



CP² CENTER NEWS

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Caltrans District 1 warm mix projects

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Engineers in District 1, headquartered in Eureka, Calif., have expanded their use of warm mix technologies with two more projects constructed during the summer of 2010. This continues the pilots placed in 2009 using warm mix technologies in conventional and AR mixes.

State Route 1

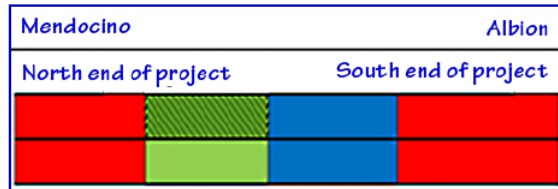
The first project was placed in late June and early July, 2010, on SR 1 between Mendocino and Albion River Bridge. The contractor for the project was Granite Construction out of Ukiah, Calif., and

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the RE for Caltrans was Chuck Lees based in Fort Bragg. The warm mix technologies selected for the open graded polymer modified mix (PG 64-28 PM) were as follows: Advera, Rediset, and Double Barrel Green method.

The layout for the paving is shown in Figure 1 which locates the different projects and where they were placed along the length of the project.

Figure 1. Two-lane route 1 paving plan



Red - DGAC
 Green - OGAC with Advera
 Green with slash - OGAC with Rediset
 Blue - OGAC (Green Machine)

A counter flow drum plant was used to produce the warm mix with polymer modified binder. The plant mix was transported from Ukiah, approximately 64 miles away, about a 1- to 1½-hour trip from the job site. The weather during construction was cool with a high of about 60° F and a low of about 54° F. The weather was also dry and the wind was calm. The mixing, laydown and compaction temperatures are summarized as follows:

Table 1. Mix temperature of SR 1

Product	Mix Temperature at plant (°F)	Mix Temperature in shuttle buggy (°F)	Mix Temperature behind paver (°F)
Control	325	NA	225-260
Control with Advera	270	240-255	225-245
Control with Rediset	270	240-250	230-235
Control with Green Machine	270	NA	240

The transport trucks were tarped to reduce the heat loss in the mix during transport. The mix was dumped into a material transfer vehicle (MTV) and then placed using a laydown machine. Breakdown compaction was done using a 10-ton vibratory compactor followed by intermediate compaction using a 10-ton pneumatic roller. Finish compaction was done using a double drum 12-ton roller. The compaction of the mix was easily accomplished. The finished thickness was to have been about one inch, but in places it was much thicker.

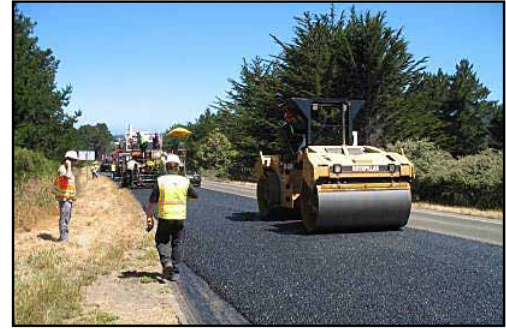


Figure 2. Breakdown compaction on Route 1

The finished surface is shown in the following photo. The RE mentioned the mix was initially tender but that it set up nicely within a few days.



Figure 3. Finished project after striping

Overall, Caltrans was very pleased with the warm mix HMA placed on SR 1. The RE said that compaction was easy to attain even at the lower temperatures. There were few emissions at the plant and the final product looks good.

SR 101

This project, constructed in August 2010, was a short project between Arcata and Crescent City along the north coast. Granite Construction was the contractor on this project. This project consisted of cold planing and patching an existing open graded mix to remove loose materials and then placing a 1.2 inch layer of a dense-graded mix containing a PG 64-28 TR and a PG 64-28 PM binder. The proposed paving plan for the project is shown in Figure 4.

Figure 4. Four lane hwy 101 paving plan



Red - PG 64-28 TR
 Green - PG 64-28 PM with Advera
 Blue - PG 64-28 PM

The mix design for the ½-inch Type A HMA overlay used 5.3% asphalt binder. The terminal blend rubberized binders were provided by Paramount from Elk Grove, Calif. The mix temperatures were recorded at several sites in the paving operation.

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The data below summarizes this information.

Table 2. Mix temperatures at paving sites

Product	Mix temperature at plant (°F)	Mix temperature behind the paver (°F)	Mix temperature at initial compaction (°F)	Mix temperature at final compaction (°F)
Control TR	325	290-300	270-280	220
PM with Warm mix Advera	310	280-290	265-275	220

Some problems were encountered with the introduction of the warm mix additive. These included the warm mix additive feed system which wasn't working properly and there was some loss of additive during the mixing process. As a result, all warm

Figure 5. Behind the paver with HMA



mix terminal blends planned were not placed. The remainder of the project went well. Figure 5 illustrates part of the construction process

Greg Thorne was the RE on the project. Overall, he was pleased with the long hauls and the workability of the pavement in the weather below 60°F, except for the prob-



Figure 6 Finished paving with striping

lems with introducing the Advera into the mix. The plant lost around 1% of the Advera mix on the first day which was around 500 lbs for the day. The second day the Advera pump was also unsuccessful so the warm mix terminal blends were not placed as planned.

Summary

The Center will monitor these projects over the next few years and include them in its pavement preservation database. For more information on the warm mix projects, contact either Dr. Gary Hicks or Dr. Ding Cheng at the CP² Center.

