INNOVATIONS IN TECHNOLOGY

Federal Highway Administration

shrp

by Donald Jackson

Rapid repair techniques save time

Aging portland cement concrete (PCC) bridge decks present highway agencies with numerous challenges. As the bridge decks age, they often begin to experience corrosion of the reinforcing steel caused by the penetration of water and chloride ions from salt. Older decks can also suffer from poor ride quality, poor skid resistance, inadequate drainage and deteriorated sections.

Traditionally, highway agencies have rehabilitated aging bridges by placing another layer of PCC or asphalt on top of the original deck. These overlays can add 10 to 30 years or more to the life of the bridge, but the repairs often take weeks or even months, causing major inconvenience to drivers and leading to greater traffic congestion on alternative routes. To surmount this problem, the Virginia DOT (VDOT) is turning to rapid bridge deck repair techniques evaluated under the Strategic Highway Research Program (SHRP).

VDOT used the rapid repair techniques in May on a bridge in northern Virginia. The bridge, which carries an average of 64,000 vehicles a day, had begun to deteriorate due to water and chloride ions that penetrated the concrete. Closing it for repairs, however, would create massive traffic problems. Instead, VDOT decided to use a very early strength (VES) latex-modified PCC overlay. The VES overlay is as durable as a conventional overlay but uses a concrete mix that is designed to cure very quickly, allowing the bridge deck to be opened to traffic only eight hours after construction begins. A typical schedule for placing the VES overlay is:

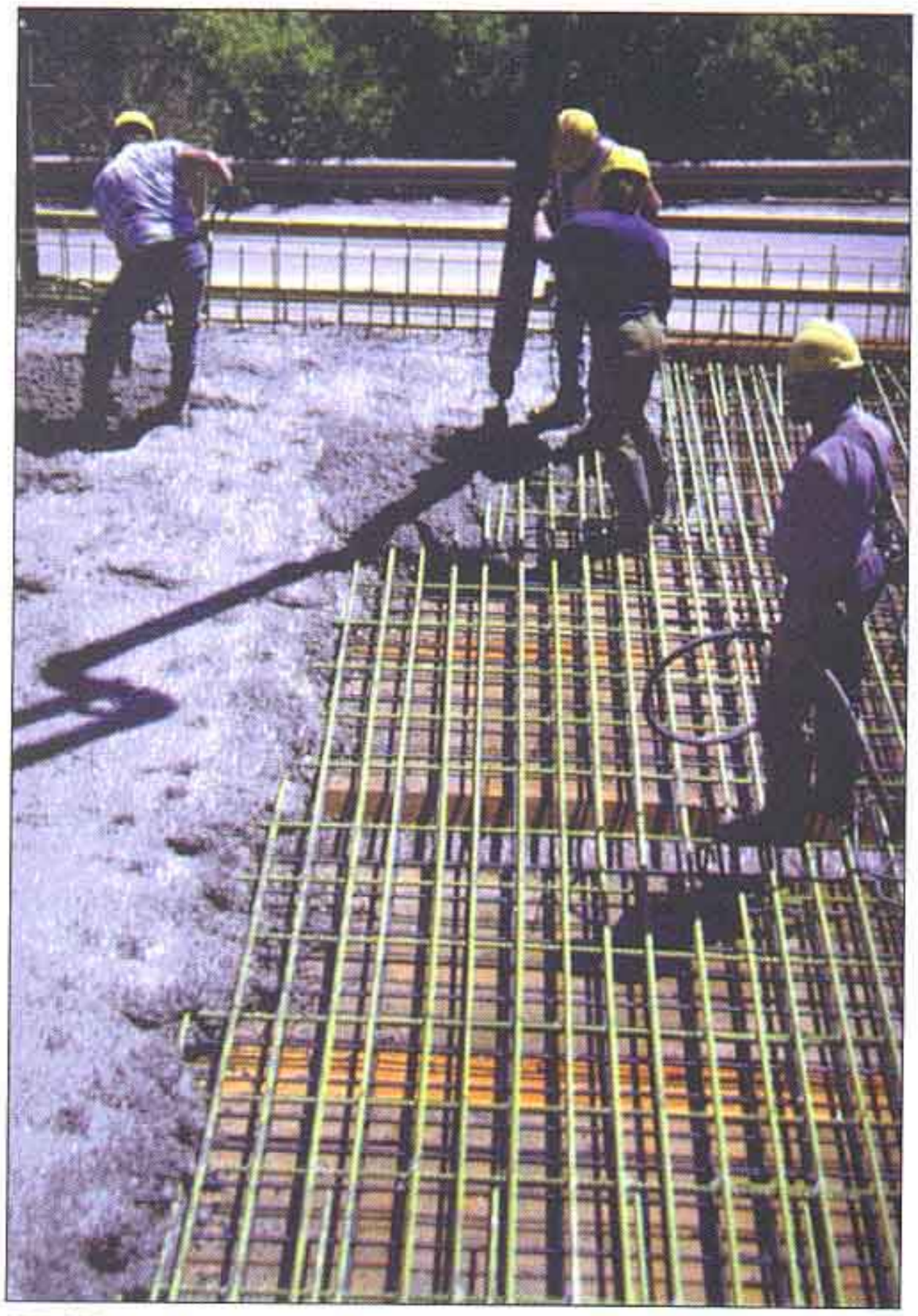
- Close the bridge at 9 p.m.;
- Mill and shotblast the bridge deck by 11 p.m.;
- Place the overlay by 2 a.m.; and
- Open the lane to traffic by 5 a.m.

The northern Virginia project was successfully completed in the expected eight hours and the VES concrete overlay is now performing very well, with a permeability lower than that of conventional latex-modified concrete overlays.

Because the concrete cures so rapidly, the key to placing VES overlays is to work fast. The material has to be put down quickly and then immediately covered up with wet burlap or polyethylene, in order to avoid cracking.

The materials for VES overlays are more expensive, but the cost is more than offset by the resulting savings on traffic control and work-zone safety measures. According to VDOT, when these costs are factored in, a fast-curing VES overlay costs approximately $115 per sq m ($96 per sq yd) for labor and materials, compared with the $156 per sq m ($130 per sq yd) it costs to place a conventional PCC overlay.

The success of the northern Virginia project, along with the agency's previous use of a VES overlay on a bridge near West Point, has convinced VDOT to use a VES overlay to repair another bridge in northern Virginia this fall. Time is critical to this project, as the bridge is a major commuter route into Washington, D.C.



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Additional information on the SHRP rapid bridge deck repair techniques can be found in *Concrete Bridge Protection and Rehabilitation: Chemical and Physical Techniques-Rapid Concrete Bridge Deck Protection, Repair and Rehabilitation* (Publication No. SHRP-S-344). This publication is available from the Transportation Research Board bookstore, call 202/334-3214, or fax 202/334-2519, Internet address www2.nas.edu/trbbooks/SHRP1.html.

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