Stability…

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Ground Stability…

Job-Site Conditions Checklist…

- Effects of adverse weather conditions on personnel and operations.
Communication...

- Pre-task planning sessions for the upcoming pour should include representatives from the contractor, concrete pumping company, and redi-mix company.

Communication...

- Between the Redi-mix company and concrete pumping company regarding the delivery and status of trucks.
Communication…

➢ Between the redi-mix driver and pump operator/hopper watch to ensure personnel safety while trucks are pulling up, backing in, and pulling out.
Communication…

Communication…
Communication...

- Between the redi-mix driver and pump operator/hopper watch to maintain the proper level of concrete in the hopper.
- How to locate and activate the horn on the truck.
- The location of the emergency stop switches.

Communication...

- Full Hopper
Communication...

- Emergency Stop & Horn

Communication...

- Emergency Stop (E-Stop)
Communication...

- Between Pump Operator and Placing Crew
Communication…

- Between Pump Operator and Placing Crew
  - To keep hose moving smoothly and at the proper height over the concrete...not in it.

Hose/Pipe – Size & Selection…

- Determined by:
  - The speed (in yards per hour) of the pour.
  - Size of the aggregate/mix design.
  - Weight of the delivery hose.
  - Ease of use for the operator.
Hose/Pipe – Size & Selection…

➢ Mix Design

Hose/Pipe – Size & Selection…

➢ How many yards/hr will travel through system?
Hose/Pipe – Size & Selection…

- Ease of Use

Hose/Pipe – Size & Selection…

- Tip Hose = 1 End Coupled
Hose/Pipe – Size & Selection...

- Double-Ended Tip Hose....Never!

Air In The System...

- Air in the system results from (among other things) allowing the level of concrete in the hopper to fall below its safe operating level of the pump.

- **Communication** between the redi-mix operator/ hopper watch person and the pump operator is critical.
Air In The System…

Blockages In The System…

➢ Thorough cleaning is essential. A hose or pipe that has not been properly cleaned will reduce the ability of the concrete to flow smoothly and may cause a blockage.
Blockages In The System…

➤ Dirty Hoses
Blockages In The System…

- Foreign objects from concrete mixer trucks...(barrel chips, oversized aggregate, etc.) can get into the system and cause a blockage that results in the concrete plugging.
Blockages In The System…

- Long delays on the jobsite can allow the concrete to set up and cause a blockage.

- Release of a temporary blockage
Blockages In The System…

- Extreme caution must be taken whenever a blockage occurs. The operator must get all personnel must get back beyond the reach of the tip hose before he can attempt to free the blockage.

- If the clamp is removed before the operator backs off, the pressure there can be a violent release of concrete. Communication is critical!

Blockages In The System…

- Do NOT remove clamps before directed to by the operator
Clamp Opened Under Pressure

Blockages In The System...

- Kinking the hose prevents continuous flow of concrete and INSTANTLY creates maximum pump pressure
- This can cause a violent reaction.
Blockages In The System...

- Kinked Hoses...Will Straighten!

Thanks….and Have a Safe Pour!