Lowes Company is a retail home improvement and appliance company with stores throughout North America. Founded in 1946 in North Wilkesboro, N.C., the chain serves more than 14 million customers a week in its 1,710 stores.

When Lowes decided to build a new distribution center in North Floyd County, GA., they acknowledged that one of the most important aspects of the facility was the concrete floor. It had to stand up to the rigors of their demanding, ongoing forklift traffic. Lowes had tried several different slab types and options when attempting to solve their floor and equipment maintenance issues. Due to the size of their facilities, they have been seeing an increase in the rack weights, live weights and frequency of their loads. Lowes has started using extended pallet riders that are capable of carrying three full pallets at high speeds.

In addition to the abuse of the weight on these lifts, they had started to use smaller and much harder wheels that have a shore harness of 95 or greater. The joint fill material being installed in control and construction joints only had a shore harness of 90. Since the joint filler was softer than the wheels, it did not protect the joints properly. Because of the weight, frequency and wheel density, the forklift traffic was destroying the joints of their typical or conventional concrete floors.

With all these factors in mind, The Fricks Company recommended Type-K shrinkage compensating concrete to Lowes’s. Lowes then chose Fricks to construct a very durable concrete floor.
USING SHRINKAGE-COMPENSATING CONCRETE

The Fricks Company decided to use CTS Cement Manufacturing’s Type-K Cement to install 800,000 square feet of 9-inch shrinkage-compensating concrete with monolithic trap surface hardener and 600,000 square feet of 8 ¼-inch shrinkage compensating concrete base slab with Fricks’ ¾-inch Dewatered Trap Rock Topping.

Type-K Cement is a hydraulic cement designed for use in shrinkage-compensating concrete which reduces shrinkage of concrete. It provides an effective and economical way to minimize the cracking caused by drying shrinkage in Portland cement concrete. By producing controlled compressive stresses in the concrete, Type-K reduces the detrimental tensile stresses, which lead to shrinkage cracking in the concrete. Type-K is designed to keep the concrete in compression through the life of the concrete.

“The only proven method to remove the control joints was with shrinkage-compensating concrete,” said Greg Fricks, owner of The Fricks Company. “By using shrinkage-compensating concrete, we were able to eliminate 85% of the joints in this facility, which was over 200,000 linear feet.”

With shrinkage-compensating concrete, significant volume changes do not occur as the concrete is typically restrained by the reinforcing steel and the sub-base friction. The design and placement techniques for concrete produced with CTS Type-K are similar to regular Portland cement concrete; however, concrete can be installed in placements as large as 25,000 square feet without joints. Super flat floor profiles may be obtained through the use of laser screeds and proper finishing techniques.

In this Lowe’s, Fricks also used their FMT surface hardener, which is a dry shake aggregate surface hardener that extends the life of the floor by providing abrasion and impact resistance. Fricks then installed 600,000 square feet of the Type K shrinkage-compensating concrete for the base slab and then used Fricks’ FDT topping over the base. This trap rock topping is applied over the shrinkage-compensating concrete base slab to provide the highest level of abrasion and impact resistance. The topping system is used in areas subject to the most extreme traffic and wear.

The FMT hardener was used in a monolithic placement. The aggregate surface hardener was cast into the Type-K shrinkage-compensating concrete surface immediately following the initial strike off, increasing the aggregate-to-paste ratio at the surface, creating a durable, impact- and abrasion-resistant surface that is self-polishing.

Type-K shrinkage-compensating concrete was used to eliminate control joints. The slabs were placed in 10,000- to 15,000-square-foot blocks, and the only joints were construction joints 100- to 120-feet apart. These joints were steel armored with diamond dowels for positive load transfer. Shrinkage-compensating concrete is virtually curl-free. With the absence of curling and the superior joint detailing, the joints are maintenance free.

“Type-K shrinkage-compensating concrete not only eliminates the control joints, but it also eliminates curling at the construction joints, which we were able to install steel armor to protect the nosing,” said Fricks. “With the drastic reduction of the joints and the elimination of the slab curl, Lowe’s is now able to run their lifts faster and more efficiently while drastically reducing their forklift and floor maintenance.”

Constructing a shrinkage-compensating concrete floor takes professional planning, testing, good field conditions, quality control, and expert execution. To ensure proper expansion, The Fricks Company ran daily tests of the concrete.

PLACING THE CONCRETE

To ensure a successful placement, the slabs were placed indoors, under reasonable conditions, and the base was graded and well compacted. Thickness of the concrete was consistently the same throughout the length of the slab.

Saddles and chairs for the reinforcement were not made of concrete, but rather steel and plastic, in an effort to avoid the bonding of the concrete saddle to the concrete slab. Embedments, openings, re-entrant corners, pipes, columns, and base plates were addressed by wrapping them and using additional reinforcement.

Delivery of the concrete was scheduled continuously without delays. Higher slumps were achieved by adjusting the water-reducer dosage and not by addition of water, therefore keeping the W/C ratio unchanged. Concrete was placed in early hours of the morning, allowing the crew more time and easier placement.

As soon as the concrete surface was hard enough, the wet curing commenced. This was done carefully so that the concrete surface was not scratched. Wet curing was for seven continuous days. Crew members were in charge of replenishing water under the plastic sheet, so the surface would not become dry.

Upon completion of the wet curing, the plastic sheets were removed, allowing the slab to cure further in the ambient air temperature.

CONCLUSION

By using CTS Type-K, larger concrete slab placements may be made and within those larger placements, joints can be eliminated. Slab placements should be as square as possible without exceeding a 3:1 length-to-width ratio. Additional reinforcement may allow for placements with increased length-to-width ratios. Warping and curling of slabs are eliminated when CTS Type-K is used. Concrete with a slump of 4-1/2 to 6-1/2 inches is normally used for slabs. Due to the absence of bleed water, finishing on the CTS Type-K concrete slabs may begin earlier than finishing on similar Portland cement concrete slabs.

To learn more about CTS Type-K Cement, visit www.ctscement.com.

ABOUT CTS CEMENT:

CTS Cement Manufacturing Corporation manufactures Rapid Set® professional-grade cement products and Type K shrinkage-compensating cement. Contractors, owners, engineers and architects choose Rapid Set® to eliminate problems they have with other concrete repair materials, to save time and money, when superior durability is required, and results need to be aesthetically pleasing. Contractors, owners and engineers choose Type-K for installing industrial-size floors and concrete structures with no curling, no cracking and no control joints. Type K conforms to ASTM C845. For more information, please visit http://www.ctscement.com.