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The National Precast Concrete Association's Creative Use of Precast (CUP) Awards competition recognizes innovative applications of precast concrete.

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NPCA's Sustainability Awards competition rewards excellence in sustainable products, practices and operations within NPCA membership.

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ON THE COVER:

Night landing: A precast concrete pavement slab replaces a damaged section of I-94 near Hudson, Wis., during an overnight repair project. Within a few short hours, the worn section is cut out, excavated, leveled, replaced with the precast repair section, and grouted before morning traffic picks up. See the story on page 16. Images provided by T-BO Photography, courtesy of Ayers Associates (aversassociates com).

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ABOVE-GROUND CATEGORY FIRST PLACE

SMITH-MIDLAND CORP. (WWW.SMITHMIDLAND.COM) PROJECT: THE ALEXANDER APARTMENT COMPLEX LOCATION: EDGEWATER, N.J.

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UNDERGROUND CATEGORY FIRST PLACE

Anchor Concrete Products (www.anchorconcrete.com) Project: Highway 407 East Expansion Location: Whitby, Ontario

THE NATIONAL PRECAST CONCRETE ASSOCIATION'S CREATIVE USE OF PRECAST (CUP) AWARDS COMPETITION RECOGNIZES INNOVATIVE APPLICATIONS OF PRECAST CONCRETE IN TWO CATEGORIES: ABOVE-GROUND AND UNDERGROUND. AN INDEPENDENT PANEL OF INDUSTRY EXPERTS SERVED AS JUDGES, AND AWARDS WERE PRESENTED DURING THE PRECAST SHOW 2014 IN HOUSTON. FOR COMPLETE DESCRIPTIONS OF THIS YEAR'S WINNING PROJECTS, PLEASE VISIT PRECAST.ORG/CUP2014.



Above-Ground Category

FIRST PLACE

SMITH-MIDLAND CORP. (www.smithmidland.com) Project: The Alexander Apartment Complex (Photo on page 4) Location: Edgewater, N.J.

Tasked with replicating the architecture of New York City's Park Avenue circa 1945 for The Alexander, a nine-story apartment building in Edgewater, N.J., Smith-Midland Corp. manufactured precast concrete wall cladding with historical details such as cornices, reveals and bull noses. Each of the manufactured panels is a buff color with an acidetched finish.

Due to the lightweight design of the system used, many project costs were reduced, including those associated with the building foundation, structure, shipping and installation. Additionally, the project featured 1,024 LEED-friendly exterior panels, combining a proprietary precast concrete product with traditional architectural precast totaling nearly 100,000 sq ft. Thanks to the design of the panels, the building facade will remain virtually maintenance free for many years to come.

The proprietary 360 degree concrete-to-stud connection isolated the exterior precast concrete cladding from the structural stresses associated with wind loading, steel frame movement, expansion and contraction, and seismic shock. The result was a residential building both structurally sound and pleasing to the eye.

SECOND PLACE

UNIVERSAL PRECAST CONCRETE (WWW.UNIVERSALPRECAST.COM) PROJECT: BUMPER CARS PLAYGROUND DISPLAY LOCATION: NATIONAL PLAYGROUND EXPO, HOUSTON, TEXAS

Bumper cars have been around for many decades entertaining children and adults alike and earning their place in Americana. Precast concrete bumper cars, however, are something new and different altogether.

Universal Precast Concrete was approached with the idea of designing precast bumper cars to be installed as very durable and heavy-duty additions to a playground concept. The customer wanted the cars to look real and also be able to withstand use from many children over the years.

Universal Precast's designers worked on renderings and concepts that were approved by the client, which led to the next step of developing molds to pour the unique products. To successfully pour and strip the forms, elements were split into modules that were cast separately and then assembled at the plant. The cars were also given footings to provide additional stability once installed.

The last step was painting the cars to ensure they resembled real bumper cars. As a finishing touch, a steel post was added to simulate the electrical connection that is synonymous with the power source of real bumper cars.

The end product was exhibited at the National Playground Expo in Houston and, thanks to the durability of precast, stands the chance of creating a legacy that lasts as long as the project's real-life inspiration.

THIRD PLACE (TIE)

NORWALK CONCRETE INDUSTRIES (WWW.NCIPRECAST.COM) PROJECT: EATON CORPORATE HEADQUARTERS REFLECTING POND WALL LOCATION: BEACHWOOD, OHIO

When the project architect sought to design the site for the new Eaton Corporate Headquarters in Beachwood, Ohio, the goal was to combine the necessary function of a large retention pond with an eye toward aesthetics. Given the clean lines and contemporary architectural style of the building, the material selected for the walls of the pond had to have clean, uniform and clearly delineated lines.

Norwalk Concrete Industries worked with a big block wall producer to create an old-world texture and then created customized block sizes to meet the requirements for the project. Custom forms were fabricated and a total of 1,900 individual blocks were produced.

