Nobody should ever try to breed cold, hard pavement with hot molten lava. Public works departments across the Midwest know the exact consequence of such a congregation. A psychodramatic winter that carried as many as 30 freeze-thaw cycles in some areas and endless layers of snowfall had most riding surfaces producing sudden and dangerous consequences. It was as if bubbles were rising to the top and popping, spewing out chunks of asphalt.
Potholes have been a drawn-out topic of discussion in the road construction industry, but for the past four months the maintenance issue has been simply spinning out of control. Funding levels suffering from capital dwarfism is one contributor, but perhaps the biggest igniter of this black plague is the traditional mindset of city, county and state DOTs. Some agencies have been following the same directions on the box for decades: When potholes develop, throw cold mix on the deteriorated surface. Repeat as needed. The Illinois Tollway, however, tore that label off this winter by opening a hot-mix asphalt plant in the middle of the season to calm its riding customers. The cost of such an expedition is much lower than you might think, but the question is, was this winter bad enough to upgrade from the shovel and toss to the most productive and permanent?

Keep shoveling

Back in early February, one two-block stretch of Rte. 58 in Illinois had more craters in number than a militarized hot zone in Iraq. The roadway was crumbling into a no-drive zone, with motorists doing more swerving than straightening.

The Illinois DOT was well-versed on the current sad state of Golf Road in Schaumburg, as well as with several other areas that were showing premature potholing. IDOT has crews rating road systems all year long and was putting together a short list of emergency projects.

For roads that are in bad shape, IDOT looks at the condition of the pavement and the level of traffic the road handles and prioritizes the work, Mike Claffey, spokesman for IDOT, told ROADS & BRIDGES in early March. “Obviously Golf Road is pretty high volume; a lot of people use it and if it is in really bad shape, somehow we have to figure out a way to get it done.”

“The longer you keep patching, you get to the point where you just lose the road completely and you have to reconstruct it from the ground up.”

Fortunately, Golf Road between Basswood and Plum Grove Road appears to be on IDOT’s list for a complete reconstruction for the spring. But in the meantime, the state agency continued to treat infected roadways with spoonfuls—or shovelfuls—of cold-mix asphalt. According to Claffey, in the six counties forming the Chicagoland area, IDOT was using 200 tons of cold mix per day.

“We have had 40 to 50 pothole patching crews out on many days in the last few weeks,” he said.

Through the month of February, IDOT had splashed the roadway with as much as 5,172 tons of pothole patching material. The mass production did not include the first two weeks of March, which included up to 11 in. of new snow on the 21st. On average, IDOT has dropped just over 2,800 tons per year since 2001-02, which included just 1,982 tons in 03-04. The highest total in the past 14 years came in ’96-97, when 5,645 tons of material was used.

The winter has been a killer model of indecisiveness. On Jan. 7 the area experienced a high of 51°. Thirteen days later there was nothing left of the mild weather, as temperatures burrowed down to -5°. The average snowfall in the month of December is 8.7 in. In 2007, there was 17.6. In February, 14 in. more fell than the norm.
“This has been described as one of the worst winters in 30 years,” said Claffey. “We have had temps on several occasions that have been down in the single digits and sub-zero and then it was followed by a big warm-up. The 80,000-lb trucks come along and they pound sections that are coming loose or old patches that are weakened, and the pavement just busts loose.”

Citing the infrequency of opening up a hot-mix plant in the off-season, IDOT continues to sell the strategy of the complete reconstruction of certain pavements every spring. This year, the agency’s repair campaign will cost about $15 million. IDOT’s multiyear improvement program maps out what roads will be taken care of over the next six years. Unfortunately, due to a shrinkage of funds, maintenance has been the one and only feature of the program. The state of Illinois has not had a major infrastructure bill in place since 2000, but Gov. Rod Blagojevich continues to lobby for one. His “Strengthen Illinois” economic package calls for a $25 billion capital plan that would support more than 700,000 jobs. According to Claffey, 65% of the money for the plan would come by privatizing the state lottery. That portion would raise $7 billion annually. The other 35% would come from bonds.

Funding has tied together the work shoes of the Iowa DOT, too. Almost 75% of a $1 billion, five-year road-building bill has been allocated just for maintenance activities.

“We are really trying to focus on rebuilding what we have and maintaining what we have,” Iowa DOT spokesperson Dena Gray-Fisher told ROADS & BRIDGES. “We are very optimistic they are going to come up with a solution. The gas tax was mentioned early, but the governor does not support a gas tax increase so they are looking at other revenue options such as changing vehicle registration fees and driver’s licensing fees.”

Last year the DOT approached the state legislature with a desperate plea for more money, and the lawmakers responded by forming a new fund called “Time 21.” However, the planted seed has not begun to grow. This year the Iowa DOT is asking for a supplemental appropriation of $9.3 million just to cover snow-clearing operations.

“That does not include pothole repairs, and all of that affects your overall maintenance budget,” said Gray-Fisher.

