'Sustainability' Drives Student Interest in Pavement Preservation

Editor's Note: Under the direction of Andrew Braham, P.E., the University of Arkansas-Fayetteville actively promotes pavement preservation as a course of study to engineering students. These students bring a different perspective of why a young civil engineer would pursue preservation study. This is the first in a series of occasional profiles of students in pavement preservation there, this issue focusing on Sadie E. Smith, graduate research assistant.

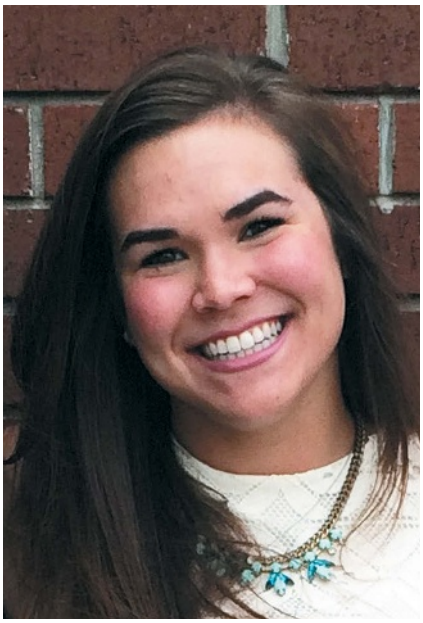
PPJ: WHAT GOT YOU INTERESTED IN PAVEMENT PRESERVATION?

Sadie E. Smith: As I was entering college, "sustainability" was becoming a huge buzzword, and the source of much discussion regarding the future of design. The heavy emphasis was being placed on not only creating structures that would meet the needs of its users, but could also be more economically and environmentally viable. This made so much sense to me.

On top of all this, I saw the potential for my designs to potentially increase the quality of life of others, both now and in the future, and that adds so much value to what we do. Additionally, the materials side of civil engineering has always been one that has interested me, and pavement preservation falls right in line with both of these interests.

Transportation is essential to the lives of people all over the world, but building and maintaining transportation networks is very expensive. There is so much existing infrastructure already in place, and it's very inefficient for us to not continue building on this foundation by preserving and extending the life of these structures whenever possible.

With pavements, there is so much potential for preservation techniques, such as fog seals, chip seals, and slurry seals, to be very useful, cost effective, and environmentally friendly tools for agencies maintaining existing infrastructure. So it's exciting to get to really dig into some of the questions that are still unanswered for these benefits to be fully realized.



University of Arkansas-Fayetteville grad student Sadie E. Smith

HOW IS YOUR RESEARCH RELATED TO PAVEMENT PRESERVATION?

Pavement preservation techniques such as fog seals, chip seals, and slurry seals show a lot of potential to preventively maintain our existing infrastructure and protect the investment already made in our transportation network.

These techniques can serve to provide new riding surfaces, correct small surface deformations, and even fill in existing cracks at the surface level. Unfortunately, sometimes pavements are not properly maintained early enough, or simply degrade to a point at which preservation is no longer an option.

In these cases, it is great to have rehabilitation and recycling tools available that do not require full reconstruction of the pavement. While not strictly a pavement preservation treatment, one rehabilitation technique that has become more popular is full-depth reclamation (FDR). Most of my research thus far has been exploring the mix design and structural design of FDR. This technique uses the entire pavement structure to create a rehabilitated, structurally sound foundation for the road, allowing for future preservation.

FDR can provide cost and environmental benefits by using in-place materials, cutting down on hauling distances, and using "cold" stabilization techniques such as foamed asphalt, asphalt emulsion or cement. My research has focused on the unique questions raised by combining soil base layers with the asphalt concrete layers of the pavement structure to create a composite recycled material.

As an undergraduate, I completed a project comparing laboratory compaction techniques used for FDR stabilized with foamed asphalt and asphalt emulsion. While pursuing my master's degree, I explored the use of the existing *Mechanistic/Empirical Pavement Design Guide* (MEDPG) for use with asphalt emulsion FDR pavements by evaluating the effects of considering the FDR layer to be an unstabilized base course versus an asphalt concrete layer.

As I begin my Ph.D., I plan to continue focusing on the asphalt stabilization methods used for FDR, asphalt emulsion and foamed asphalt,

which are also used in pavement preservation techniques. Gaining a more fundamental understanding of how these stabilizers are actually adhering to the soil or aggregate will allow us to continue to better utilize these preservation, maintenance and rehabilitation techniques to make this process more widely known and more frequently utilized.

HOW HAS YOUR PERSPECTIVE CHANGED ABOUT OUR ROAD INFRASTRUCTURE SINCE BEGINNING RESEARCH?

In our culture, we are inundated with the idea that new is better, and I probably would have applied this idea to infrastructure as well. Entering the field of civil engineering, it seems to follow that new construction and new development is a necessity to have ongoing work.

However, since I've begun to learn more about – not only my research specifically – but also the field of pavement maintenance, preservation and rehabilitation as a whole, I have realized that new may not always be the best option. I find the innovation and creativity of trying to extend the life of a pavement – rather than just tearing it up and starting over – to be a welcome and interesting challenge.