



EVALUATION OF A RUBBER-MODIFIED MIXTURE DESIGNED USING A BALANCED DESIGN IN COFFEE COUNTY, ALABAMA

Year 3 Evaluation Report

Submitted to

COFFEE COUNTY, AL

By

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Evaluation of a Rubber-Modified Mixture Designed Using a Balanced Design in Coffee County, Alabama

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Project Objective

This project aims to evaluate the performance of a rubber-modified mixture designed using a balanced mix approach compared with an unmodified mixture also designed as a balanced mix, and a conventional unmodified Superpave mix. Coffee County resurfaced a portion of County Road 110 with these three mixtures to accomplish this objective. The field performance of the test sections will be monitored for 6 years.

Year 2 Project Evaluation

A field performance evaluation was conducted on November 10, 2023, after approximately 3 years in service. Data were collected on the three sections to document performance regarding rutting, cracking, smoothness in terms of the international roughness index (IRI), and macrotexture in terms of the mean profile depth (MPD).

The evaluation was conducted using an automated pavement condition survey vehicle shown in Figure 1. The data collection vehicle used by NCAT is a fully automated PathRunner vehicle. The van is a class 1 inertial profiler with a 3D automated crack and rutting detection system. The van includes an on-board laser package that measures smoothness, rutting, and macrotexture, in addition to front-facing super HD cameras, GPS, and 3D automated crack detection software providing a comprehensive pavement evaluation. Three data collection runs were made in each driving lane.



Figure 1 Data Collection Vehicle

Figure 2 presents the layout of the three sections.

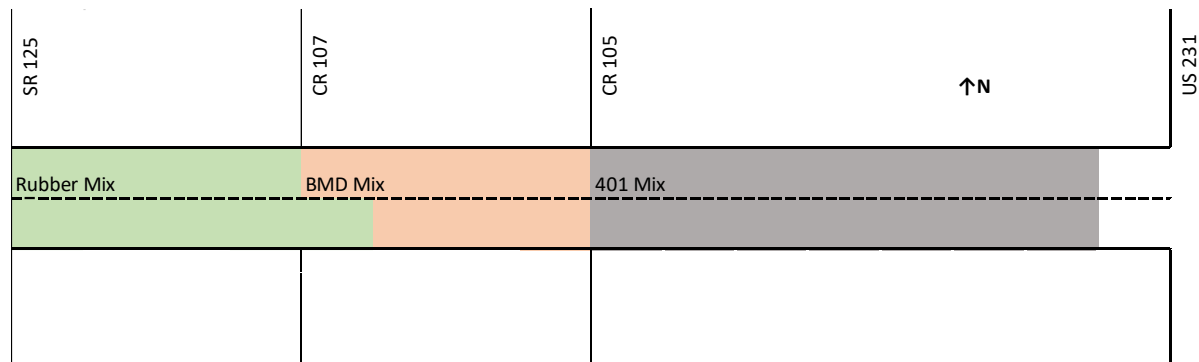


Figure 2 Layout of the Test Sections.

The average performance data for IRI, rutting, and texture measured after 1, 2, and 3 years of performance are shown in Figures 3-5. As presented in Figure 3, the rutting performance of all the sections after 3 years did not change significantly with rutting not exceeding 0.11 in. IRI of the sections was similar with the BMD-WB mix showing the highest value after 3 years of performance at 100 in/mi. The macrotexture increased for year 3, with the highest value reported for the control Superpave mix (401 mix).

