

Options for Using Precast Concrete to Speed Construction

A solution for repairing roadways with faster project schedules, reduced congestion, and improved safety

Precast concrete pavement (PCP) segments can be quickly installed on a prepared foundation. PCP has application both in accelerated pavement reconstruction as a permanent surface over a wide area, as well as for temporary segments to allow more flexibility in construction phasing. There are great potential benefits to using PCP systems: they can speed up roadway reconstruction without sacrificing quality; once installed, the roadway can quickly be reopened; and traffic disruption during construction can be significantly reduced through use of unique phasing opportunities. In many cases, contractors have been able to repair the subgrade and return the roadway to full service within one construction shift.

Over the past 10 years, several transportation agencies have recognized the benefits of this technology and installed PCP systems in a variety of applications. Because it is a relatively recent technology, however, information on precast pavement practices and PCP performance has not been well documented. In addition, most PCP systems are proprietary, so state transportation departments have often found them difficult to specify.

The objective of the research from the second Strategic Highway Research Program (SHRP2) was to fill this gap in knowledge by developing guidelines and tools for public agencies to use in the selection, design, construction, installation, and maintenance of PCP systems, and to provide the tools for cost/benefit assessment in situations where the technology may apply.

Precast Concrete Pavement Technology

The Solution

Because PCP systems are a recent technology, there was insufficient data on their use over an extended period of time, with gaps in knowledge regarding durability and performance at the joints and panels. Additionally, unrealistic expectations about PCPs as “super pavements” potentially could undermine the success of the technology. To address these issues, SHRP2 investigated 16 PCP projects at locations with a wide range of climates (from Michigan to Texas) and assessed how the PCP systems were used (on ramps, toll plazas, at-grade roadways, and airports). Field surveys included short, intermittent repairs as well as longer, continuous applications.



Precast concrete pavement saves time and money

FOCUS AREA:
Renewal (R05)

Tools to match the right pavement installation options to the project, as well as specifications for design, fabrication, and installation of precast concrete pavement systems.

Save Lives

- Shorter construction period means less exposure to work zone hazards for drivers and construction workers.



Save Money

- Installation costs for PCP are slightly higher than alternative CIP solutions, but can result in significant savings because of reduced installation time and traffic maintenance costs.



Save Time

- PCP enables rapid installation and quality control, and roadways can often remain partially open during the installation process for reduced congestion and minimal impact to users.



SHRP2's research found that modular pavement technology is still evolving, but that over the 10 years it has been used, **well-designed and well-constructed PCP systems can provide high-quality, long-term service and are often a good choice for rapid repair and rehabilitation of existing pavements**. These new guidelines provide transportation agencies with tools that can match the PCP installation technology to the project, while providing clear specifications for PCP design, fabrication, and installation, as well as model specifications.

The Benefits

PCP pavement provides the opportunity for significantly reducing traffic impacts of roadway reconstruction projects, particularly on heavily traveled routes. The technology has applications both in small segments to allow flexibility in construction phasing, as well as use for corridor-wide pavement reconstruction. This tool will support the continued growth and understanding of the use of PCP for roadway construction. Some benefits are:

- ▶ Shorter installation time means reduced traffic impacts.
- ▶ Safety of drivers and construction workers improves due to reducing the frequency and duration of work zones.
- ▶ Pavement is ready for traffic upon installation—no curing time.
- ▶ Slabs are cast in place under ideal conditions for optimum quality.
- ▶ Installation can take place at night or under adverse weather conditions, extending the construction season.
- ▶ Durability can be similar to or better than traditional cast-in-place (CIP) solutions.

Who is using these modified pavement technologies?

PCP systems are in place across the country. Here are just a few examples:

Agency	System	Projects
Caltrans	Precast, prestressed, and jointed PCP (Caltrans designed)	I-680 (prestressed system) I-15 (jointed system) and other locations
Illinois Tollway	Jointed PCP for repairs (Tollway designed and Fort Miller Co. systems)	Several projects in the Chicago area
Iowa Department of Transportation (DOT)	Precast, prestressed, and jointed PCP for approach slabs	Highway 60 near Sheldon, IA Iowa 43 near Denver, IA
New Jersey DOT	Jointed PCP for repairs (Fort Miller Co. systems)	Several projects along I-95 and other primary roadways
Utah DOT	Utah DOT-designed Fort Miller Co. systems	I-15 and other locations
Virginia DOT	Precast, prestressed (Virginia DOT designed) Jointed (Fort Miller Co. systems)	Fairfax County, VA; I-66 mainline (prestressed system); I-66 ramp (jointed system)

How can you learn more?

For more information, contact Sam Tyson at FHWA, styson@dot.gov, or Jameelah Hayes at AASHTO, jhayes@aashto.org.

Additional resources include a project overview on the TRB website at

<http://apps.trb.org/cmsfeed/trbnetprojectdisplay.asp?projectid=2169> and a report, *Precast Concrete Pavement Technology*, available at <http://www.trb.org/Main/Blurbs/167788.aspx>.

About SHRP2 Implementation



The second Strategic Highway Research Program is a national partnership of key transportation organizations: the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. Together, these partners conduct research and deploy products that will help the transportation community enhance the productivity, boost the efficiency, increase the safety, and improve the reliability of the Nation's highway system.

Strategic Highway Research Program

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