Ask an Urban Historian

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Q: Potholes emerge every spring, and their repairs cost cities lots of time and money. Have there been any innovations that might help cities save these resources and avoid having to address potholes each year?

— Thom Hamell, Charlotte, N.C.

Cities are facing an increasing demand for improved road safety and quality. In regions that experience cycles of freezing and thawing, the number and severity of potholes increase sharply in the spring, with damage exacerbated by frozen water trapped in the pavement cracks. City streets are built with curbs and gutters and generally have gentler slopes than rural highways, allowing water to dwell longer on the surface and cause greater damage.

Due to safety concerns and legal liability, cities strive to repair potholes within days of being reported. Online reporting systems such as SeeClickFix allow the public to report potholes and track their status easily and conveniently. But perhaps the best way to eliminate potholes is to build roads to a higher standard and using materials that are most compatible with the climate and anticipated traffic volumes in the first place.

In the past decade our understanding of the sensitivity of aggregates and asphalts to moisture has improved, and the resistance of paving mixtures to moisture damage has also improved. Newer materials and equipment are being used to repair potholes in a safer and more automated manner. Warm mix asphalt is an emerging type of asphalt mix producing lower emissions and fewer health concerns, and also requires less asphalt and energy. Paris has experimented with warm mix asphalt as a way to address complaints from concerned citizens about fumes and odors from paving projects.

Another promising innovation is in-place recycling, where an asphalt road is milled, recycled, reapplied and compacted all in a single pass of a mechanized train of equipment. The road can be reopened to traffic within hours, and the cost and energy savings are significant.

The last decade has seen the evolution of pervious, permeable and porous pavements. This class of pavements is designed to have larger and more connected voids at the surface to channel water during rainstorms down to a designated drainage layer underneath the surface. These pavements typically remain dry on the surface, which also makes them safer.

Across North America, these innovations are becoming increasingly popular as greener alternatives to conventional construction, and as cost-effective and sustainable measures for cities concerned about their bottom lines.

TIMELINE A BRIEF HISTORY OF URBAN PAVEMENT

4000 BC. The first indications of constructed roads: Stone-paved streets at Ur (modern-day Iraq) and timber roads preserved in a swamp in Glastonbury, England.

1717 John Metcalfe, who built about 180 miles of roads in Yorkshire, England, is born. His well-drained roads were built with three layers: large stones, excavated road material and gravel.

1824 Asphalt is used as a paving material for the Champs-Élysées in Paris.

1921 The Bureau of Public Roads (BPR) authorized by the Federal Highway Act of 1921 to fund state highway agencies' construction of two-lane interstate highways.

1935 The father of Good Roads movement, Horatio Sawyer Earle, dies after spending decades advocating for improved road conditions.

1981 The New York State Trial Lawyers' Association establishes the Big Apple Pothole Protection Committee to monitor streets for potholes, notifying the city of problems and allowing injured pedestrians to sue New York City.

2009 KFC tells city mayors it will fix their streets' potholes — with a KFC logo on top.

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