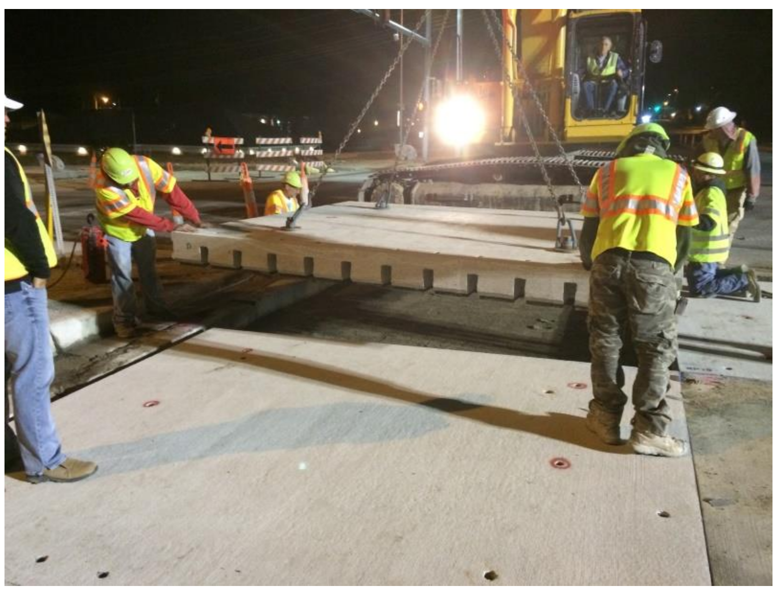
FHWA REPORT NO. FHWA-HIF-17-005

FHWA PROJECT R05 IAP FUNDED PROJECT CASE STUDY

LEAVENWORTH PRECAST CONCRETE PAVEMENT DEMONSTRATION PROJECT



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16. Abstract

The production use of precast concrete pavement (PCP) has come a long way over the last 15 years. The technology is gaining wider acceptance in the U.S. for rapid repair and rehabilitation of concrete pavements as well as for heavily trafficked asphalt concrete pavements and intersections. Several U.S. highway agencies have implemented the PCP technology, and other agencies have constructed demonstration projects.

In the U.S., the PCP technology is being used for intermittent repairs (full-depth joint repairs or full panel replacement) and for continuous applications (longer length/wider area rehabilitation) with service life expectations of at least 20 years for intermittent repairs and at least 40 years for continuous applications, without significant future corrective treatment.

Strategic Highway Research Program 2 (SHRP2) Project R05 was conducted from 2008 to 2012 to develop technical information and guidelines that would encourage the rapid and successful adoption of PCP technology. In 2013, the SHRP2 Implementation Assistance Program (IAP) was created to help state highway agencies, metropolitan planning organizations, and other interested organizations deploy SHRP2-developed products to deliver more efficient, cost-effective solutions to meet the complex challenges facing transportation agencies. On March 28, 2014, as part of round 3 of the IAP, four lead adopters were selected to receive financial support from the Federal Highway Administration for implementation of PCP technology. Kansas Department of Transportation, one of the agencies selected as a lead adopter, received an award of $300,000 to help offset the cost of the implementation of PCP technology in the State.

This case study report provides details of the 2015 PCP use for rehabilitation of two distressed concrete pavement intersections and a bridge approach section along US 73 in Leavenworth, Kansas.

17. Key Words Bridge approach slab, intersection rehabilitation, precast concrete pavement system, construction, pavement rehabilitation, SHRP2, SHRP2 Project R05		18. Distribution Statement No restriction.	
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MODERN METRIC CONVERSION FACTORS

Conversion factors both to and from the modern metric International System of Units (SI) can be found at: http://www.fhwa.dot.gov/publications/convtabl.cfm.

ABBREVIATIONS AND ACRONYMS

AADT	Annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
DOT	Department of transportation
FHWA	Federal Highway Administration
FMC	Fort Miller Company, Inc.
IAP	Implementation Assistance Program
PCP	Precast concrete pavement
SHRP2	Strategic Highway Research Program 2

INTRODUCTION

The production use of precast concrete pavement (PCP) has come a long way over the last 15 years. The technology is gaining wider acceptance in the U.S. for rapid repair and rehabilitation of concrete pavements as well as for heavily trafficked asphalt concrete pavements and intersections. Several U.S. highway agencies—including Caltrans, Illinois Tollway, and the New Jersey, New York, and Utah State Departments of Transportation (DOTs)—have implemented the PCP technology, and other agencies have constructed demonstration projects. There have also been many advances in the design, panel fabrication, and panel installation aspects of the PCP technology.

In the U.S., the PCP technology is being used for intermittent repairs (full-depth joint repairs or full panel replacement) and for continuous applications (longer length/wider area rehabilitation) with service life expectations of at least 20 years for intermittent repairs and at least 40 years for continuous applications, without significant future corrective treatment.

PCP technology can significantly reduce traffic impacts of roadway repair and reconstruction projects, particularly on heavily traveled routes. The technology is applicable to small segments, enabling flexibility in construction phasing, as well as for use in corridor-wide pavement reconstruction.

