



REPRINT | PRECAST CONCRETE ELEMENTS

Precast Elements Provide a Model for Rapid Bridge Replacement

REPRINT  
CPI 04/17



-  Abcic  
Asociación Interamericana de Cementos  
Interamerican Association of Cement
-  ABTC
-  ACI  
American Concrete Institute
-  American Concrete Pipe Association
-  bim
-  British Precast Member
-  ICI
-  icpi  
Interlocking Concrete  
Precast Institute
-  IPHA  
INTERNATIONAL PRESTRESSED  
HOLLOWCORE ASSOCIATION
-  PCI  
Precast/Prestressed Concrete Institute
-  NATIONAL PRECAST
-  NPCA  
National Precast Concrete Association
-  NZCS
-  PCI
-  precast.com.cn

Hamilton Form Company, Ltd, Fort Worth, TX 76118, USA

# Precast Elements Provide a Model for Rapid Bridge Replacement

**With over 6,000 bridges listed as structurally deficient and as many as 300 being added to that designation each year, the state of Pennsylvania, needed to take bold action to tackle a growing infrastructure problem. By restructuring the state's gas tax, increasing fees and structuring a new P3 initiative (public private partnership), the state is finally making an impact. One of the keys to the success of the program is the use of standardized design using pre-stressed concrete components.**

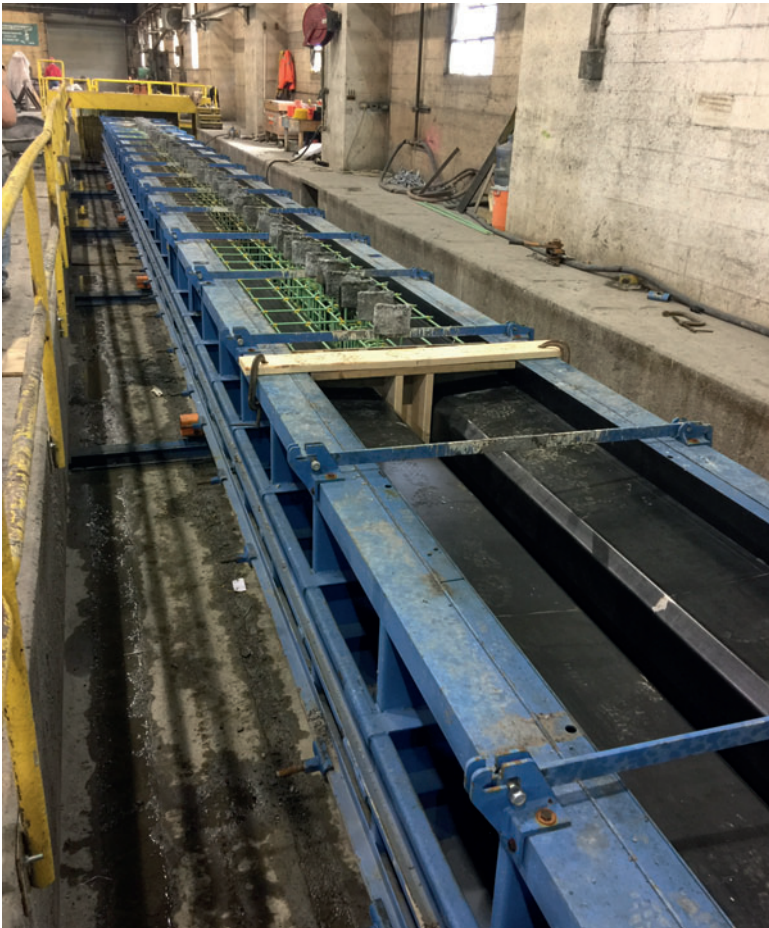
In the USA, both citizens and politicians are painfully aware of the country's crumbling infrastructure. In many states, motorist

use roads and bridges that are in dire need of repair and replacement. In terms of bridge deficiency, Pennsylvania was one of the worst states in the country. In 2015, the Pennsylvania Transportation Department estimated as many as 6,000 bridges were structurally deficient and in need of replacement or rehabilitation.