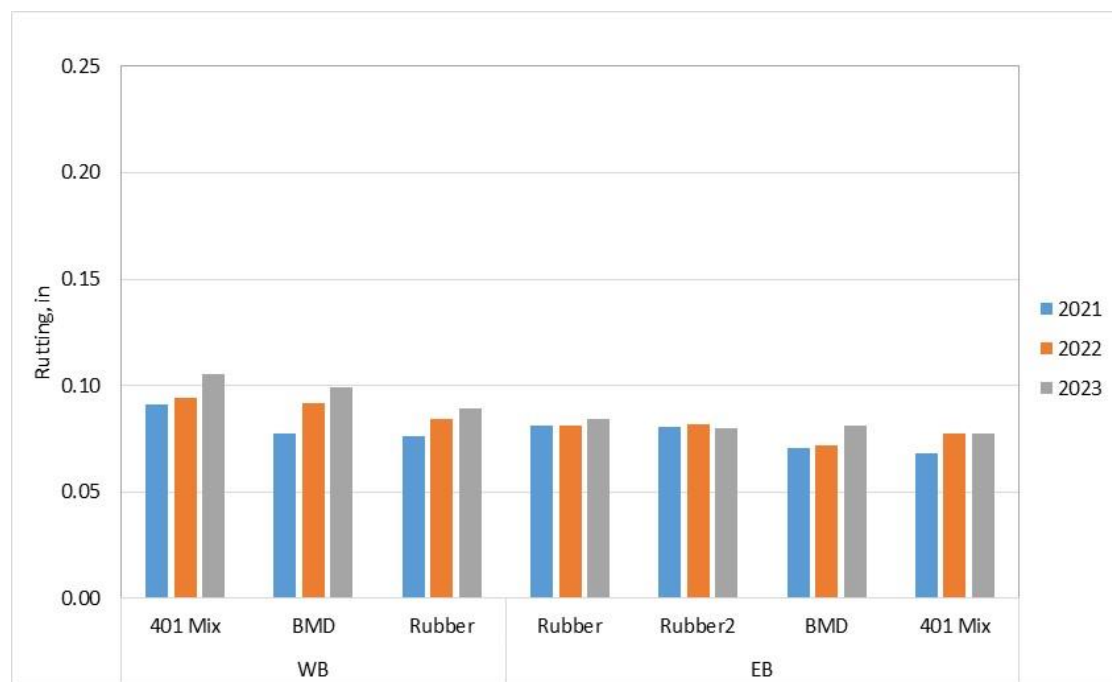


Figure 3 Rutting Results

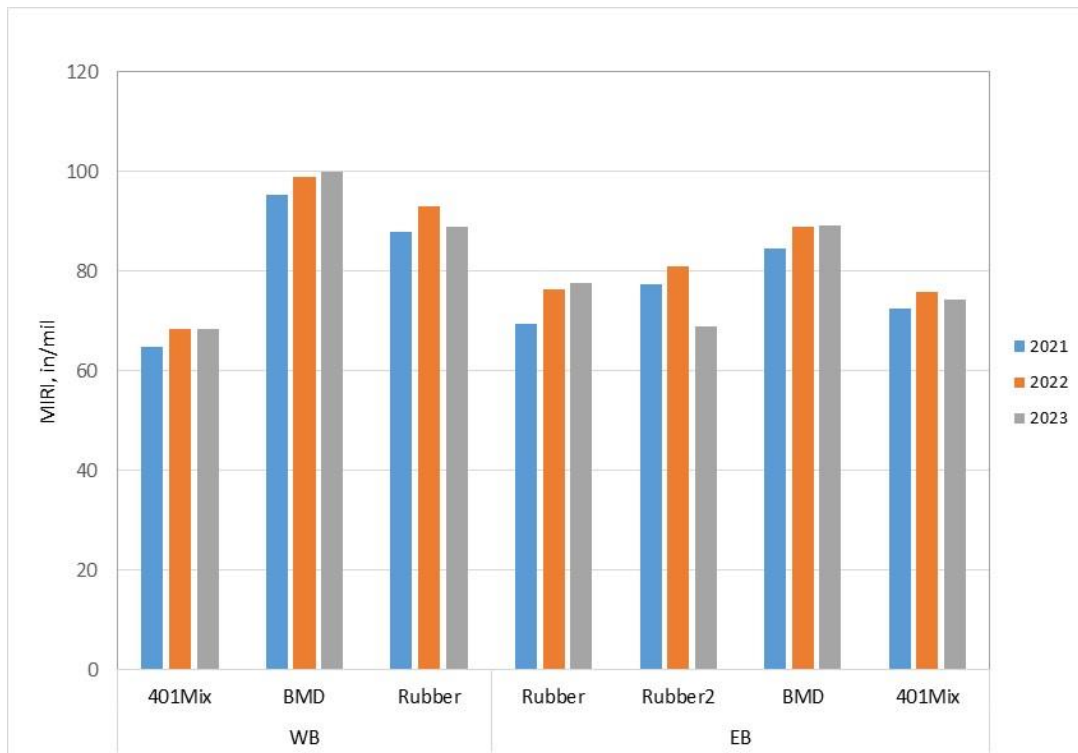


Figure 4 IRI Results

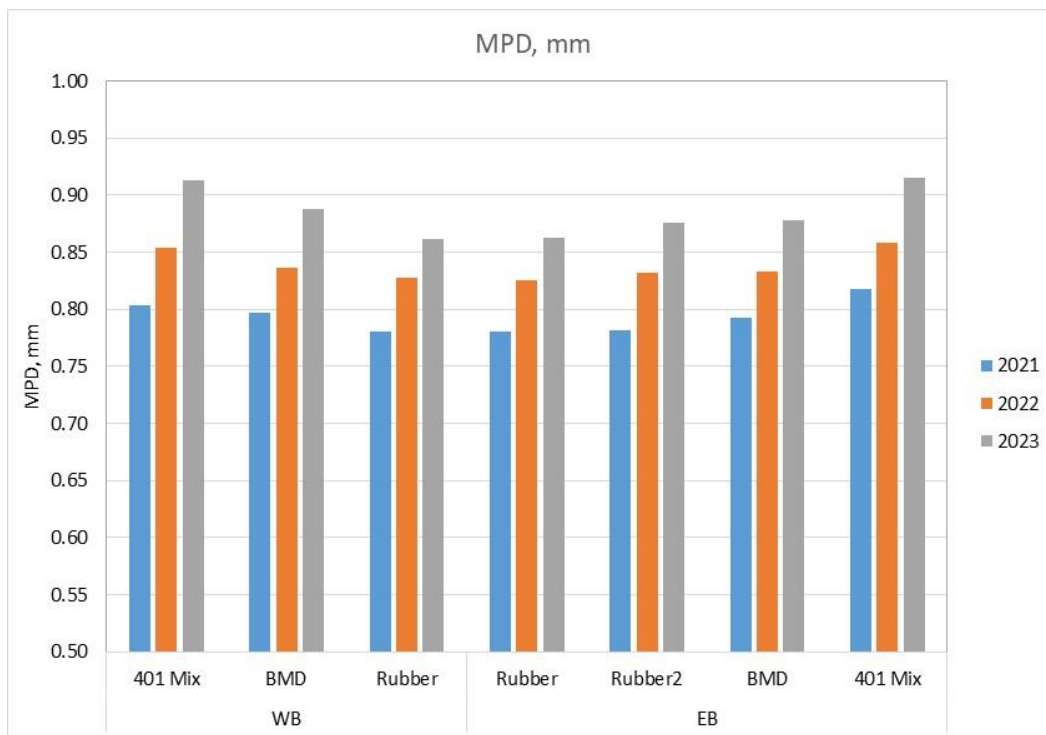


Figure 5 Texture Results

Cracking was detected and classified using Pathway Service’s software AutoCrack and AutoClass which classifies cracking by type. At the time of the 3-year visit, there was still very little cracking observed. The cracking identified by the AutoClass software was manually inspected for quality, and any obvious errors made by the software were then corrected. Tables 1 and 2 show summaries of the few cracks that were identified by the Pathway system at the time of the 2022 and 2023 visits respectively. There was more cracking detected in 2022 compared to 2023. This is not uncommon since the cracks are so small, that sometimes the collection vehicle will not detect them.

