The Road Forward **Climate-Conscious** Pavement Design

RAP MIX SHOULDERS ENHANCE RESILIENCE AND SAFETY OF ROADS IN LOUISIANA

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Rural roads in Louisiana have very narrow shoulder areas and are often adjacent to substantial drainage ditches. Historically, aggregate or RAP was used for the shoulder material. However, there were issues with the loose material being washed into the ditch over time or during storm events, creating safety issues with drop-offs at the edge of the pavement (Figure 1) that resulted in significant accidents.

Figure 1: Picture taken in 2001 of LA 464 with plain RAP shoulders and typical shoulder drop-off (courtesy James Winford, Jr, PhD, PE)

In the late 1990s, Prairie Contractors LLC was working on a job in Calcasieu Parish where they did not have enough RAP material to complete the shoulder work. They worked with the Parish engineer to make a 'Hot RAP' mix in the plant, a low asphalt content mix that was placed on the shoulders instead of the loose RAP or aggregate (Figures 2 and 3).

The Parish engineer recognized the benefits of the increased safety and reduced maintenance needs that using Hot RAP shoulder material achieved. The low asphalt content mix stayed in place, maintaining the safety of the road edge and eliminating the wasting of loose material that washed away, along with the required maintenance to replace it. The Hot RAP material had higher initial cost, but the Parish engineer recognized

[1]https://www.ltrc.lsu.edu/pdf/2013/ts_453.pdf

Figures 2 and 3: **Pictures taken in 1999 of LA 464 (left) and Calcasieu Parish (right) using 'Hot RAP' on shoulders (courtesy James Winford, Jr, PhD, PE)**

it was a good investment in the long run, considering the ongoing maintenance and safety aspects. Calcasieu Parish transitioned to exclusive use of the material on their entire road network following the success of the test sections. Also, the perception of higher initial costs has shown to not always be accurate, as recent bids for 2024 projects in Calcasieu Parish were $105/ton for Hot RAP and $140/ton for aggregate surface course material.

The initial mix design and placement procedures have been modified with experience over the last two decades. LA DOT developed a specification for Hot-Mix Asphalt Treated Aggregate Surface Course (HMATASC) and conducted research a project[1] to develop a simplified mix design methodology for these materials. While the HMATASC specification does not require the use of RAP, Prairie Contractors LLC have consistently used about 20% RAP for these mixtures, finding it to be a good application for their lower grade RAP material.

In addition to the safety and maintenance benefits that provided the initial motivation, the Hot RAP shoulders have demonstrated significant resilience benefits under storm surge flow events. The Hot RAP shoulders prevented undermining of the road that was observed in other areas with traditional loose RAP or aggregate shoulders. Additionally, the Hot RAP shoulder material has helped with drainage from the pavement surface, eliminating ponding issues that occur with buildup of debris along grassy verge areas and decreasing the maintenance needs associated with cleaning debris and mowing, which are associated with the loose shoulder materials.

In summary, Louisiana has found that the use of asphalt treated surface materials, or Hot RAP, in the shoulders of rural roads has provided substantial benefits with respect to safety, reduced maintenance costs, and increased resilience to storm events.

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