Construction of this segmental retaining wall required attention to detail when installing the base course to maintain level and achieve the proper circle diameter. Once the base course was installed, each of the nine remaining courses of block could be installed with relative ease.

The result is a fully functional, EPA-compliant storm detention pond that is a focal point for this new headquarters. The total length of the top course of the wall is 1,062 lineal ft, making the circular pond visible from space using your favorite satellite photo viewing software.

THIRD PLACE (TIE)

SHEA CONCRETE PRODUCTS (WWW.SHEACONCRETE.COM) PROJECT: OCEAN AVENUE SEA WALL LOCATION: NEWPORT, R.I.

The City of Newport, R.I., sought design-build proposals to repair or replace a failing cast-in-place retaining wall along the famed Ocean Avenue. Critical wall criteria included sustainability, minimal construction footprint and aesthetics.

Fourteen designs were submitted, with all but one focusing on a cast-in-place solution or repair of the existing wall. The one exception was a precast concrete modular block wall (PMBW) submission. The





city selected the PMBW solution – submitted by Shea Concrete Products – because it provided a completely new wall that offered additional benefits: The modular nature of the system allowed for easy installation between tides; a grid tied the entire system together; the joints between the blocks allowed for rapid escape of water from overtopping waves; and the road could remain open during construction.

Shea Concrete Products refers to the PMBW as "a hybrid gravity and positively connected MSE retaining wall."

The delivered block comprised \$62,000 of the \$600,000 project. Shea Concrete Products provided 3,080 sq ft of blocks: 426 blocks in depths of 45 in. or 60 in. and heights of 16 in. or 32 in.

From demolition to completion, the construction (which was only feasible during low tide and cooperating wave conditions) took two months. The wall was completed just before tropical storm Irene and Hurricane Sandy arrived along the coast.

HONORABLE MENTIONS

SMITH-MIDLAND CORP. (www.smithmidland.com) Project: Lake Wappapello Restroom Buildings Location: Wappapello, Mo.

STRUCTURECAST (WWW.STRUCTURECAST.COM) PROJECT: DIABLO VALLEY COLLEGE LOCATION: PLEASANT HILL, CALIF.

UNDERGROUND CATEGORY

FIRST PLACE

Anchor Concrete Products (www.anchorconcrete.com) Project: Highway 407 East Expansion (Photo on page 5) Location: Whitby, Ontario

Precast concrete culverts alone are a fairly standard product. The specifications on this job, however, were anything but standard.

Anchor Concrete Products entered a competitive bid for phase one of a \$1 billion supersized highway project in Whitby, Ontario, that included four large-scale culverts. The team needed to provide high-quality structures that would meet design needs, a challenging schedule and the installer's need for a quick and efficient install – all while dealing with the large scale of the pieces.

The solution was an innovative, two-piece clamshell culvert that incorporated a cantilever joint allowing the contractor to place the pieces using only a crane. This eliminated the costs associated with pulling the pieces together. The added value of the cantilever joint helped secure the bid.

The completed first culvert is 251 ft, 4 in. long, consisting of 88 culvert pieces with an overall height of 11 ft, 8 in. and a 29 ft, 6 in. span. In total, 2,710 tons of concrete were delivered and installed in just four days and each 38.6 ton section was placed in less than seven minutes.



BWI AIRPORT GLYCOL RECLAMATION/RECYCLING PROJECT

It is one of the largest precast culverts in the area and is an integral part of developing sustainable highway infrastructure and protection for natural wildlife. The culvert provides a natural stream bottom and a pathway for wildlife to cross under the road rather than above where danger to the animals and motorists would be imminent.

SECOND PLACE

TERRE HILL CONCRETE PRODUCTS (WWW.TERREHILL.COM) PROJECT: BWI AIRPORT GLYCOL RECLAMATION/RECYCLING PROJECT LOCATION: BALTIMORE, MD.

What role could precast concrete trench drains, manholes, vaults and leveling pads possibly play at Baltimore-Washington International Airport? This networked system of products was installed for the





Tight tolerances required that Terre Hill Concrete Products also manufacture 230 leveling pads to aid the contractor in setting the sections of trench. An average of 120 ft of trench was delivered to the site daily, allowing the project to be completed in three weeks. In the end, precast concrete was the ideal solution for the project thanks to its minimal disruption and speedy installation.

THIRD PLACE

BLUFFTON PRECAST CONCRETE (WWW.BLUFFTONPRECAST.COM) PROJECT: HELLBENDER SALAMANDER HUT LOCATION: RIVERS AND STREAMS

The Eastern Hellbender salamander is found in swift-flowing rivers and streams in

the eastern United States, but the population of this ancient amphibian has declined as much as 82% in recent years. Researchers suspect that disappearing habitat may have a lot to do with the decline of this species. And that's where the precast solution comes into play.

Working closely with a biologist and a custom mold maker, Bluffton Precast Concrete developed the Eastern Hellbender salamander hut, a 150-lb precast concrete structure that can be installed in streams and riverbeds frequented by the Eastern Hellbender.

