

Use of Precast Slabs for Pavement Rehabilitation on I-66

Perspective Precast concrete slabs (panels) have been used for more than 10 years to build and repair pavements. They allow faster construction and are more durable than cast-in-place (CIP) concrete. Precast panels are cast and cured off-site with better quality control than CIP concrete. They can be deployed rapidly, helping to minimize safety hazards and traffic delays associated with CIP concrete. Michigan, Texas, and California are among the states that have successfully used precast systems.

This study documented the construction and initial performance of two precast systems used to rehabilitate highway pavement in Northern Virginia. Everyone who participated in this study found the constructability of the systems to be satisfactory. Surveys conducted after 18 months indicated satisfactory pavement performance. Highway repairs with precast concrete systems initially cost more than with CIP but should last longer. The higher cost can be justified to limit congestion and delays for motorists in high-volume traffic areas where extended lane closures are not feasible, such as the interstate system.

Background VDOT received incentive funding from the Federal Highway Administration’s Highways for LIFE program for this demonstration project. It took place on a 0.2-mile four-lane section of I-66W between Exits 60 and 57 near Washington, D.C., and on a curved section of a nearby 0.7-mile two-lane exit ramp onto U.S. Route 50W. The contractor placed precast concrete pavement (PCP) slabs on part of the ramp.



Precast concrete pavement system

The PCP system used reinforced slabs with doweled joints that were cast to match the ramp curvature and superelevation. Prestressed precast concrete pavement (PPCP) slabs were used in the straight section on I-66W.




Prestressed precast concrete pavement system

Transversely prestressed panels were longitudinally post-tensioned together at the site to reduce the chances of cracking and provide continuity at the joints.

Research and Recommendations The contractor constructed trial sections of PCP and PPCP off-site to identify and resolve construction challenges. Elements requiring special attention included base preparation, placement and matching of slabs, grouting operations, quality control of precast fabrication, alignment of post-tensioning ducts, development of ways to avoid corner cracks and edge spalling during installation, the tying together of adjacent lanes, and the securing of post-tensioning strands.

Eighteen months after traffic opened on the study sections, researchers observed some deterioration of PPCP expansion joints and minor cracking at or near patches for lifting hooks, grouting holes, or post-tensioning block-outs. The PCP slabs had shown a few mid-slab cracks at traffic opening, but cracks were still tight and stable. The study recommends that VDOT consider both types of precast systems as options when rapid construction and longevity are needed and that VDOT continue evaluating nationwide improvements for precast systems.

For the full report, see [VCTIR 12-R9](#).  For more information about the research, contact M. Shabbir Hossain, Ph.D., P.E., VCTIR senior research scientist, at Shabbir.Hossain@vdot.virginia.gov.

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