

CSI Country Wide Case Study Safety Strategy Discussion

Construction Safety Investigator



Instructions:

The objective of this tool is to provide field supervisors with information to proactively engage workers and discuss safety-related concerns that they may encounter. Safety discussions should not be limited to the subject above and should pertain to the activities that workers will be involved in that may have the potential for safety-related exposures.

Case Day:

9/1/16

Accident Type:

Concrete Formwork Collapse

Relevant laws, rules and codes may include:

29CFR 1926.20(a)(1); 1926.21(b)(2); 29 CFR 1926.703(a)(1); 29 CFR 1926.703(b)(6); ANSI A10.9-1983 (non-mandatory)

Case:

Worker Killed When Formwork Failed and Collapsed

Accident Detail:

Three employees were engaged in the work with one employee falling along with the formwork table and fatally injured.

A formwork table being installed for pouring concrete on the 15th floor of a multi-story residential building failed and collapsed. A number of floor slabs had already been completed and crews were installing forms for the next level.

The failed form table was to be part of a larger group of tables that would be connected together to form a large pour area prior to any concrete being poured. On this day, crews were not at this point of construction so no additional support was yet required.

Due to high winds, gusting to over 30mph, the table in question was subjected to lateral loading causing the ratchet strap screws securing the table to the deck to become loosened, creating uplift of the table. This allowed the screws to pull out of the concrete.

As a result the table was thrown off the floor deck by the high winds along with an employee, whose fall protection became entangled with the formwork table, severing the wire rope lifeline cable.

Reconstructive Safety Evaluation:

- What are some of the possible causes of the accident being discussed?
- What actions could have been taken that might have prevented this accident from occurring?

Accident Scene Conclusion:

This accident resulted in a number of identified failures contributing to the accident.

- The incident occurred before concrete was poured; as a result, neither the additional supports were provided or required, nor any connection with the adjoining tables were made to form a continuous sheathing for placement of concrete.
- At the time of the incident, the table was standing alone, independent of any lateral support from the sheathing diaphragm that was to be provided later.
- The table was subjected to lateral loading causing the ratchet strap screws to become loosened and creating the uplift of the table.
- After the table was installed, wind increased gusting to over 30 mph.
- A review of the structural design indicated initial structural stability of the table was not considered during early phase of erection; the table was only designed for its final condition at the time of concrete placement.
- Only the two front legs of the table were anchored; the two rear legs were not anchored. The legs were provided with four holes, but only one anchor was provided in the front legs. Instead of using the required ½” diameter bolts with a minimum embedment of 2”, concrete smooth nails were used as the erection crew was reported to have run out of the bolts.
- The table-setting crew did not follow the established best practice document for anchoring the table to the concrete slab. The table was supposed to be anchored to the concrete before unhooking the crane.
- There was a lack of instructions to employees erecting the formwork table. The Table that failed was different from other tables used at the site because it had a six-foot cantilever on two sides. The table setting-crew was working from an unsigned makeup drawing where the additional shores were not shown.
- The table-setting crew was wearing a self-retracting cable lifeline for fall protection. Two employees anchored their fall arrest system to bracings of the nearby formwork tables without verifying the capacity of those bracings to withstand a force of 5,000 pounds.
- The deceased employee’s self-retracting fall protection’s wire rope became entangled with the falling formwork and severed the 3/16” wire rope thus resulting in his death.
- The contractor neither checked the stability of the formwork nor designed the formwork for different phases of construction.

Preventive Safety Measures Include:

- Complete a Job Safety Task Analysis that includes scope of work, anticipated exposures and safety equipment and/or procedures needed to ensure the task is completed successfully and safely.
- Conduct a pre-work meeting to review the JSTA and ensure workers understand the task to be completed, any safe working procedures and have the necessary safety equipment.
- Employees should have adequate training on job-specific tasks. Proper training must extend to all workers, including day laborers. Language barriers and communication should also be considered during training.
- Ensure form work is designed to withstand loads from wind gusts, and other normal occurrences of the jobsite. Consideration of high winds may require additional supports or bracings.
- Formwork shall be designed, fabricated, erected, supported, braced and maintained so that it will be capable of supporting without failure all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork.
- All base plates, shore heads, extension devices, and adjustment screws shall be in firm contact, and secured when necessary, with the foundation and the form.
- Inspections are completed by Qualified Person(s) to ensure formwork is constructed according to approved engineered drawings and specifications.
- Workers are properly trained in the fall protection systems they are required to utilize as well as have specific anchor points designated by a Qualified Person to attach the PFAS system to.

Attendance Roster:

Reference: This case investigation was reported by the U.S. Department of Labor, Occupational Safety and Health Administration – Incident 9/1/16, West Palm Beach, FL

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