NCDOL INDUSTRY ALERT
Division of Occupational Safety and Health

Tilt-Up Wall Construction Can Be Deadly

Three construction workers were killed when a 23-foot-high, 20-foot-wide, 40,000-pound concrete wall panel fell to the ground. The wall panel was one of many making up the exterior wall of a box-type, tilt-up structure, where walls are composed of panels secured in place by roof and floor structural connections. Tilt-up structures are a very common type of construction where panels are fabricated on site in a horizontal mold then tilted up to form vertical walls.

This structure, by design, should have had three permanent connections to secure the roof, wall and floor systems together to complete the structural integrity of the box:

- Roof joists welded to plates that were embedded in the walls
- Grout inserted between wall panel and footing
- Reinforced concrete poured into the pour-back or leave-out strip to tie the wall to the floor

Contractors at the Home Depot site were largely unaware of tilt-up construction requirements.

The 40,000-pound panel that fell and killed three employees was not secured.

The wall panel was fabricated on site horizontally and "tilted up" to vertical on its footing. Temporary braces were installed as specified. The construction plan and OSHA regulations require the following before braces can be removed:

- Welders connect the wall panel to the roof trusses with structural fillet welds
- The tilt-up contractor stabilizes the wall panels by grouting at the base, between the panels and the footing
- The tilt-up contractor completes the structural connection from the wall panels to the floor with concrete in the pour-back/leave-out strip

Workers having lunch by the wall did not know the 40,000-pound panel was free standing.

Equipment problems, unfamiliarity with requirements for tilt-up construction and the contract documents, inadequate training, and poor communication between workers and contractors contributed to this accident. The general contractor was responsible for bridging these procedural and communication gaps.

The contract specified that 100 percent of the welds were required to be inspected. However, the inspector only inspected a sample of the welding and assumed welders had secured wall panels to the roof steel with the required structural welds. The inspector's report stated all welds were complete and acceptable; in fact, several were missing. The tilt-up contractor had not secured the wall panels by grouting nor completed the pour-back/leave-out connection to the floor slab. The wall panel was assumed to be secured and stable when, in fact, it was not. It was further assumed that it was safe to remove the temporary braces from the wall panel when, in fact, it was not.

Seven workers eating lunch in the shade of the wall were not notified that braces were about to be removed. After brace removal, the wall panel, lacking permanent connections, was free standing, supported only by alignment shims. When the panel fell, two workers escaped, two were grazed and slightly injured. Three men were unable to escape the falling panel and were killed instantly.

Accident investigators determined that the accident, like most accidents, resulted from a chain of events or factors. If one of many people involved recognizes an unsafe condition and does something about it—or even voices a warning or complaint—one link in the chain is broken and the accident "almost happens." Often, few to none of the people involved are aware of the "close call."

Tilt-up is a very popular construction method, with over 14 million panels installed in the United States.

Five contractors were cited for contributing to this tragic accident, because of:

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• Lack of training and understanding of tilt-up construction and its hazards

• Inadequate support of tilt-up panels

• Failure to ensure the panel's permanent connections to the structure (welds, grout, pour-back strip) were complete and acceptable before removing temporary braces

• Failure to train inspection employees on job specifications and hazards of tilt-up construction

Wall panels for tilt-up construction must remain braced until all permanent structural connections, as specified by the job specifications, are complete.

Simple safety precautions would have protected construction workers.

Note: The OSHA Standards for Construction require that "tilt-up wall panels shall be adequately supported to prevent overturning and to prevent collapse until permanent connections are completed." (29 CFR 1926.704(a))

A 40,000-pound, unsecured wall panel shows no mercy when it falls.

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