To tackle this problem, officials bundled 559 small to medium-size bridges into a single contract. The project was awarded to a consortium known as Plenary Walsh Keystone Partners (PWKP). The partners finance, design, construct, and maintain the bridges for a 28-year term.



Wall Form



*Beam Form at NPP*

Most of the bridges in the contract average 60 feet in length and are on secondary state highways and rural areas. While the bridges' functional designs vary based on geography and other variables, standard designs and the use of prefabricated prestressed concrete components have minimized replacement time, cut construction costs and long-term maintenance costs. With these and other efficiencies, the average cost to design, build, and maintain each bridge is roughly 20% less than the expected lifetime cost of a comparable project.

The prestressed products for the project were awarded to Northeast Prestressed Products (NPP) in Cressona, PA. The majority of the bridges under contract were made with precast/prestressed box beams. The volume and the schedule to produce the beams would require the plant to dedicate a new line to producing those beams. Dennis Fink, Vice President of NPP has been the chairman of the Precast/Prestressed Concrete Institute's (PCI) Productivity Committee and is known for his ability to improve the production process of precast concrete. He partnered with Hamilton Form Company of Fort Worth, TX to design forms with features to improve plant efficiency.

Most of the bridges called for 36" box beams. To produce those beams, Hamilton Form supplied NPP with 304 bed feet of a 36" tall beam form. Because the form requires minimal adjustability, one side is fixed to the pallet, eliminating the need for top ties to lock the side forms in place during the pour and then removed and cleaned before the next pour. The other side form has a flex-back release system. The flex back release allows the product to be stripped without manually unbolting and moving the sides away from the pallet, saving labor as well as crane time. Bolt-on risers were provided to allow the height of the beam to be increased when required.

The bridge deck panels were cast on a self-stressing steel casting table also by Hamilton Form. The casting table was located in a tight area in the plant. To work the bed, Hamilton Form built a custom designed utility machine. The machine oils the form and pulls strand for set-up. The machine is also outfitted with a brush to sweep the form after stripping. Dennis Fink at NPP comments, "The brush/oiler/strand puller machine's versatility made our deck panel production more efficient by combining three functions into one perfect solution to reduce manpower needs while fitting in to a tight production space." Plant safety was also improved with one man operating the machine instead of a crew working in the area.

Other forms supplied for the project included a small bulb tee line and two battery molds used to cast walls. The bulb tee side forms are installed on a roll back system, making it easy and again, eliminating the use of a crane to move the side forms for set-up and stripping. The battery molds are in-



*Brush/Oiler/Strand Puller Machine*

stalled on a sleeper system so that one side of the form is moved back for stripping while the other side remains stationary. The stationary side has a working platform to allow access at the top of the form for workers. The catwalk stays attached to the side forms for daily set-up and stripping, but can be easily removed if needed.

"Standardized products eliminated the need for constant form change overs in the plant," noted Dennis Fink, "and the form work developed by Hamilton Form helped us improve efficiencies in the plant."

Pennsylvania's bridge replacement work began during the summer of 2015. By the end of 2016, crews finished over 170 bridges. In 2017, nearly 200 more bridges are slated for replacement. The project is expected to be completed in 2018.

The key to this rapid repair and replacement project is the use of standardized precast/prestressed bridge elements. Pennsylvania's rapid bridge replacement program is "very replicable," says Michael Bonini, director of the PennDOT P3 program. Other states already have expressed an interest in the program, paving the way for similar projects in the future. ■

### FURTHER INFORMATION



Hamilton Form Company, Ltd  
7009 Midway Rd., Fort Worth, TX 76118, USA  
T +1 817 590 2111  
[sales@hamiltonform.com](mailto:sales@hamiltonform.com)  
[www.hamiltonform.com](http://www.hamiltonform.com)



*Bridge 184 after replacement*

*(photo credit: Plenary Walsh Keystone Partners)*