SHRP2 PROJECT R05 BACKGROUND

Because the information on PCP technology was not well documented, in 2007 the Strategic Highway Research Program 2 (SHRP2) initiated Project R05 to develop the necessary technical information and guidelines that would encourage the rapid and successful adoption of this new technology. The Project R05 study was conducted from 2008 to 2012. The final report, Precast Concrete Pavement Technology, is available at http://www.trb.org/main/blurbs/167788.aspx. The study demonstrated that the PCP technology is ready for wider implementation and that many of the PCP systems available in the U.S. can meet the needs of highway agencies for rapid renewal of their highway systems. The following products were developed under SHRP2 Project R05:

- Overall findings related to viability of the PCP technology.
- Findings based on SHRP2 field testing.
- Guidelines for PCP project selection.
- Guidelines for PCP system acceptance.
- Guidelines for design of PCP systems.
- Guidelines for PCP fabrication.
- Guidelines for PCP installation.
- Implementation plan for PCP technology.
- Long-term monitoring plan for PCP projects.
- Model specifications.

The review of projects constructed in the U.S. and the SHRP2 field testing indicated that sufficient advances have been made to reliably design and construct PCP systems to achieve five key attributes of successful pavements, as follows:

- Constructability—Techniques and equipment are available to ensure acceptable production rates for the installation of PCP systems.
- Concrete durability—Plant fabrication of precast panels results in excellent concrete strength and durability.
- Load transfer at joints—Reliable and economical techniques are available to provide effective load transfer at transverse joints in jointed PCP systems and post-tensioned PCP systems.
- Panel support—Techniques to provide adequate and uniform base support conditions continue to be improved.
- Efficiency—Panels are thinner than standard cast-in-place concrete and last longer because of prestressing and/or reinforcing elements in the PCP system.

SHRP2 PROJECT R05 PRODUCT IMPLEMENTATION PROGRAM

In 2013, the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO) created the SHRP2 Implementation Assistance Program (IAP) to help State DOTs, metropolitan planning organizations, and other interested organizations deploy SHRP2-developed products to deliver more efficient, cost-effective solutions to meet complex challenges. Seven rounds of the IAP were offered between February 2013 and April 2016.

On March 28, 2014, as part of round 3 of the IAP, four lead adopters were selected to receive financial support from the FHWA for implementation of PCP technology. Kansas DOT, one of the agencies selected as a lead adopter, received an award of $300,000 to help offset the cost of the implementation of PCP technology in the State. The objective of the award was to allow Kansas DOT to construct a demonstration project that would provide a learning environment for operations such as fabricating panels, setting panels, installing dowel bars, grouting under panel areas, and other related activities needed to implement precast panel installations in Kansas. The IAP funding helped offset a portion of the funds for the pavement rehabilitation using PCP for a production project.

This case study report provides details of the PCP implementation to rehabilitate two distressed concrete pavement intersections and a bridge approach section along US 73 in Leavenworth, Kansas. The intersections were located at the entrances to Fort Leavenworth. A test section was constructed in July 2015. Full installation began in October and was completed by the end of November 2015.

PROJECT DETAILS

PROJECT DESCRIPTION

The project was part of pavement reconstruction along US 73 (Metropolitan Avenue) in Leavenworth, Kansas. The concrete pavement along the project had been overlaid twice and was exhibiting significant distresses at the time of reconstruction. The concrete pavement, over 67,000 square yards, had been designated to be rehabilitated using cast-in-place concrete. However, the roadway at the 4th Street and 7th Street intersections and from station 193+99 to the Centennial Bridge over the Missouri River, about 4,555 square yards, was reconstructed using precast concrete panels. The highway is adjacent to Fort Leavenworth, and the two intersections serve as the primary entrances to the fort. Because of the importance of maintaining traffic to the fort at all times, extended lane closures at the intersections were not desirable. Any lane closures for any pavement rehabilitation work at these intersections needed to be kept to a minimum.

The project locations for installation of precast concrete panels are shown in figures 1 and 2. As of 2015, the annual average daily traffic (AADT) along the project site was about 12,000 vehicles/day with about 600 trucks/day.

Figure 1. Photo. Three locations along US 73 where precast concrete panels were installed.


Figure 2. Photos. Views of the two intersections and the bridge approach section.

In the past, the concrete pavement along US 73 (KS 92) was rehabilitated using rapid setting cast-in-place concrete at intermittent locations or using asphalt concrete overlays. However, because of the need for longer-lasting treatments and the need to keep the lane closures to a minimum, Kansas DOT considered implementing the PCP technology for this project at the two intersections and the bridge approach section, utilizing the SHRP2 IAP funding to offset the cost of using PCP for the repair work.

The PCP project was awarded to Miles Excavating, Inc. The project work consisted of fabricating, furnishing, and installing precast concrete panels in accordance with the project plans and specification. The work included performing a detailed field survey, preparing the required submittals, removing the existing concrete pavement, constructing a new cement-treated base, grading and compacting the cemented bedding material layer, installing dowel bars, placing panels, installing dowel grout in the bottom slots and along joint gaps, installing undersealing grout under the panels, and performing diamond grinding.

