Cementing Safety for Concrete Workers: Cast-in-place Concrete

What's at Stake?

A 40-year-old worker was killed at a construction site recently in Toronto. According to police, concrete panels had fallen onto the worker as they were being unloaded, and the man became trapped. The man was rushed to a trauma center before being pronounced dead at the hospital.

Fatalities and injuries like this highlight the very real importance of safety for concrete workers among all the risks and hazards involved in their work.

What's the Danger?

As seen in the above example, falling and collapsing slabs are two of the main concerns when working with concrete. These hazards are compounded when bracing and frameworks are improperly installed, not sufficient to support construction, and/or removed too early. Frameworks and shoring are major components of risk for cast-in-place construction.

How to Protect Yourself

First, consider some general features for safety when working with concrete.

- The structures must be able to support intended loads, and this should be determined by a qualified professional with experience in structural design.
- Reinforcing steel should be used, and capped, to prevent puncturing workers.
- Only essential employees should be granted access to work zones, and signs and barriers must be used to inform non-essential workers to avoid the area.
- All design plans, including revisions and accompanying drawings, must be made available at the jobsite.
- Lastly, but most importantly, appropriate PPE should always be provided and used. Hardhats, safety glasses, gloves, high-visibility clothing, safety shoes, and any other job-specific PPE must be worn as instructed by your employer. If you ever feel you are not provided with adequate or functional PPE, speak up!

Secondly, think about some specific factors for safety when working with cast-in-place concrete.

- Frameworks must be designed, built, braced, and maintained so they can support

the structures without compromising any vertical and lateral loads that are applied to them.

- Shoring equipment must be inspected before, during, and after concrete placement. Sills must be intact and rigid and must be able to carry the max intended load. All base plates, shore heads, extensions, and adjustment screws must be in firm contact and secured with the foundation and in the form.
- For single-post shores additional requirements are needed.
    - They must be designed and inspected by a structural design engineer.
    - Must be vertically aligned and spliced and braced in two perpendicular directions at the splice level, and each tier must also be diagonally braced.
    - Lastly, any adjustments to raise frameworks must be made before placement of concrete.
- Reshoring must be done when the concrete is required to support loads more than its capacity. It must not be removed until the concrete being supported has attained adequate strength to support its weight as well as all loads placed on it.
- Vertical slip forms must have scaffolds or platforms for employees to work or pass, and forms must be designed to prevent excessive distortion of the structure during jacking.
    - Steel rods and pipes used for jacking or lifting forms must be appropriately designed and braced.
    - Safety limits, such as rates of lift, or rate capacity of jacks, must never be exceeded.
    - And finally, fail safes such as holding devices like mechanical dogs, must be in place in case of lifting mechanism failure.
- In most cases, forms and shores should only be removed after the concrete has enough strength to support its weight and imposed loads. Strength can be either pre-determined in construction plans so that certain parameters are met, or strength can be determined by testing with an ASTM method designed to indicate compressive strength.

Final Word

Consideration for the structural integrity and strength of the concrete structure is key for concrete safety. Frameworks and shoring procedures will ensure safety during cast-in-place construction.