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Innovative Use of Permeable Pavement

AMAP ADVISORY COMMITTEE QUARTERLY TECH BRIEF

Contributions: National Asphalt Pavement Association, Asphalt Institute, National Center for Asphalt Technologies, Asphalt Pavement Alliance and Pavement Preservation & Recycling Alliance

Association of Modified Asphalt Producers

this issue

Faced with roadway flooding in critical coastal locations, DelDOT is implementing an innovative solution to manage immediate drainage challenges.

DelDOT - South Bowers Road

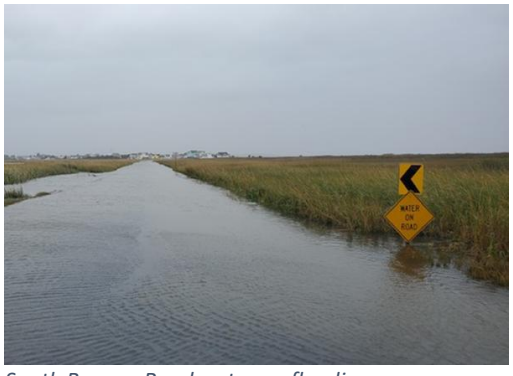
As the lowest lying state in the nation, Delaware has experience with flooding and the issues caused by the inaccessibility of flooded roadways. Unfortunately, some of these frequently flooded roadways are to coastal communities that only have single access points, so these roadways are one way in, one way out. When these roadways are inaccessible due to roadway flooding, the communities are cut off from all access including emergency services if needed. From the Delaware Department of Transportation (DelDOT) perspective, that is an unacceptable risk and one that had to be investigated to determine viable options meeting engineering, economic, and environmentally sensitive requirements.

South Bowers Road was identified as a critical frequently flooded roadway that needed a solution. As can be seen in the photo below, South Bowers Road is surrounded by water, Delaware Bay to the east, the Murderkill River to the west along with tidal wetlands

South Bowers Road

To address the roadway flooding, engineering options were evaluated. The obvious, easiest solution would be a conventional, dense graded Superpave surface mix which is the typical overlay option throughout the state. However, that overlay raised an immediate concern about settlement given the tidal, marshy area and soft underlying soils.

Through a geotechnical investigation, settlement analysis was performed for both conventional, dense graded asphalt pavement mixtures and permeable asphalt pavement mixtures. The settlement analysis showed substantial settlement with the use of a conventional, dense graded mixture (~6") while the analysis with a permeable pavement showed slightly less settlement. The other major concern with the settlement estimates for the dense graded mix was the time for the settlement; the analysis showed ~6" of settlement within 18 months of placement. It was quickly determined that it was not acceptable and that option was removed from consideration.



South Bowers Road, extreme flooding

AMAP ADVISORY COMMITTEE

AMAP has an Advisory Committee comprised of members from several aspects of the industry. The Committee consists of a Roofing, Paving, Agency Subcommittee (SC). The Committee's primary goal is to maintain open communication between AMAP and the rest of the industry, offering education and insights on modified asphalt, from its definition to its usage and performance.

PAVING & AGENCY SC

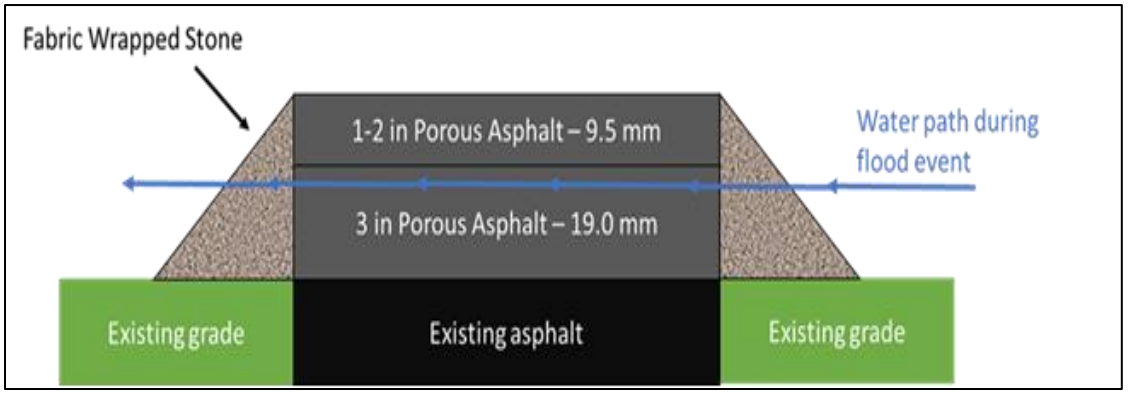
The Paving SC consists of representatives from AI, NAPA, PPRA, & NCAT. The Agency SC consists of representatives from DOTs in each region, the Asphalt Pavement Alliance (APA), and the American Public Works Association (APWA).

GET INVOLVED

Find out how to get involved! Contact us at info@modifiedasphalt.org.

DON'T MISS OUR NEXT ISSUE

The upcoming issue will showcase projects redefining what's possible with balanced mix design—demonstrating how smart engineering delivers durability, value, and environmental stewardship.



Typical Cross-Section for South Bowers Road

The ultimate decision was made to use a permeable asphalt pavement to overlay the existing roadway. However, due to the tidal water movement horizontally, with the pavement acting as a reservoir, there were concerns about debris clogging the voids in the permeable pavement. It was determined a geosynthetic or geotextile filter placed along the longitudinal pavement edge could potentially address this concern. Secondarily, if the "filter" was designed properly, it could also act as a safety edge drop off to prevent vehicles from leaving the edge of the roadway.

Stone wrapped geotextile edge protection

Given the surrounding wetlands, DelDOT did not want to go through the process of applying for and receiving permits for work outside the existing pavement footprint, so it was decided to stay within the existing roadway width which ranged from approximately 20' to 24' wide.

Ultimately, it was decided to place a two-lift overlay of the permeable pavement with a coarser graded 3" mix as the base and a finer 2" lift for the surface. The base mix used a 12.5 mm nominal maximum aggregate size while the surface course used a 9.5 mm nominal maximum aggregate size. It was also decided to use a PG76-22 polymer modified asphalt binder for both lifts to maximize the durability. Also, of note for this project, DelDOT specified the use of a straight PG64-22 as a tack coat, not the typical emulsified asphalt tack coat. DelDOT has used PG64-22 as tack coat on a few previous projects where bond was of critical importance to ensure pavement performance.

The overlay has now been in service for over 3 years. Follow-up analysis has shown settlement in some areas but overall, the pavement is performing as expected and DelDOT has looked for opportunities to use this same design methodology for other critical, flooded roadways.

This DelDOT project is an example of addressing resilience and sustainability concerns faced by many agencies across the country. The use of a polymer modified asphalt binder in the permeable pavement should extend the life of the pavement for DelDOT and the users of this roadway.

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Graphic credit: Google maps, DelDOT, Auburn University, AECOM