The project specification allowed for the use of a grade-supported PCP system or a grout-supported PCP system. The grade-supported systems are placed directly on a prepared support, typically an existing or new base and a thin bedding layer. The grout-supported systems typically use a leveling system to set the panels at the desired elevation while maintaining a gap of about ¼ to ½ inch between the panel bottom and the base surface. The gap is filled with a rapid setting high strength grout material. The contractor elected to use a grade supported system designed by the Fort Miller Company, Inc. (FMC).

The project details included the following:

- State Project No.: U073-052 KA 3529-02.
- Project owner: Kansas DOT.
- Prime contractor: Miles Excavating Inc.
- PCP system designer: FMC, Schuylerville, New York.
- Panel precaster: Forterra Pipe and Precast (Forterra) (previously Cretex Concrete Products, Inc.), Shawnee, Kansas.
- Project plans and specification: Kansas DOT.
- Dowel slot grout: Dayton Superior HD 40.
- Panel undersealing grout: Generic cement slurry.

PAVEMENT DETAILS

The original pavement (two lanes plus turn lanes in each direction at the two intersections and narrowing to one lane in each direction at the bridge) is a 9-inch-thick jointed concrete pavement that was constructed between 1987 and 1989. The details of the pavement rehabilitation are as follows:

- Existing concrete pavement.
  - Slab thickness: 9 inches.
  - Base: 4-inch-thick cement-treated base.
- Number of lanes rehabilitated:
  - Up to four lanes in each direction at the two intersections.

- One lane in each direction at the bridge approach.
- Total number of panels installed: 294 (4,555 square yards).
  - Width: 6 to 16 feet.
  - Length: 6 to 16 feet.
  - Thickness: 9 1/8 inches.
- New base: cement-treated base, 4 in. thick.
- Bedding layer over the base: cemented sand (one part cement to eight parts sand).
- Joint load transfer: 14-inch-long dowel bars uniformly spaced at 12 inches; dowel diameter of 1.25 inches.
- Tie-bar use: headed tie bars along longitudinal joints.
  - Precast panel to precast panel.
  - Precast panel to new cast-in-place curb and gutter.
- Dowel bar and tie-bar slot grout: capable of being pumped into the slots; a minimum compressive strength of 2,500 psi before the panels are open to traffic and a minimum compressive strength of 4,000 psi at 28 days.
- Panel undersealing grout: to develop a minimum compressive strength of 575 psi in 24 hours.
- Finishing activity: Grind all PCP surfaces.

Figures 3 through 5 show the precast panel layouts for the three locations where the precast panels were used.

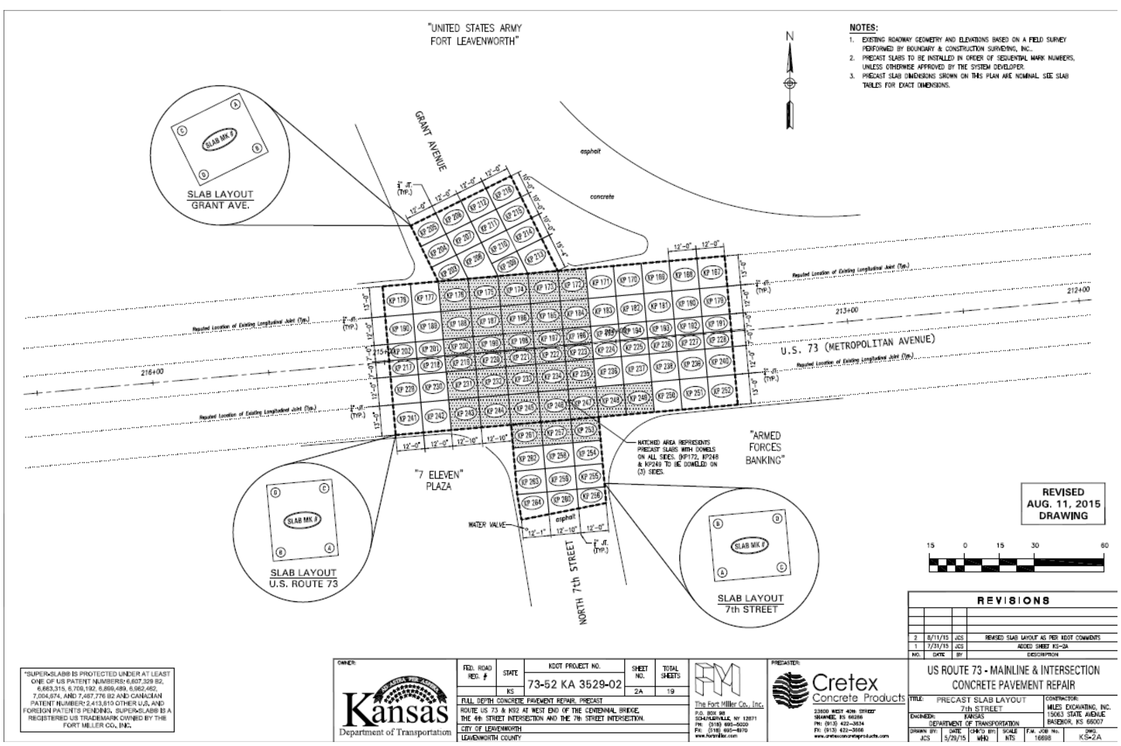

Figure 3. Diagram. Panel layout at the intersection of US 73 and 7th Street.