The width of these cracks is minimal and could have been caused by a wide variety of factors. Since it makes up such a small percentage of the lane area, these cracks are probably not indicative of mix performance. Overall, the test sections appear to be performing well.

Table 1 Cracking Totals in 2022

Direction	Mix	Length, mi	# Trans. Cracks	# Long. Cracks	Total Length Trans. Cracks, ft	Total Length Long. Cracks, ft
WB	401Mix	2.7	0	1	0	1.0
	BMD	1.7	1	9	3.8	12.0
	Rubber	1.5	0	0	0	0
EB	Rubber	1.5	0	0	0	0
	Rubber2	0.5	0	0	0	0
	BMD	1.2	0	0	0	0
	401Mix	2.7	2	0	3.7	0

Table 2 Cracking Totals in 2023

Direction	Mix	Length, mi	# Trans. Cracks	# Long. Cracks	Total Length Trans. Cracks, ft	Total Length Long. Cracks, ft
WB	401Mix	2.7	1	0	5.3	0
	BMD	1.7	0	2	0	2.8
	Rubber	1.5	0	0	0	0
EB	Rubber	1.5	0	0	0	0
	Rubber2	0.5	0	0	0	0
	BMD	1.2	0	0	0	0
	401Mix	2.7	2	1	6.7	1.0

Figure 6 shows an example of the cracking area identified by the Pathway System. Figures 7 – 9 show examples of each mix type at the time of the 3-year visit.

