Hole-y highways

Asphalt + Winter + Water = Potholes

By Bob Kudelka

Joe Davis and Paul Fee hopped out of their black truck to inspect the latest culprit: a 1-foot-wide, 1-foot-long pothole, about 3 inches deep in the middle of a residential street near Broad River Road.

"On a scale of 1 to 10, it's about a 2," Davis said. "It's not really a bad pothole."

The two trades specialists from Richland Maintenance spent the next 15 minutes patching the pothole before it was on to the next street with another pothole.

Davis and Fee make up one of four pothole crews in Richland County.

This year, they've been busier than ever.

Pothole patching across District 1 is more than double compared to last year and 3½ times higher than two years ago, said Robert Dickinson, District 1 Maintenance Engineer.

"We've had all four crews running from daylight to dark patching potholes," said Walt Holladay, Operations Engineer at Richland Maintenance. "It's a concentrated effort to try to get them all patched as quickly as we can."

Seventy miles north in York County, District 4 Engineering Administrator Stan Bland said pothole complaints are as bad as he has seen in his 39 years at SCDOT.

"The phone is ringing off the hook," Bland said. "Everybody complains they're living on the worst road in the state. Claims are going out of the ceiling - bent rims, busted tires or damage to cars – it all goes together."

According to the Chinese calendar, 2010 is the year of the tiger. At SCDOT, it is the year of the pothole.

While motorists generally take road conditions for granted, it is the pothole that gets their attention.

Statewide, pothole complaints rose 43 percent this winter compared to last year, said Jim Feda, Director of Maintenance.

"Every DEA (District Engineering Administrator) has expressed concern that they could not keep up with the complaints they were getting on the potholes," Feda said. "Everybody has seen a big increase in the number of potholes and the number of pothole complaints. I don't remember it being this widespread across the state."

There are two key reasons for the state's pothole plague:

- An abnormally cold and wet winter.
- The 23 years it's been since the motor fuel user fee, or gas tax, was last increased has taken a toll on the state's ability to maintain roads.

The main cause of potholes? Water.

Unlike most liquids, water expands when it freezes. Anyone who ever hoped to chill their water bottle but left it in the freezer too long has learned that plastic is little match for expanding water. Neither, it turns out, are our roads. Freezing water can exert 15 tons per square inch of pressure on its surroundings.

Normal wear on a road, due to the stress of traffic and heat of day, eventually leads to tiny cracking in the asphalt. Rainwater seeps through theses cracks down to underlying dirt and gravel. When it gets cold, the water freezes and expands. Some of the dirt and gravel is pushed out, leaving a hole when the ice melts. Cars, trucks and SUVs continue to punish the road, putting more stress on these unseen holes by riding over the layer of asphalt covering them.

Eventually, the asphalt layer over these divots collapses, forming potholes. Even in places where the air temperature rarely falls below freezing, excessive rainfall or flooding can also cause potholes to form.

This past winter was one of the coldest and wettest on record in South Carolina. The repeated freezes and thaws "played havoc" on the roadway surface, Feda said.

"All the factors were there to produce a lot of potholes," he said.

Complaints began flooding into district offices.

ROB THOMPSON/THE CONNECTOR

Paul Fee, left, and Joe Davis repair a pothole using the 'Pro-Patch' truck in Richland County. The vehicle carries hot asphalt and all the tools needed to patch a pothole.

It got so bad in February that District 4 drew a line in the asphalt and declared war.

"We had every crew except the sign crew doing pothole patching," Bland said.

After about 10 days, the District's combined efforts led to the patching of 2,000 potholes. By mid-April, Bland said potholes were still "popping out" and crews remained busy.

"It's been hectic," Bland said. "The road system is getting old and it needs a lot of attention."

Some roads are in such poor condition that pothole patching is not the solution.

When a portion of a road's base is failing, the only remedy is to dig up the base and failed subgrade and build it back up with a mix of new asphalt and new base. This is called full-depth patching.

This spring, District 1 put together $2 million worth of contracts for full-depth patching to be done over a six-month period. This will improve 31 sections of roads with some of the worst conditions in the district, said Dickinson. To afford the full-depth patching work, District 1 had to cut other areas from its budgeted contract work.

Full-depth patching, however, has its limits as well.

While it is a more comprehensive fix than pothole patching, there comes a point – when more than 20 percent of the road requires full-depth patching – that it makes more sense economically to re-build the entire road.

"In some cases, the roads are beyond patching," Feda said.

South Carolina state highway funding per mile is the lowest in the nation. SCDOT's road maintenance budget relies on the state's motor fuel user fee. This rate of 16 cents per gallon does not grow with the price of fuel and was last adjusted in 1987. So revenues can only go up if more fuel is consumed, but vehicles are becoming more efficient and need less fuel.

"Material costs have gone up and our revenue has not kept pace with inflation," said Feda, who recalls when asphalt was $25 per ton. It is now $85 per ton. "We've been telling everybody who will listen that we need more money for maintenance."

To make matters worse, the unusual snowfall this past winter, including a storm that blanketed nearly every county, could not have come at a worse time.

Money that could desperately go toward road surface improvements was spent on keeping the roads open and safe this winter.

The salt dome on Shop Road in Columbia holds salt for snow and ice emergencies. It was filled last year at a cost of $1 million. The winter storms were so bad that all the salt in the dome was used. The dome will have to be filled again to prepare for next winter.

"The money we're having to spend to replace the salt could have been spent on pavements or other maintenance activities," Feda said. "We had a hard winter with snowstorms so we spent more money on the de-icing materials. The byproduct of the winter is more potholes and more pavement repairs.

"It's kind of like a double-whammy."

Feda is wrestling with how to improve the roads with limited resources.

"Next year's budget is a reduced maintenance budget but we're trying to increase the amount of money we put into our pavements by deferring other non-safety related activities," Feda said. "We're looking at reducing our equipment budget by a minimum of 50 percent over last year and we're looking at other cuts in non-safety related activities to try to put as much as we can into our pavements."

One unknown is whether the heavy rains and cold temperatures this past winter were an aberration or the beginning of a trend.

"Are we in a cycle now where we have normal or above normal rainfall for a couple of years and cold winters, or is this a one-time thing?" Feda said. "Who knows?"