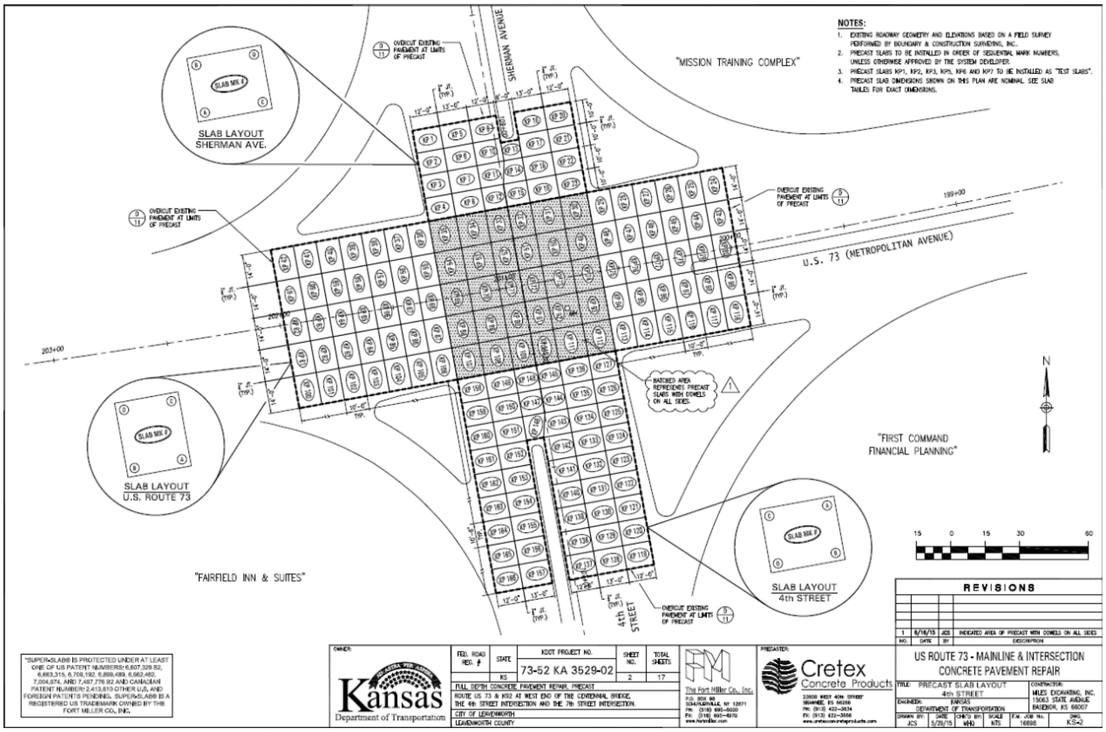

Figure 4. Diagram. Panel layout at the intersection of US 73 and 4th Street.

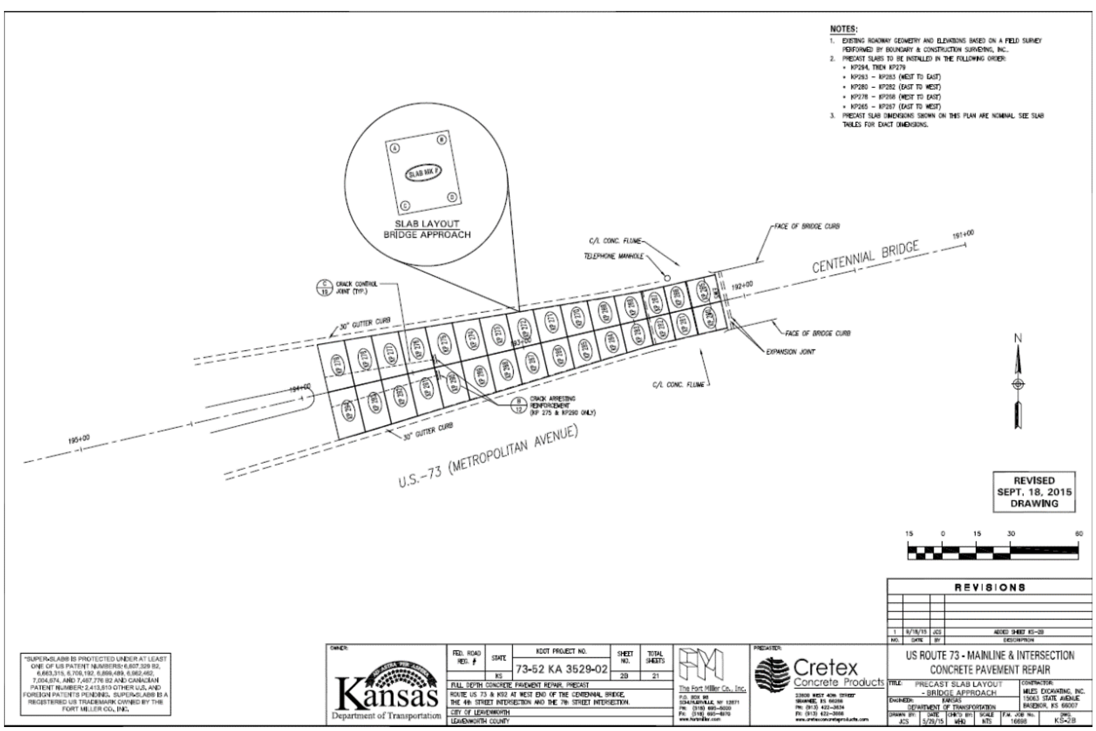

Figure 5. Diagram. Panel layout at the approach to Centennial Bridge.

