June 2012

ROADS&BRIDGES

Scranton Gillette Communications

www.RoadsBridges.com

SUPER PAVEMENT

Friendly banking

Race-car drivers will get a kick out of new Kansas Speedway

ALSO INSIDE:

NOLA Motorsports Park

Preventing Frost Heave

Product Portfolio

By Allen Zeyher
Managing Editor

Reconstructed ground

Racetrack park begins life on newly stabilized land

Drop a cone penetrometer on the soil beneath a typical highway pavement, and it won't dig very deep. It might take 75 blows to go 36 in. down. Drop a penetrometer on the soil below NOLA Motorsports Park, and before stabilization, it took only four or five blows to reach 36 in. deep.

In fact, the land under NOLA Motorsports Park, in Avondale, La., about 15 miles southwest of New Orleans, was swamp 30 years ago, until the local parishes started controlling the water table. The total cost of building NOLA Motorsports Park will be around $60 million, including the north and south tracks.

"Behind us we have a huge levee system," Wes Ratcliff, spokesperson for the park, told ROADS & BRIDGES. "It's a Dutch-style levee. It's much larger than what you have around New Orleans."

Building a racetrack and all of the necessary facilities on such land takes a great deal of soil stabilization. To avoid settlement, the builders are using fly ash, mixed into the soil to a depth of 18 in. Using fly ash was the brainchild of the racetrack's owner, Laney Chouest.

"His thought process was that if he avoided increasing the unit weight, he could help prevent settlement," Brian Prowell, Ph.D., P.E.,

The Designer's-Eye View

NOLA Motorsports Park was designed by Alan Wilson of Wilson Motorsport Inc., North Salt Lake, Utah. He told Roads & Bridges the first thing he does is ask what type of facility the owner wants:

"The design follows the function. We realized very early on that New Orleans, being very much the 'visit-me' city, had the opportunity for being one of the major corporate motor-sports venues in North America. The value of that is corporate business is the single highest profit center for any racetrack.

"The business determines what the design is, the types of buildings and the space and the relationship of one feature to another. If you're doing corporate, you want all your corporate guests to be able to walk from one activity center to another with a nice hospitality area in the center, which is exactly what NOLA's got.

"The other major activity is the club member, what we call the 'recreational' motor-sport guy. He doesn't want to damage his car if he goes off the track. And he will. He'll make mistakes. That's why it's got wide-open safety zones.

"Because the north track is not designed for professional motor sport, it flows very nicely, because it's not a track which we designed for aggressive racing or aggressive overtaking.

"The south track, on the other hand, when it gets built, will be a much more aggressive track, because it will be designed for competition.

[Do you have a favorite turn or series of turns on the racetrack?] "Yes, the esses on the back straight. It's a very challenging sequence of corners, because each ess is different, and instead of approaching slow and coming out fast, you approach fast, go slow, go fast, go slow, go fast. Unless you've got a car that handles perfectly, you're playing the throttle and balancing the car all the way through."

principal engineer with Advanced Materials Services LLC, Auburn, Ala., told Roads & Bridges. "So, instead of putting down stone and a higher unit weight than the native soil, which would tend to lead to settlement, he was trying to find a system that would create a subgrade roadbed, if you will, that would have a similar unit weight to the native soil."

Reclaimers mixed the fly ash into the soil in two passes, each 18 in. deep. They didn't cover every square yard of the property, but they did stabilize 10 ft wider than the racetrack. The stabilization contractor was Greg Contrell Inc. Because the water table was less than 10 ft below the surface, it was impossible to give the track any significant changes in elevation.

Most of the twisting road course is 40 ft wide, but there are several small areas where the designer, Alan Wilson, drew it up 50 ft wide.

Screed up

During Roads & Bridges' visit last October, the screed suddenly lifted off the fresh asphalt. Prowell looked into what was happening.

"Electronics can be problematic on tight turns," he said, "and apparently—they have not had a problem to date, this is not the tightest turn, but apparently—here something happened to cause the screed to go high where it's tying into that lane.

"You want a longer ski to get better smoothness overall," he said, "but when you go into these tighter turns, if the ski is reading out here, but you're going that way, it can throw things off. They may just end up turning off some of the sensors until they get around."

Recovering from the glitch was a delicate process that required quite a bit of shoveling the material off the mat and making sure that area was smooth, setting the screed back in the right spot, restarting the paver and trying to make sure the transverse joint where the screed picked up and was placed back down would not be a problem.

"It'll be a hot joint, but it'll be a joint," said Prowell. "It all depends how good a job they do taking off."

The glitch happened at Turn 13 on the 2.75-mile north track at NOLA. There also is a 2.69-mile south track in the plans but not yet constructed. The tracks are laid out with connections at several points, so cars can race through different configurations.

The asphalt mix used at NOLA is a 5-in. pavement, put down in three lifts.

The base course is 2 in. of a conventional Louisiana DOT mix, with 12.5-mm aggregate size and a 67-22 or 64-22 binder.

The leveling and wearing courses are the same material but with a PG 82-22 binder and additives to adjust the softening point, the elastic recovery and a few other factors.