The Iowa DOT has used over 29,000 labor hours to spread 2,428 tons of cold patching over 8,909 miles of road this winter, but much of the work has been trying to figure out the best time to do any kind of pothole maintenance. With the constant pelting of ice and snow, Gray-Fisher said, much of the DOT’s effort has been removing snow and ice.

“We have had few opportunities,” she said.

The chance to fix unpaved roads in the state also has evaporated. This winter has washed some of them away, but the price for aggregate
continues to go up. Gray-Fisher said this was due to the construction of wind farms. A huge quantity of rock is being used to construct new gravel roads for the fast-growing business.

Money was having trouble connecting with the Minnesota DOT until the state legislature passed a spending plan for roads, bridges and mass transit in mid-February worth just under $8 billion.

The bill, which raises the state’s 20-cent gas tax a nickel in 2008, passed despite a veto from Gov. Tim Pawlenty.

Minnesota, however, has instituted some other tactics to avoid potholing. Perpetual pavement is perhaps the most successful, and according to the Minnesota Asphalt Pavement Association, the state has won five industry perpetual pavement awards. The Minnesota DOT also has safeguarded certain roads with road weather information systems (RWIS). When the pavement hits a certain temperature, heavy loads are not allowed to drive on it.

“They have sensors in 20 key locations in the northern half of the state, and they allow higher wheel loads during January and February, and when the permafrost starts to melt they do not allow those loads,” Chuck Dowding, a geotechnical engineering professor at Northwestern University, told ROADS & BRIDGES. “The haulers are on board with this. They know they get a break during the winter, but they know that there is going to be a month and a half when they can’t be on the road.”

Still, when it comes to basic pothole patching, Minnesota shows its old age in terms of strategy.

“It has basically gotten to be a dump-and-hit method,” a source told ROADS & BRIDGES. “They throw a shovel full of something out there, let traffic hit it for compaction and cross their fingers and hope nobody calls. It works for a while and then they will be back out there again.”

Pothole pinpointing

The city of Chicago has seen a few championship seasons through the wintertime, thanks to the Bulls. This year, however, it was the department of transportation trying to stay in the win column—or just in the lead. Each day through the month of March the city utilized 27 crews, and through February the work force was filling a staggering 3,000-5,000 a day, depending on the weather.

“Last year from Dec. 1 through March 1 we had done about 50,000 potholes,” Chicago DOT spokesman Brian Steele told ROADS & BRIDGES, “but this winter that number has been over 100,000.”

The Chicago DOT does have a go-to guy—or in this case a go-to computer—to pull them out from the depths of defeat. A 3-1-1 city services number is used to develop real-time maps of the Chicago area with dots at spots with pothole complaints. The map also allows city personnel to draw up the most efficient plan of attack for any given day. Crews can pinpoint the exact location of the...
problem pothole and also will survey the surrounding areas for others like it.

“The vast majority of the potholes we get are the ones we encounter on the way to take care of that 3-1-1 reported pothole,” said Steele.

Chicago uses a high-performance cold patch material to replace the pavement divots. The DOT claims it bonds to the existing pavement surface better than the traditional cold mix and insists opening up a hot-mix plant in the middle of winter is cost-prohibitive. The city cuts back on its personnel during the off-season, carrying just 30-40% of its regular seasonal work force.

“If we were using hot mix, we would have to address the labor needs,” said Steele.

There is an “aggressive” repaving and resurfacing program that takes place every spring, one that calls for 2- to 4-in. milling and reconstruction and starts April 1 and goes until Nov. 1.

“We have what we call a residential resurfacing program, an arterial resurfacing program and a roadway repaving and reconstruction program . . . three main programs that handle the work,” said Steele.

However, the problem child for the city of Chicago for the past 10 years has been its most famous strip of all—Lake Shore Drive. The north portion of the arterial has been popping apart annually at an uncontrolable pace. Talks of repaving the section, which according to the city is under the state’s jurisdiction, have surfaced regularly for about 15 years, but nothing has been done. Steele said crews have been out sometimes two to three times a week stuffing the damaged areas and indicated a temporary resurfacing effort might take place this summer.

Dowding believes the root of Illinois’ problem is at the sub-base. After all, according to the professor, proper drainage starts underneath the riding surface. The state is not rich when it comes to aggregate. Many sub-bases are made of limestone, which is expensive to drill, blast and crush. Limited budgets over the decades might have led to cheaper layers. Furthermore, right below the sub-base is essentially clay, which stores water instead of drains it, and also the region is very close to the water table.
“The state is not long on freely draining materials,” he said. “It is very challenging.” Dowding has noticed an increase in drainage pipe installation along the roadways in recent years, but it hasn’t been enough to make a true impact.

There also is the issue of proper pothole maintenance. According to Dowding, to effectively fill, crews must completely clean the damaged area.

“You can’t just go out and dump a patch on this stuff,” he said. “It is like going to the dentist. The dentist doesn’t just go in and put a filling in your tooth, they scrape all the decay out.