PRECAST CONCRETE PAVEMENT SYSTEM USED

The Super Slab system used for this project is a proprietary system developed in 2001. Since 2001, several highway agencies have used the Super Slab system for intermittent concrete pavement repairs and for rehabilitation of concrete and asphalt pavements. The Super Slab system consists of the following components.

Reinforced Precast Panels

The panels are fabricated in an approved precast concrete plant, always using steel forms. When the panels are produced by another FMC-approved precaster, FMC typically leases a set of forms to the precaster and provides training in form setup, casting, finishing, foam gasket installation, storage, and shipment to the job site. A typical form setup for a Super Slab panel is shown in figure 6. Figure 7 shows the stripping of the forms at about 16 hours after concrete placement.

Figure 6. Photo. Super Slab panel form setup

Figure 7. Photo. Super Slab panel form stripping.

The Super Slab panels incorporate the following features:

- Transverse joint load transfer system that uses bottom slots, as shown in figure 8. For intermittent single-panel repairs, the panels incorporate bottom dowel slots along both transverse sides of the panel. For continuous application, one side of the panel has the bottom dowel slots and the other side has embedded dowel bars.
- Bottom slots along the longitudinal sides to accommodate use of tie-bars when required by project plans.
- Undersealing grout distribution system consisting of half-round channels cast in the bottom of the slab (that extend from one end of the slab to the other) bounded and separated by foam attached to the bottom of the slab.
- A set of four lifting inserts.
- Grout ports over the dowel slots.
- Grout ports for the undersealing grout, located over the grout distribution channels.
- Foam gaskets that line the dowel slots and the grout distribution channels at the panel bottom, as shown in figure 8.
- Panel surface finishing as per the project plans and specification requirements.

Figure 8. Photo. Dowel bar slots and foam gaskets at the panel bottom.

Bedding Layer

The bedding layer, also known as “stone dust” or screenings, is placed over the compacted and graded base. The use of the bedding layer helps achieve a smoother surface on which to place the panels, minimizing point-to-point contacts. FMC’s recommended gradation of the bedding material is shown in table 1.

Table 1. Bedding material gradation.

Sieve Size	Percent Passing by Weight
½-inch maximum	100
No. 4	80-100
No. 10	55-75
No. 40	10-40
No. 200	0-20

The bedding layer is compacted and graded using specialized laser or otherwise mechanically controlled grading devices to achieve a three-dimensional panel support surface that matches the finished panel surface and is theoretically correct to within a tolerance of +/- 1/8 inch. The bedding layer is typically less than ½ inch. Some recent projects using the Super Slab system have used cemented bedding material to ensure stability.

Dowel Slot Grout

A pre-bagged dowel and tie bar grout is used to fill the bottom slots. The grout is a pumpable, rapid-setting non-shrink structural grout. Typical specifications require the bottom slot grout to achieve compressive strength of 2,500 psi at the time of opening to traffic. Figure 9 shows a core taken above a dowel slot showing the hardened grout completely filling the slot around the dowel.

Figure 9. Photo. Bottom slot filled with grout.

Undersealing Grout

A non-structural bedding grout is used for undersealing below the panel to ensure full contact of the panel bottom with the base. The grout is pumped through the grout ports at one end of each grout channel until it exudes from a grout port at the other end of the same channel.

Installation

The Super Slab system can be used to produce non-planar (warped) panels using a patented process. The use of the Super Slab system requires the repaired/rehabilitated roadway to be ground to ensure a smoother pavement surface. The following are the Super Slab system installation steps:

1. Mark repair limits (engineer) and measure existing lane width (contractor).
2. Remove existing pavement.
3. Drill and epoxy-grout dowel bars in the existing pavement joint faces.
    a. For repair application, do this along both sides of the existing pavement
    b. For continuous application, do this along the approach and leave sides of the pavement rehabilitation area.

4. Prepare existing base or new base (grade and compact).
5. Place bedding layer. Grade and compact the bedding layer.
6. Set panels over the prepared bedding layer, with the bottom slots located over the dowel bars in the existing pavement or in the adjacent panels.
7. For continuous application, maintain the transverse joint widths as small as possible.
8. Open to traffic
9. During a later lane closure:
    a. Fill the bottom dowel bar slots using the dowel slot grout.
    b. Apply the panel undersealing grout.
    c. Complete finishing activities.
    d. Open to traffic.

The Super Slab system panel installation is shown in figure 10.

Figure 10. Photo. Super Slab system panel installation.

CONSTRUCTION STAGING AND TRAFFIC-RELATED REQUIREMENTS

Traffic on US 73 was carried throughout construction. The traffic was maintained in normal alignments outside of the traffic zones under construction. A minimum of one lane in each direction was maintained through the work zones. No through traffic was closer than 6 feet from the edge drop-off of more than 2 inches. The timeframe for the PCP construction ranged from 7:00 pm to 5:00 am. Construction traffic management was an integral part of the PCP work. The roadway was opened to full traffic during the hours of 5:00 am to 7:00 pm.