"For the weight of a race car, you don't really need 5 in. of pavement in the long term just from a pavement design standpoint," said Prowell, who was brought in by NOLA specifically for his asphalt expertise. He is overseeing

For more information

NOLA Motorsports Park
www.nolamotor.com

Alan Wilson
www.wilsonmotorsport.com

Circuit of the Americas
http://circuitoftheamericas.com

the asphalt operations at the plant and at the track. "Our feeling is you need that thickness, interacting, well-bonded together to resist that shoving. So bond between layers, thickness of the pavement, we believe all factor into that, and then stiffness of the binder as well."

The paving contractor was Barriere, a local company.

How asphalt unravels

The main failure mode for racetrack paving is raveling.

"The hot, sticky race-car tires tend to pick aggregates out of the surface of the pavement, particularly in turns," said Prowell.

Shoving also is a concern in braking zones, where racetracks can develop ripples, and in turns because of the lateral forces. A sturdy bond between asphalt courses helps to prevent shoving.

Raising the softening point of the mix helps prevent raveling: "If you have a high enough softening point, you can prevent that phase change," said Prowell. "The track will get hotter with cars on it than it would be just from solar radiation. If we can keep the track temperature below the softening point then we can prevent raveling. There's other factors that go into that too, like density and having enough binder content in the mix, but that's one of the major ones."

Above: The paving crew attempts to place the screed exactly where it was when it encountered a problem getting around a sharp corner.

Below: The longitudinal joint down the middle of the NOLA track is cut by a special roller with a cutting wheel following behind the other rollers.

NOLA was not doing the paving in echelon, though Formula One specifies echelon paving, so Circuit of the Americas outside of Austin, Texas, should be doing echelon paving a little later this year, before the first U.S. Grand Prix race there on Nov. 18.

"We did Lime Rock [Lime Rock Park in Lakeville, Conn.] and we did Portland International Raceway in echelon," Prowell added. "Echelon paving if it works could work well, but a lot of things have to go right."

The longitudinal joint down the middle of the NOLA track will be cut by a special roller with a cutting wheel following behind the other rollers.

"We actually cut off the outer, low-density material," explained Prowell, "and then we put a . . . joint adhesive on the face and then we'll pave up against that. It makes a fairly good longitudinal joint, and we end up with densities that really match the mat density."

There will be two transverse joints, one a conventional butt joint, the other a spiral joint.

The target density at NOLA is 94% of theoretical maximum, so they are shooting a bit higher than many highway pavements. They are using a standard vibratory screed, so most of the compaction comes from the rollers that follow behind. Two twin-drum vibratory compactors followed the paver, plus a third vibratory finish roller. They also used a rubber-tire roller on the base and leveling courses but not on the wearing course to avoid roller pickup.

Another reason for laying three courses of asphalt is smoothness.

"Ideally you want a smooth leveling course, which they had," Prowell said. "They had a few bumps they found. They milled those to remove the bumps. Then you run on the skis to smooth out

Barriere used a material transfer vehicle, skis and sensors to ensure the asphalt surface was smooth. With a 0.1-in. blanking band, they saw a profile index of 8.6 in. per mile.

Paving COTA

The Circuit of the Americas is being constructed outside of Austin, Texas, in preparation for the return of a U.S. Grand Prix to the Formula One World Championship.

Asphalt courses at COTA, from top to bottom:

- 1.57-in. asphalt wearing course, modified for racing circuits;
- 1.97-in. binder course;
- 3.15-in. asphalt base course;
- 17.72-in. crushed limestone road base/hydraulically bound base course; and
- Two layers of crushed road base, upper layer laid by using a paver.

Workers heat and smooth a transverse joint by hand. The asphalt mix used at NOLA is a 5-in. pavement, put down in three lifts. The base course is 2 in. of a conventional Louisiana DOT mix, with 12.5-mm aggregate size and a 67-22 or 64-22 binder.

the bumps" while laying the wearing course, letting the skis average out variations over a distance. Each course is smoother than the one before. Prowell said they were using a 0.1-in. blanking band and seeing a profile index of 8.6 in. per mile.

Up and running

Since Roads & Bridges visited last October, NOLA Motorsports Park has finished the north racetrack as well as the landscaping with grass and palm trees and held several races.

"The racetrack's fully functional and has been since New Year's," said Ratcliff. "The surface has held up extremely well."

The facility has hosted a regional race on the kart track and is in the final running to host an international kart race. Ratcliff called it "the Super Bowl of karting for the world."

NOLA also has hosted several race-related events. Ducati used the NOLA facilities to launch a new sport bike. Subaru is using NOLA to unveil a new sports car. They are going to fly Subaru dealers to the site and let them drive the new cars on the track.

NOLA is getting noticed by major race series as well, both in sports cars and motorcycles. General Motors brought its racing teams to NOLA to do testing in preparation for the Grand-Am Rolex series and Continental Tire series.

"The largest event we'll have this year is the American Motorcycle Association, AMA. They're having their season finale race here. It'll be televised on Speed. This particular race happens to be an even more special one. There's a promoter, M1 PowerSports. Each year they pick three of the AMA rounds to highlight, and they call them the 'Big Kahuna' rounds. The grand finale here is the last and the biggest Big Kahuna race. Jason DiSalvo, one of the riders, was just here. He did some demo laps. He was very positive about the surface and the layout of the track, the quality of everything. It was a huge compliment to get someone of that stature to speak so highly of what we've done." R&B

For more information about this topic, check out the Asphalt Channel at www.roadsbridges.com.