At the time of the year three evaluation, no significant differences were observed in the performance of the rubber and control sections. The next field inspection will take place in October 2024.

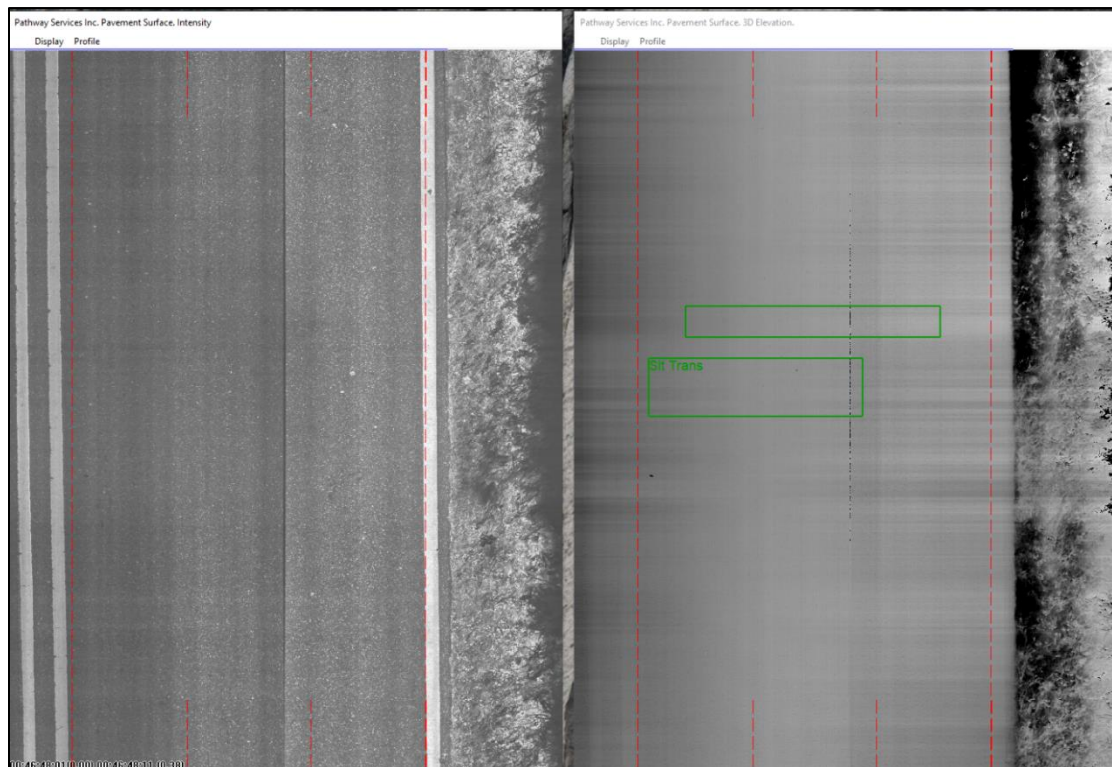


Figure 6 Example of Cracking Identified by Pathway System

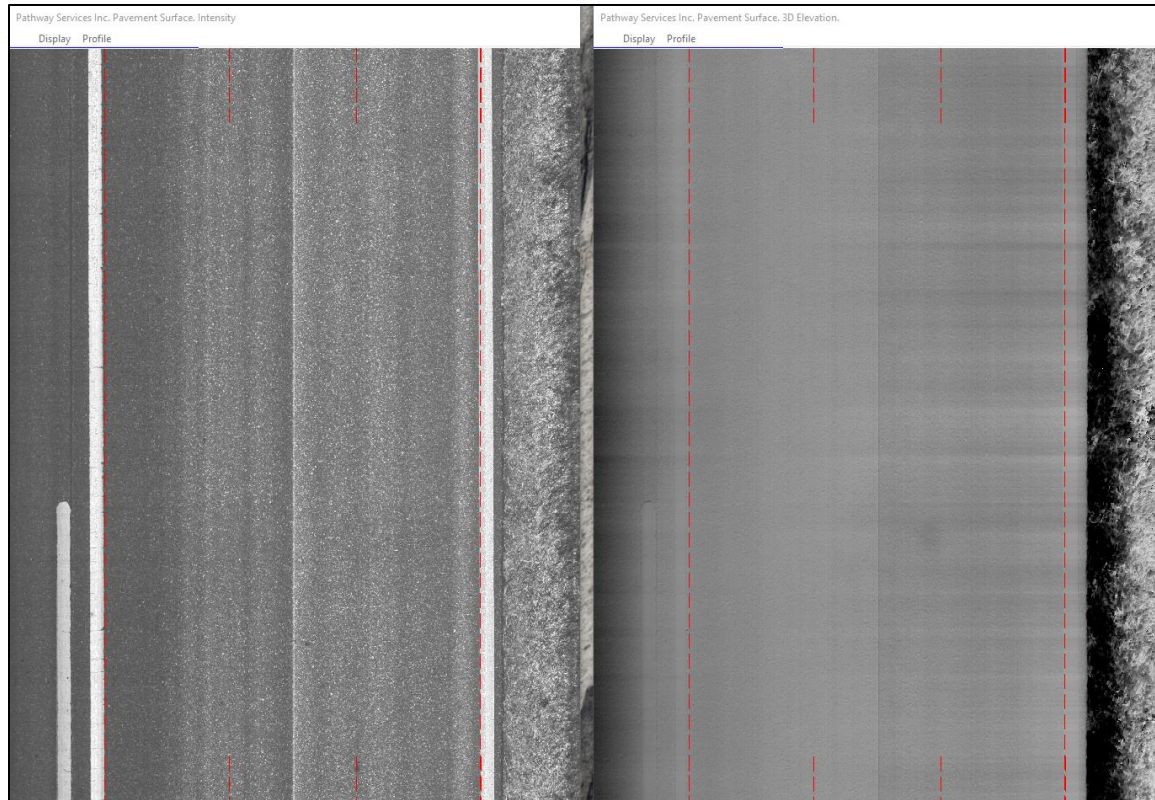