The project contract required the PCP work to be completed along designated sections within 30 days. The penalty schedule for extended lane closures was as follows:

- $2,000 per day past 30 days of lane closures for each section.
- $2,000 per 30 minutes for lane closures past 5:00 am at the precast panel installations.

Before the field installation work started, Kansas DOT conducted extensive public awareness activities, including posting the project description and regular updates at the DOT's website.

PANEL FABRICATION

Forterra fabricated the panels at their plant in Oskaloosa, Kansas, a distance of about 25 miles. The panels were stored at the facility until they were needed for installation. The panels were fabricated based on shop drawings prepared by FMC and approved by Kansas DOT. The panels included both planar panels and non-planar (warped) panels because of the varying geometrics at the three panel installation locations. The panel formwork provided by FMC to Forterra was used to fabricate non-planar panels. A summary of the panel fabrication requirements is given below:

1. Concrete mixture to meet the requirements of a Special Provision to the Standard Specification 07-04002 (latest revision) and having a minimum 28-day compressive strength of 4,000 psi. Concrete aggregates to meet the requirements listed in a Special Provision to the Standard Specification 07-11004 (latest revision).
2. Use of epoxy-coated steel reinforcement that result in a ratio of the streel area to the concrete area of at least 0.0018 inch both directions and bar spacing in both direction to not exceed 18 inches.
3. Casting panels to meet the tolerances given in table 2.
4. Applying curing compound immediately after removal from the forms.
5. Removing any curing compound or other deleterious material from all dowel bar blockouts and other bonding surfaces by sand-blasting or other approved means.
6. Finishing panel surfaces with a uniform broom finish.

Table 2. Panel geometry tolerances.

Material	Proportion
Length	+/- 1/4 inch
Width	-1/8 inch +1/4 inch
Thickness	+/-1/8 inch
Squareness	+/-1/4 inch
Dowel bar insert	+/-1/4 inch
Grout cavity insert	+/-1 inch
Grout port/lift port locations	+/-3 inch

As part of the panel fabrication process, the ready-mixed concrete was regularly tested for fresh properties and for strength. The concrete typically exceeded the design compressive strength of 4,000 psi at 28 days and typically exceeded 3,000 psi at about 16 hours to allow for panel form stripping.

Kansas DOT performed extensive concrete-related testing before panel production work, to eliminate any concern with premature deterioration of the panel concrete. Premature deterioration of concrete at the joints in concrete pavements and parking lots has been observed in Kansas. The distress is first observed as shadowing when microcracking near the joints traps water, later exhibiting as significant loss of material. Not all roadways are distressed, but the problem is common enough to warrant attention for new construction. The concrete distress is generally a combination of marginal factors rather than a single bad parameter in the concrete. These factors include the following:

- Locally saturated concrete.
- Air content below 5 percent.
- Water to cementitious materials ratio (w/cm) above 0.40.
- Aggressive use of deicing salts.
- Marginal or slowly D-cracking aggregates.

Because of concerns with concrete durability, Kansas DOT established the following specific concrete requirements for this project:

- Air content at point of placement > 5 percent.
- Spacing factor < 0.008 inch.
- Low permeability.

Panel production began in June 2015 and was essentially completed by mid-October 2015. A few additional panels were fabricated after that to replace a few panels along the bridge approach section. Figure 11 shows a typical panel formwork setup at the Forterra plant. Figure 12 shows a close-up view of the panel formwork setup. Figure 13 shows concrete placement in the panel formwork.

The panel production schedule is shown in figure 14. Figure 14 also shows the rate of panel shipment to the project site. Although a few panels were used for the test section installation, panels were shipped for production work from early October to mid-November 2015. It can be seen from figure 14 that a good backlog of panels needs to be produced before the start of panel installation.

Figure 11. Photo. Panel formwork setup.

Figure 12. Photo. Close-up view of the panel formwork setup.

Figure 13. Photo. Concrete placement in the panel formwork.

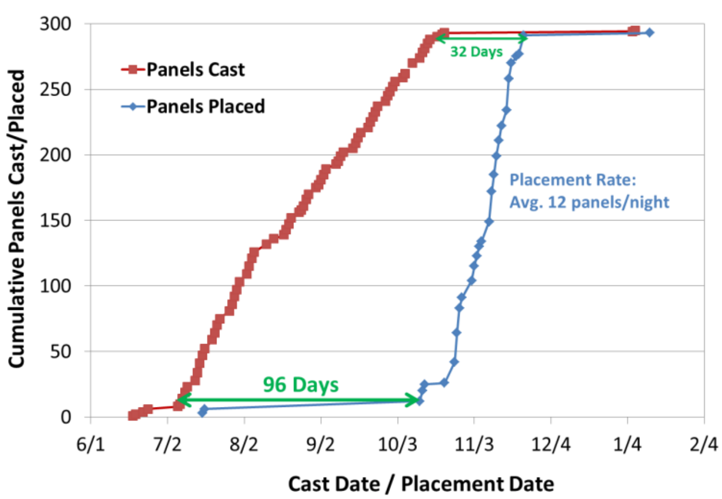

Figure 14. Graph. Panel fabrication and panel installation rates.

