# Tech Brief

## Route 130 Bridge Snowfree Installation
## Electrical Analysis and Recommendations

FHWA-NJ-1998-008-TB February 1998

HERE'S THE PROBLEM

A previously conducted a research project had installed "Snowfree", a Hot Mix Asphalt overlay using graphite as a conductor, to heat a bridge deck on Route 130 in Southern New Jersey during winter months. The installation had failed immediately after installation.

AND, HERE'S THE SOLUTION

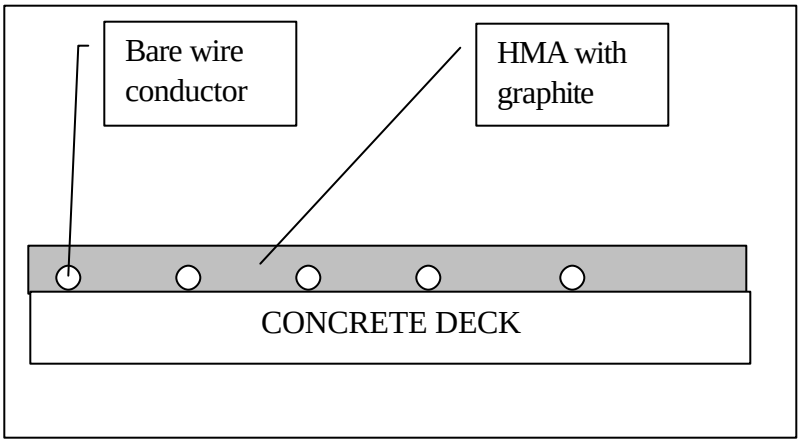
This follow up research effort examined the electrical properties of the hot mix asphalt containing graphite. The study included a detailed electrical analysis of the present system to determine the problems of the initial installation, and to provide recommendations for improvements to the system.

THESE ARE OBJECTIVES…

- The main objective of this proposal is to analyze, re-evaluate, and re-engineer the construction and material procedures.
- To provide a means of eliminating, or mitigating, the problems of the initial installation.

HERE IS WHAT WE DID…

Theoretically, the present heated pavement system was designed so that each section of the deck would be equivalent, in terms of dimensions and resistivity, which would result in a balanced electrical load and the uniform dissipation of heat throughout the asphalt. However, the actual



operation of the system failed to produce the uniform dissipation of heat necessary to effectively prevent the accumulation of wintry precipitation.

Therefore, a detailed electrical analysis of the system was conducted to determine the problems of the initial installation and provide recommendations for improvements to the system. This involved a detailed study of the material composition of the conductive pavement, in order to determine the principle factors influencing the resistivity.

Data taken from measurements of asphalt core samples was studied and compared to resistivity charts in order to ascertain the possible causes of the inconsistent cable currents. Load resistance from each main bus cable to the ground was obtained by implementing the four-point probe technique for accurately measuring small resistances.

After determining the load resistance values, it was determined that they were inconsistent, and differed significantly from the resistance necessary for proper operation of the system. It was concluded that the graphite had not been uniformly distributed throughout the HMA. This detailed analysis and experimentation process indicated the importance of alterations to the current system.

## WHAT IS THE NEXT STEP?

The next step in this case would be to follow the recommended analysis on areas of importance regarding the heated pavement system. It must be determined when the system will require some form of maintenance or possible replacement. During the reconstruction of the system, routine visits to the site will be performed to evaluate the procedures and to measure resistance values, as the layers of pavement are applied. In addition, inspection of the road surface will take place, in order to look for potential problems. Field-testing should be followed by technical support, such as an evaluation of the overall performance of the improved heated pavement system.

The desired values would be compared to measurements to determine whether the proper resistivity was obtained, and whether the system is drawing the specified current. These results would assist in the final electrical analysis of the improved structure and would provide a sold foundation for recommendations for future projects involving heated pavement systems.

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A final report is available online at http://www.state.nj.us/transportation/research/research.html

If you would like a copy of the full report, please FAX the NJDOT, Bureau of Research, Technology Transfer Group at (609) 530-3722 or send an e-mail to Research.Bureau@dot.state.nj.us and ask for:

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