Figure 7 WB 401-Mix Section @ 25' scale

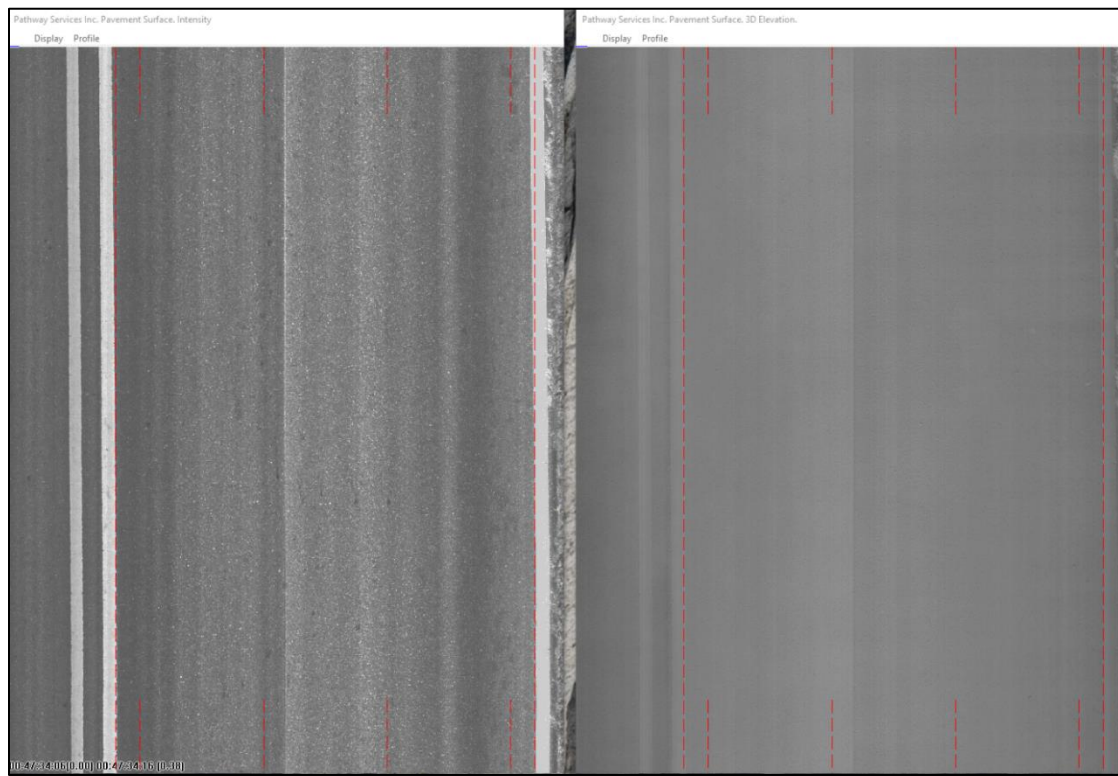


Figure 8 WB BMD Mix Section @ 25' scale

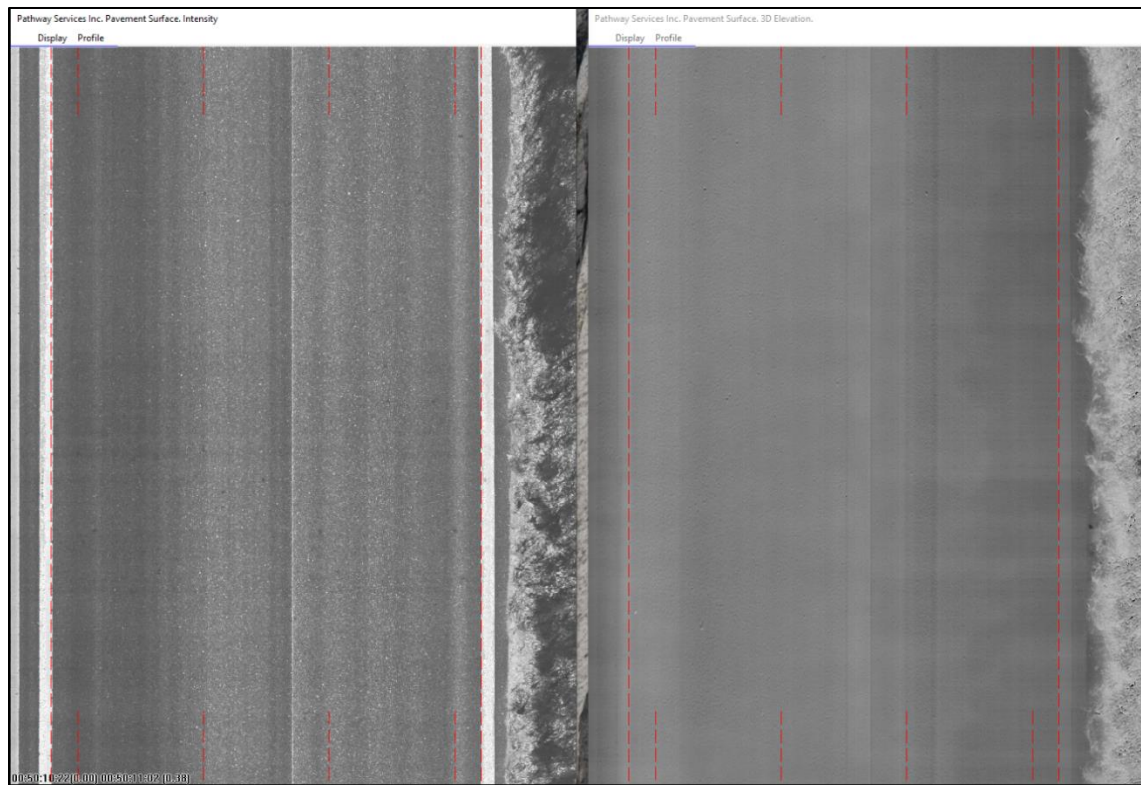


Figure 9 GTR Section @ 25' scale