PANEL INSTALLATION

The project specification required construction, within the project limits, of a test section incorporating at least five panels. The test section was constructed in June 2015 during the daytime. The test section work generally progressed well and was considered acceptable.

Panels were installed primarily from early October to mid-November 2015. A few panels were installed after that to replace panels at the end of the bridge approach section. The required panels were delivered nightly from Forterra's precast plant. The panel installation order was as follows:

1. Intersection at 4th Street.
2. Intersection at 7th Street.
3. Bridge approach section.

The project specification required the panels to be installed within the following tolerances:

- The vertical differential between adjacent precast panels across any joint to be ¼ inch or less.
- Transverse joint width between adjacent panels to not exceed ¼ inch.
- Longitudinal joint width between adjacent panels to not exceed ¼ inch.
- Longitudinal joint width between new panels and existing pavement to not exceed ¾ inch.

The project specification allowed grade-supported panels to be opened to traffic as long as the bedding layer had been accurately graded and fully compacted prior to panel placement. The dowel bar slot grout, also applied along the perimeter joint gap, and the panel undersealing grout were required to be installed as soon as possible after panel installation. If the panels were opened to traffic before installation of the dowel bar slot grout, shims were required to be placed in joints to prevent adjacent panels from touching under traffic.

The panel installation process was as follows:

1. Closures were initiated to cover the length designated for repair during any given nighttime lane closures. One lane of traffic was maintained within the lane closure area.
2. The existing distressed concrete slabs and the asphalt concrete base were removed.
3. The subgrade/subbase was graded and compacted.
4. The cement-treated base was placed, graded, and compacted.
5. The cemented bedding layer, brought to the project site in ready-mixed concrete trucks, was placed graded and compacted. The bedding layer placement is shown in figure 15. The bedding layer was fine-graded using a mechanically operated screeding device. The bedding layer grade was checked to ensure it did not vary from the theoretical elevation by more than +1/8 inch within the length of each panel. The bedding layer was lightly wetted just before panel placement.

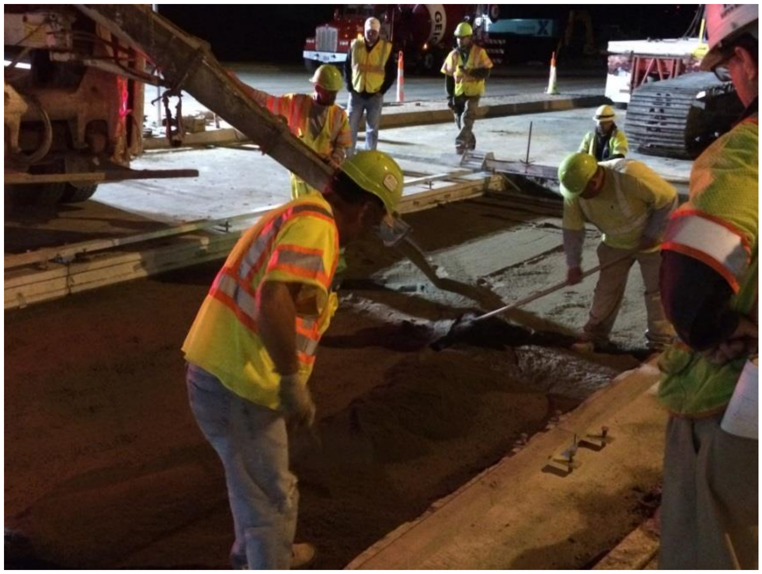

Figure 15. Photo. Placement of the cemented bedding layer.

6. The panels were delivered each night by trucks to the repair area and installed. Figure 16 shows panels on a truck at the project site. Figure 17 shows a typical panel placement operation, and figure 18 shows the installed panel.

   The installed panels were typically opened to traffic the next morning. The dowel bar slot grouting and the panel undersealing work were performed during subsequent lane closures.

Figure 16. Photo. Panels on a delivery truck.

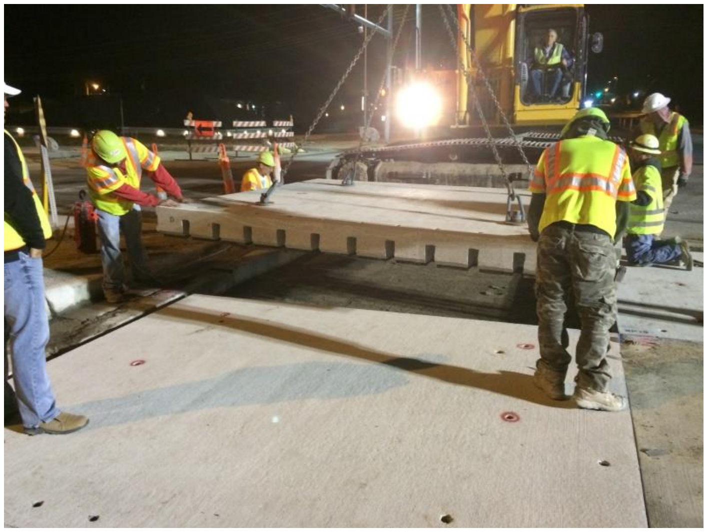

Figure 17. Photo. A typical panel placement.