“If you are going to fill a pothole up you really should get in there and dry it out, excavate all of the bad stuff and chip away all of the fractured pavement. Then you need to heat it up. A lot of the municipalities used to heat the potholes before they patched them, but I do not know if they have enough money or time to do that now.”

When customers are handing you money across the counter, it’s important to bag everything into a neat and satisfying package.

Hot-patch remedy

The Illinois Tollway did not want to put that bag over its head with the sharp increase in potholes this winter, so the decision was made for a quick and permanent solution.

Plote Construction Inc., Hoffman Estates, Ill., cranked up a hot-mix asphalt plant located near O’Hare International Airport to take care of the rough-ride concerns. The start-up cost for one night was $5,000, and the Illinois Tollway had to use a minimum of 150 tons of the hot-mix patch. Through the opening week of March, the owner had placed 1,200 tons at a cost of $60,000.

“This plant is one of the ones O’Hare would go to if they had a runway problem during the wintertime, so it is not out of the question for them to open this plant,” Paul Kovacs, Illinois Tollway chief engineer, told ROADS & BRIDGES.

Kovacs, however, could not recall the Illinois Tollway ever pulling off such a stunt. This season, however, carried special circumstances beyond the weather. Major reconstruction is taking place on various stretches of the toll road, putting added stress on existing pavement.

“Because of our construction zones, we have traffic straddling some of the normal pavement joints, so we have had to do some extensive long patches on the joints,” said Kovacs.

The Illinois Tollway did extend the hot-patch offer to both the Illinois and Chicago DOTs, but neither expressed an interest to share the cost.

Kovacs, however, was quick to draw a sharp difference between a toll road and a public road. The Illinois Tollway has paving contractors, some of which are under contract to fill potholes, and a full maintenance crew on-call 365 days a year, a luxury that IDOT and CDOT simply do not have. IDOT also has a larger footprint of responsibility. Then there is the whole direct contact with the customer. The tollway has a tighter relationship with a motorist who pays to play within its system.

“The tollway in some instances gets a slightly different reaction from drivers in the fact that people are paying directly to use our roads,” Illinois Tollway spokesperson Joelle McGinnis told ROADS & BRIDGES. “The fact they are physically paying a toll there is more of an expectation that they are going to get something for their money.”

The political stonewall that crushes DOT budgets doesn’t exist, either. The Illinois Tollway has an 11-member board of directors that approves the flow of dollars from year to year.

“The tollway has the ability to take care of the roadways because we have our own funding, whereas the state [DOT] has been limping around for a long time here,” added McGinnis.

Smooth sees a bump

When someone puts up a roadblock in the town of Perfect Pave-ment, U.S.A, you know maintenance is a struggle.

Since 1958, Rockville, Md., instituted its smooth seal program, and for decades potholes could not seem to break into the neighborhood—until now. Due to consecutive years of short funding, Mike Wilhelm, chief
of the contract management division for the city of 65,000, has caught a glimpse of what he calls “pot marks.”

“The last two years, funding has been cut,” he told Roads & Bridges. “We have been running along with about $1 million a year for the program, and the last two years we saw the jump in asphalt prices and started asking for more. We weren’t getting it.”

For 2008, Wilhelm was hoping to see $2.7 million, but only received just over $1.25 million. This year he is asking for just under $2.7 million, and all signs are pointing in a positive direction.

When the town does have enough money to play with, the program proves to be the best in the business. The smooth-seal mix is a fine, dense-graded hot-mix asphalt containing 65% crusher dust and 35% natural sand. A medium-grade asphalt binder (AC-10) is used for durability and provides a degree of plasticity that encourages the healing of any cracks. The program runs on a 10-year cycle, which includes a full mill and overlay of a regular surface every other cycle. Crews drop down a 1/4-in. to 1-in. mat over the existing seal until the pavement gets too thick.

Rockville tries to cover 16 miles a year with the smooth seal, but lately some of the older sections of town have been in need of the full-width milling down to the original surface, and it has demanded more of the budget.

“You get to a point where you get a lot of running and pushing [in the pavement], especially on the bigger streets,” said Wilhelm. “It also builds up too much on the curb line and we get scraping problems, and people having trouble getting in and out of their driveway.”

Private contractors handle the smooth-seal work, leaving city crews with handling emergency repairs. Nearby Howard County has studied Rockville’s program but has not had the funds to implement it. Washington, D.C., also has its eye on the smooth seal but has faced similar consequences.

“We are very lucky in that Montgomery County is a very affluent county,” said Wilhelm.

Social class aside, Wilhelm believes the smooth seal could work anywhere. “We have never done a full city-wide study in terms of the cost, but I think it is definitely the way to go,” he said.

Rockville is currently looking into using a polymer-modified binder in the smooth mix. The initial cost is more, but the manufacturer claims it could last up to 15 years. The current material shows signs of distress after 11. Wilhelm is hoping to set up a test section later this year.

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