



THE LOUISIANA EXPERIENCE Foamed Recycled Asphalt Pavement

Foamed RAP field experiment on US Highway 190

During a recent reconstruction of US Highway 190 near Baton Rouge, Louisiana, the Louisiana Transportation Research Center (LTRC) was provided the opportunity to experiment with alternative uses of Recycled Asphalt Pavement (RAP). The continuously reinforced concrete pavement design called for a lime treated subbase and 8" of stone base. The project also included the removal of the existing pavement, which consisted of an 8" asphalt overlay and the original jointed concrete pavement. *RAP by itself is not a qualified base*

material as its strength is not comparable to other base materials traditionally specified, especially stone. However, pre-treating the RAP using Wirtgen's foamed asphalt design methods increased its' cohesion and triaxial strength as measured in the lab indicating that treated RAP is a viable alternative to a stone base. A test section was then placed to answer the question, "how would the actual strength of the foamed RAP compare to stone?"

In an effort to maximize the use



Wirtgen Pugmill mixes foamed asphalt with RAP

expensive than importing a stone base.

Plant Production and Placement:

Wirtgen model K-150 pug mill mixer was used to mix the RAP with foamed asphalt cement (PG 58-22) and Portland cement. A scalping/screening unit was set up prior to the pug mill to remove material greater than 1" in diameter. 2% moisture was added to meet the 8% optimum moisture content. Plant production of the Foamed

RAP was about 110 tons per hour.

The asphalt must have a minimum temperature of 160°C when it is delivered and at least 150°C during production. Maintaining these temperatures assure proper foaming of the asphalt and mixing in the field.

The pug mill unloaded directly to the back of the trucks, which delivered the foamed RAP to the roadway within one mile of the mixing location. Optimum density was achieved by establishing the optimum rolling pattern with a density gage. Both the nuclear gage and a geogage were used successfully to optimize the rolling pattern with 5 passes of the 14 ton

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of RAP, the Louisiana Department of Transportation (LADOT) is now allowing more RAP in its' asphalt mixtures with up to 15% allowed in the wearing surface and 20% in all other uses. However, some reconstruction projects generate such a great quantity

Foamed asphalt treated base is a process that combines hot asphalt and a small quantity of water in a small chamber to produce an asphalt foam that is then incorporated into a base material.

of RAP that its' use as a base material on that same project becomes more efficient than hauling it to a plant for use in asphalt mixtures. And the utilization of treated RAP taken from the same project should be less

steel wheel roller. 114 lbs per cubic foot was achieved. The trucks dumped into a conventional paver. An initial thickness of 6" was required to produce the planned 4" in-place lift. Each pass of the paver placed a width of 11 feet of material. It took three passes to

tored using the microwave oven, which gave excellent QC data in a matter of 15 minutes or less. The moisture content of the RAP stockpile varied only slightly from 6 to 6.5% throughout the production. The moisture content of the foamed RAP

test, i.e. falling weight deflectometer, dynaflect and dynamic cone penetrometer, the Foamed RAP results equaled or exceeded the results for the stone base. All of these results confirm previous work done in the laboratory. The only question is "how durable this material will be in the presence of moisture"? All base materials are affected by moisture to varied degrees. We will continue to follow foamed RAP results.



Density gage used to establish optimum density.

place the 33'x 1000' test section (10 meters x 330 meters). The first 4" x 33' x 1000 feet was placed in one day. The total thickness placed was 8". The biggest problem in constructing the project with a paver was the inability to compact the longitudinal joints. Placing the material full depth with a dozer --which is typical when placing stone, was tried with success. This method of placement will be considered on future projects as an option for the contractor.

Moisture contents of Stockpile RAP and the foamed mixture were moni-

ranged from 7.8 to 8.4% during the four production days. The test section was constructed from Jan 23rd to Jan 27th, 2002. Approximately 1" of rain was recorded after the second day with no detrimental effects on construction of the foamed RAP base.

Summary of in-place foamed RAP test results vs. adjacent stone section:

Although cores could not be obtained, LTRC performed a large number of strength test on both the foamed asphalt base and the stone base. In all

CONCLUSIONS

- **Foamed RAP is an acceptable base material and should be considered for use as a standard base.**
- **Foamed RAP is not suitable for a wearing surface and must be well drained as foamed RAP will lose cohesion and strength when loading occurs in moist conditions.**

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