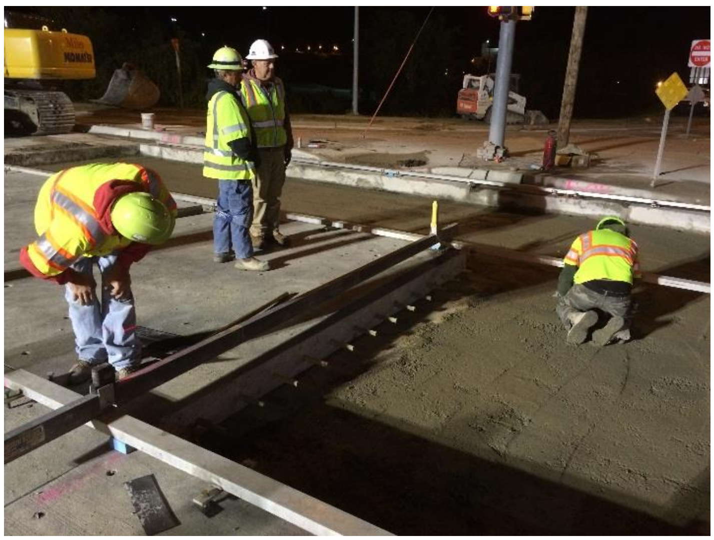

Figure 18. Photo. Installed panel.

7. During a subsequent lane closure, the dowel slot grout was mixed and introduced into the dowel slots through the grout ports and allowed to fill the transverse joint flush with the panel surface. The grout was simultaneously applied along the transverse and longitudinal joint gaps to be level with the panel surface.
8. The undersealing grout was mixed and applied.
9. Finishing activities were performed.
10. The installed panel areas were opened to traffic. Figures 19 through 21 show the three completed PCP areas.
11. The installed PCP surfaces were ground after a few weeks, as required by the project specification.

Figure 19. Photo. View northeast of the completed intersection at 4th Street.

Figure 20. Photo. View northwest of the completed intersection at 7th Street.

Figure 21. Photo. View east toward the completed bridge approach section.

LESSONS LEARNED

The use of the PCP technology on a production pavement rehabilitation project was an important step for Kansas DOT. This was the first application of the PCP technology by Kansas DOT in a challenging setting where daytime traffic operations needed to be maintained along an important highway with intersections serving as entrances to Fort Leavenworth. Based on a discussion with Kansas DOT staff, the following items were identified for consideration for future PCP projects:

- The PCP cost was not high compared to high early strength concrete used in Kansas for rapid concrete pavement rehabilitation.
- The concrete used for the panels is capable of meeting Kansas DOT's needs related to durability while meeting the precaster's need for early strength to allow form stripping within about 16 hours.
- The contractor's crews can gear up quickly to install the panels at an efficient pace.
- Replacement of panels due to damage or other reasons is possible with minimal disturbance to adjacent panels.
- Grinding should not be counted on to correct surface elevation irregularities at joints. The PCP specification should be reviewed to reconsider the allowable elevation difference between adjacent panels.

SUMMARY

The US 73 rehabilitation project in Leavenworth, Kansas, is considered a successful implementation of the PCP technology on a production basis by an agency that had not constructed a PCP project previously.

ACKNOWLEDGMENTS

The support of the Kansas DOT staff, particularly Will Lindquist, P.E., and Susan Barker, P.E., during the data collection for this report and the construction site visits is gratefully acknowledged.

APPENDIX A. KANSAS PCP PROJECT OPEN HOUSE

An open house was held on Wednesday, April 6, 2016. The open house included a workshop on PCP technology and the Kansas DOT's PCP project. The workshop was followed by a visit to the PCP project site.

The open house, open to anyone at no cost, was attended by over 75 professionals from Kansas DOT, FHWA, State DOTs, the concrete pavement industry, and consulting engineers. The project flyer is shown in figure 22.

Figure 22. Text and photos. Kansas DOT Open House flyer.

The open house agenda is provided on the following page.

AGENDA

9:00–9:05 am: Introduction and Welcome by Kansas DOT
Catherine Patrick, Kansas DOT Director of Operations

9:05–9:15 am: Welcome by FHWA and FHWA/SHRP2 Implementation Assistance Program Overview
Tom Deddens, FHWA Kansas Division, and Sam Tyson, FHWA HQ

9:15–9:45 am: Precast Concrete Pavement Implementation Overview
Shiraz Tayabji, Applied Research Associates, Inc.

9:45–10:00 am: Kansas DOT Perspective—Leavenworth Project Overview
Paul Gripka, Kansas DOT Design-Build Project Manager

10:00–10:20 am: Break

10:20–10:45 am: Precaster Perspective—Project Overview
Dave Junk, Precast Concrete Consultant, The Fort Miller Company, Inc.

10:45–11:15 am: Concrete Production and Panel Placement (including videos)
Will Lindquist, Kansas DOT Concrete Research Engineer

11:15–11:45 am: Concrete Production and Placement Lessons Learned
Forterra (formerly Cretex Concrete Products) and Miles Excavating, Inc.

12:00–1:15 pm: Lunch

1:15–1:30 pm: Site Visit Instructions

1:30–3:00 pm: Site Visit