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UNH Research Finds Thicker Pavement is More Cost Effective Down the Road

Wednesday, July 10, 2019

(HTTPS://WWW.UNH.EDU/UNHTODAY/NEWS/2019/07/10/UNH-RESEARCH-FINDS-FINDS-FINDS-THICKER-HICKER-HICKER-PAVEMENT-EMENEMEN-MORE-MORE-MORE-COST-COST-COST-EFFECTIVE-EFFECTIVE-EFFECTIVE-DOWN-DOWN-DOWN-ROAD) ROAD) ROAD)

DURHAM, N.H. – As the summer months heat up, so will the asphalt and other materials used to make roads. Pavements, which are vulnerable to increased temperatures and excessive flooding due to sea level rise, can crack and crumble. Climate change can be a major contributor and as greenhouse gas emissions continue, which scientists say have caused an increase in global temperatures since the mid-20th century, these issues are projected to accelerate. Researchers at the University of New Hampshire say because of this one of the best ways to extend the life cycle of roads, and keep future costs down, is to increase the thickness of asphalt on certain roads.

“It’s all about being strategic with the maintenance of our highways and byways,” says Jo Sias, professor of civil and environmental engineering. “Just like a regular oil change can help extend the life of a car, our research shows regular maintenance, like increasing the asphalt-layer thickness of some roads, can help protect them from further damage related to climate change.”

In their study (<https://journals.sagepub.com/doi/full/10.1177/0361198119844249>), recently published in the journal Transportation Research Record, the researchers looked at the seasonal and long-term effects on pavement life, like climate-change-induced temperature rise and higher groundwater levels due to sea level rise and heavy rains. They looked at the changes in season length, increased flooding, average temperatures, projected temperatures and resilience based on those temperatures. As global temperatures continue to rise, road conditions will shift. The winter pavement season is projected to end by mid-century, replaced by a longer fall season. Pavement damage, now seen mostly in the spring and summer, is projected to be more distributed throughout the entire year. Based on their analysis that looked at the wear and tear of roads, the researchers determined that a 7% to 32% increase in the asphalt-layer thickness might be the best way to maintain the service ability of some roads.

“For agencies and towns, it is a balancing act to repair roads so we’re trying to find some reasonable action that can be taken now to help manage their infrastructure,” said Sias. “If global warming continues then we know temperatures will rise and pavement doesn’t respond well to increased temperatures. The hope is to find some answers now so cities and towns can plan for the future.”



The researchers recognize that increasing the asphalt thickness to certain roads can be an added expense for cities and towns but they point to considerable future savings of between 40% and 50% if done now rather than later. Along with the rise in cost of materials, there could also be other expense increases down the road like project planning, design, and construction. Environmental impacts could also be costly with rough pavements adding to increased greenhouse gas production, which has the potential to accelerate climate change.

While the study looked specifically at the impact of the changing pavement seasons and the increase in temperatures and flooding at a site in coastal New Hampshire, the researchers say the approach has the potential to be applied to most roads and highways both nationally and globally. The adaptation approach, of calculating the pavement layer thickness required to maintain a safe road reliability level, could provide the guidance to address the effects of rising temperatures and changing seasons on those byways.

Funding for this research was provided by National Science Foundation (NSF), New Hampshire Sea Grant, N.H. Department of Transportation and N.H. Department of Environmental Services.

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