

A Base Stacked for Strength

If it's a super-stout pavement base model you're looking for, look no further than the Des Moines (Ia.) International Airport. Last summer, Manatts Inc. built a subgrade, base and taxiway there that would prevail against the fury of the Devil himself.

The taxiway is more than a mile long. It is 75 feet wide with 25-foot shoulders on each side. Aided by several subcontractors, Manatts put together a \$16.5 million project – using specifications from the Federal Aviation Administration – that has the following elements, taken from the bottom up:

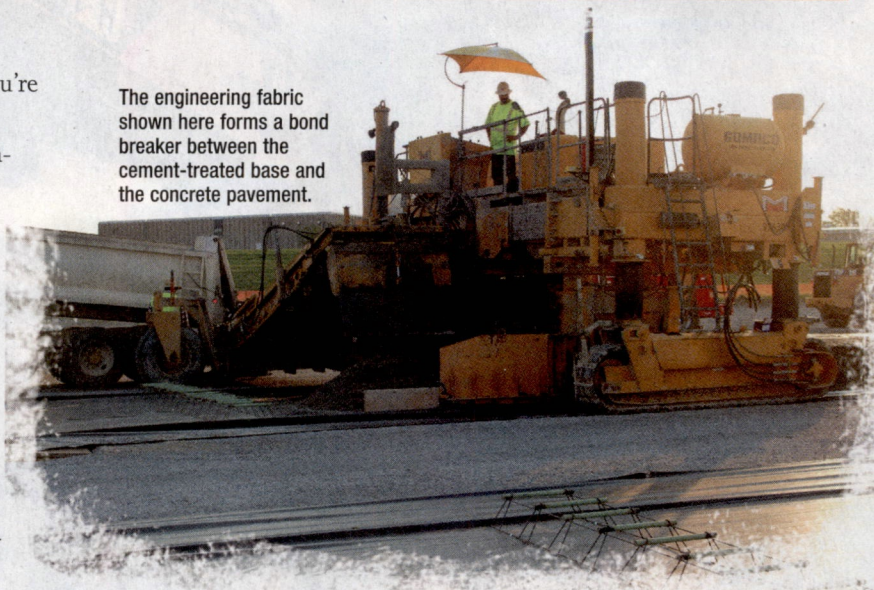
- a 9-inch-thick layer of FAA-specified P152 subgrade – very densely compacted soil;
- one layer of geogrid for stability and strength;
- a 9-inch-thick layer of FAA-specified P-219 crushed, recycled concrete base course;
- a 6-inch layer of FAA-specified P-307 drainable cement-treated base;
- an engineering fabric bond breaker;
- all topped by 16 inches of P-501 concrete.

The existing taxiway was concrete pavement with an asphalt overlay. Manatts, which is based in Brooklyn, Ia., began by milling off the asphalt. Next Antigo Construction, a subcontractor, broke the concrete with a guillotine breaker. Another sub, Reilly Construction, used Caterpillar Model 330 and 345 excavators to load the broken concrete into Cat 740 articulated trucks, which hauled it to the on-site crushing plant.

“At that point, once the pavement removal began, Reilly followed up with dirt excavation,” says Chris Sawin, project manager/estimator for Manatts. “Much of the dirt was hauled away to a waste area. And some of the dirt was carried to a fill area, because we adjusted the alignment of the taxiway. They shaped the new taxiway with Caterpillar D6 dozers and a variety of motor graders.

“We had to meet compaction, moisture and density specifications on all the subgrades,” says Sawin. “That is what the FAA’s P152 spec calls for. You have to get the dirt to optimum moisture content and compact it to 95 percent of modified Proctor density. You really have to put a lot of effort into

The engineering fabric shown here forms a bond breaker between the cement-treated base and the concrete pavement.



vibrating and compacting the dirt before it's actually accepted and ready for rock.”

For subgrade compaction, Reilly used Caterpillar 563 sheepfoot rollers, as well as a pull-type roller towed behind a John Deere wheeled tractor. “On the areas where there were cuts, they had to disk down 9 inches,” says Sawin. “The engineering firm would test density down to 9 inches.” The on-ply geogrid came next.

Next came Caterpillar 740 trucks hauling 1.5-inch top size crushed concrete back onto the grade. Cat D6 dozers spread and shaped the concrete in two 4.5-inch lifts. “It was compacted with steel drum rollers and a lot of water,” Sawin says. “Again, that base stone had to meet a density specification. They packed it in there tight with Caterpillar steel drum rollers. They had to roll in static mode because they could not break down the aggregate. In-place gradation tests verified that the crushed rock would maintain drainability.”

Then Manatts fine-graded the rock that Reilly had placed. “We trimmed it with a GOMACO 9500 trimmer,” says Sawin. To control line and grade on the trimmer, Manatts used a Leica PavSmart 3D system with robotic total stations. The system requires no stringline, and it cuts the grade to an accuracy of 3 millimeters.

The 6-inch cement-treated base, laid by a Caterpillar 1055 asphalt paver, came next. “The cement-treated base is kind of

like a road stone mixed with cement, and it's placed with an asphalt paver," says Sawin. "That's really the only way to place this stuff, is with an asphalt paver, because it had to be drainable and it sets up hard – almost as hard as concrete. The top size aggregate in that material is 3/4 inch (0.75)."

Manatts mixed the cement-treated base with their nearby concrete plant – a CON-E-CO plant with a 12-cubic-yard drum. "We had very strict guidelines on the compaction of the cement-treated base," says Sawin. "They wanted it strong

and compact, but they didn't want it too dense because they wanted it to be drainable. We followed it with three roller passes, using a BOMAG roller and a double-drum Hamm roller.

Next Manatts placed the engineering fabric. It serves as a bond breaker, to assure that the concrete pavement does not bond with the cement-treated base below it. And finally, the contractor paved the taxiway using a GOMACO GHP-2800 concrete paver working 18.75 feet wide. ❖

Taking it to the Bank

Faster production brings more dollars to the bottom line. That's why contractor Tim Hokanson is so pleased that he recently bought a Topcon grade control system for his John Deere 750K dozer.

Traffic control was the major challenge of the 3.1-mile Four Corners North project, says Hokanson, a vice president with A.M. Welles Inc., Norris, Mont.

The \$11.5-million project called for widening U.S. 191, just south of Bozeman, Mont., from two lanes to five, including a turning lane. And the state of Montana required that Welles maintain two-way traffic through the project during construction.

"We couldn't use a pilot car or switch over to one-lane traffic," says Hokanson. "We always had to be building ahead of ourselves – giving two-way traffic a place to go on one side while we worked on the other side.

"That's one of the main reasons we decided to buy a John Deere 750K dozer with another Topcon grade control system on it."

Hokanson already had one Topcon grade control system mounted on a Caterpillar dozer. By adding the John Deere 750K with automated grade control, the contractor could excavate subgrade in one place while filling with base course material and getting ready for traffic in another.

The Topcon automated grade control system sped up his



A.M. Welles Inc.'s Hokanson figures that the Topcon system will pay for itself in two years.

production by about 20 percent, Hokanson estimates. Welles nearly completed the project before winter in 2012. He says the Topcon system slashed about a month from the time it would have taken without one. In just 100 days, the contractor moved 350,000 to 400,000 cubic yards of material for the project.

"We found that the Topcon system is really good," says Hokanson. "It saves a lot of time. When we saw how well the first one was working, you could tell that there was a huge amount of savings to be made with another one. That's