PROJECT PROFILE

KOMPONENT

HIGH-PERFORMANCE TRAINING FACILITY CHOOSES A CUTTING-EDGE PAVEMENT DESIGN

Project Type:
Pavement

Application:
Skid pad

Location:
Little Falls, MN (Camp Ripley)

Project Date:
2012

Project Owners:
State of Minnesota | Minnesota National Guard & State Police of Minnesota

Engineers:
URS Engineering & Stantec Engineering

Contractor:
Donlar Construction

Project Size:
60,000 sq. ft. (5,574 sq. m.)

Products:
Komponent®

In 2012, a new 4.8-mile (7,725 m) Emergency Vehicle Operations Course (EVOC) was constructed at Camp Ripley gives the State Patrol, National Guard soldiers and other regional agencies a place to train for disasters and practice tactical driving maneuvers in a variety of conditions. It is also used to provide Minnesota DOT personnel with a place to develop industrial snow plowing skills, and military personnel a place to practice convoy training.

The Emergency Vehicle Operations Course features a test track with assorted road types, like gravel, asphalt and concrete, and a skid pad that allows trainers to set up various training scenarios, including vehicle crashes and pursuits. These pavement pads are used as a controlled, safe zone where skid control techniques and skills can be developed.

During training exercises, the skid pads are sprayed or flooded with water, and sometimes slicked with oil, to create a very slippery driving surface. This method is designed to create driving conditions that easily lose traction and where a variety of skid effects can be created. To avoid creating dangerous and undesirable influencers during training, the engineering team required a skid pad with minimal joints, no curling, no cracking, and no spalling. Komponent® shrinkage-compensating cement technology offered a high-performance solution that allowed the design team to achieve these key objectives and create a cutting-edge pavement design.

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The 60,000 sq. ft. (5,574 sq. m.) skid pad was placed in two pours, approximately 150 ft x 200 ft (45.7 m x 61 m) each at 13 in. (330 mm) thick with only one construction joint between the panels. No control joints were required. Two layers of #5 rebar were placed at 18 in. (457.2 mm) on center, with additional post-tensioned reinforcement incorporated.

The addition of post-tensioned reinforcement ensured that the single construction joint in the slab would remain tight, and that any potential cracks (e.g., plastic shrinkage cracking, hairline cracking, movement or durability cracking would also be held tight.

Komponent® shrinkage-compensating concrete met the design requirement for no curling or drying shrinkage cracking. This advanced shrinkage-compensating cement technology effectively prevents negative volume change, eliminates curling, spalling, dominant joints, and drying shrinkage cracking. It complements post-tensioned designs to provide the highest performance in pavement design.

ASTM C878 (Standard Test Method for Restrained Expansion of Shrinkage-Compensating Concrete) tests were performed on the recommended mix design to ensure the dosage of the Komponent® additive was optimized to achieve a minimum expansion of 0.50 percent. The use of admixtures was minimized, incorporating only retarder to extend the working time and allow crews to effectively finish and trowel the surface to the specified smooth finish. The smooth finish was chosen to simulate a slippery surface with no imperfections in the slab that would cause tires to grab and possibly role the vehicles.

The EVOC Team is committed to safety and quality in every aspect of its facility and programs. And the engineering teams of URS and Stantec can proudly promote their Honor Award for the project by the American Council of Engineering Companies of Minnesota, and the role each played in the post-tensioned, Type K shrinkage-compensating concrete skid pad design.

CTS Cement was proud to partner in the innovative efforts of the team to provide a high-quality shrinkage-compensating pavement design for this unique application.

HOW IT WORKS

Komponent® expansive cement additive, used to create Type K cement, is engineered to achieve a net zero drying shrinkage, prevent drying shrinkage cracking, and ensuring long-term dimensional stability. Its performance offers a host of performance and project advantages, including the ability to minimize construction joints and maximize placement sizes. The Komponent® cement additive uses an advanced hydration mechanism to create ettringite crystals that induce expansion in the concrete during the wet cure period. This expansive cement mechanism ultimately stretches (“prestresses”) the reinforcement and puts the concrete into compression and the reinforcement into tension almost immediately. When the portland cement, aggregates and other mix materials that exhibit shrinkage characteristics begin to shrink, the tensioned reinforcement acts like a stretched rubber band that keeps the Type K shrinkage-compensating cement concrete in compression. When the concrete volume change decreases, the pavement panels return to their approximate original volume, or may exhibit residual expansion. This performance achieves unmatched dimensional stability, durability and structural performance for all types of concrete and grout applications.

For information on how Komponent can be used to provide a high-performance shrinkage-compensating concreting or grouting solution on your next project, contact a member of the CTS Cement Engineering Team at (800) 929-3030 or info@CTScement.com.

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