The project started when biologist Greg Lipps searched precast.org to find a local precast producer to a design a salamander hut. Lipps showed Bluffton Precast some photographs of a chicken wire and concrete structure that a colleague had developed, and Bluffton contacted its forms supplier. The team collaborated on a three-piece mold set that includes a removable lid and a knock-out in the bottom of the structure where the river bed can be exposed.

If the Hellbender hut is successful, it could prove valuable for research, and could help rebuild the population where it has become endangered across the country.

HONORABLE MENTION

SMITH-MIDLAND CORP. (www.smithmidland.com) Project: Beach Prisms Location: Ocean Gate, N.J.



purposes of glycol reclamation resulting from the process of aircraft deicing.

Terre Hill Concrete Products manufactured 2,295 ft of trench drains for this \$1.23 million project which were placed along the north and south sides of a multimillion dollar deicing pad. Additionally, a series of 24-in. pipe was installed to connect the trenches to 14 manholes measuring 5 ft in diameter and three glycol diversion vaults. Each of the 20-ft-long, 18-in.-wide drains were 60 in. deep, with 12-in. walls and a 9-in. floor. The three vaults, which measured 9 ft wide and 18 ft long with an inside diameter of 7 ft, 6 in. each weighed approximately 167,000 lbs.

POSSIBILITIES IN PRECAST

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In an ever-evolving industry, engineers, architects and contractors alike have come to rely on a sure-fire constant: precast concrete's speed of installation.

By Mason Nichols

POSSIBILITIES IN PRECAST

When Nissan introduced the GT-R sports car in 2007, it became one of the fastest production vehicles under \$100,000 available in the world, satisfying consumers' dual needs for speed and affordability. Today, the GT-R continues to be a popular choice among motor enthusiasts looking to quell their desire for speed without breaking the bank.

While speed is incredibly important in the world of transportation, it is paramount to success in the construction industry, where completing a job on time – or ahead of schedule – is essential for earning a profit. Thankfully, precast concrete is affordable, often saving contractors thousands of dollars in on-site time, and fast, with installation times as short as a few hours to one business day.

A COMPETITIVE ADVANTAGE

As the construction industry continues to evolve, it takes on more characteristics of society at large; notably, an insatiable desire for instant results. Mike Vaughn, P.E., president and general manager for Vaughn Concrete Products Inc., has witnessed this and many other changes over the past 30 years. "Today, general contractors don't have people that are as well-versed in doing many different things like building forms and cutting, bending and tying rebar," he said. "The lack of a labor force is one thing, but everybody now is just in a considerably faster-paced mode."

This faster-paced mode has resulted in jobs being pigeonholed into tighter and tighter completion windows. Although many building materials simply can't keep up, precast concrete has continually met and exceeded the needs of the industry, as showcased by the projects below.

"EVERYTHING WAS JUST PERFECT"

After suffering through several months with a failing septic system, officials at West Hickory Haven, an assisted living facility in Milford, Mich., decided to install a new wastewater treatment tank. According to Jeff Field, president and owner of J.W. Field Grading & Excavating, West Hickory Haven worked with the local health department for approximately six months before receiving project approval.

Though the project was initially designed for a cast-in-place solution, Field contacted Lauren Sustic, product engineer for Advance Concrete Products Co. (ACP), to determine if a more efficient method could be employed. Sustic submitted drawings to Field for the new monster-sized precast tank, which measured 27 ft, 8 in. long by 16 ft, 8 in. wide by 7 ft, 4 in. high. Field then received approval from the county and project engineer for the changed plans.

Despite working with ACP in the past, Sustic noted Field was concerned whether the tank would be installed correctly and on time. "He asked questions like, 'How long will this take?' and 'What if we don't have enough time?'" Sustic said. "We simply told him that this was a normal installation for Advance and that everything would be finished before he knew it." And it certainly was. According to Sustic, the behemoth tank was installed in less than five hours, a feat that greatly impressed Field.

"The precast solution probably saved six weeks on the job by them doing it ahead of time and storing it in their yard," Field said. "The entire digging of the tank and setting the product took basically two days, and both the county and engineer loved it. The project fit all the little measurements and keyways, and everything was just perfect."

PRECAST TO THE RESCUE

When a wildfire ravaged northern Arizona in 2010, many residents were left without access to their homes. The fire, which took more than a week to contain, damaged several wooden bridges, leaving affected homeowners in need of a quick solution. Thanks to its speedy turnaround time, precast concrete came to the rescue.

Eric Jensen, chief marketing officer for Jensen Precast, said his company manufactured a series of 12-ft-long, 6-ft-high culverts to restore access for those in need. "We were able to pull off a couple of these bridges in literally less than a week," he said. "Cast-in-place would not even have the most remote dream to do it that quickly."

Precast's speed is also proving handy on another of the company's projects currently being planned for the city of San Francisco. Jensen said his company is negotiating with the city to install underground infrastructure in the heart of the downtown district.

In this kind of situation, time is really on the side of precast because of so many major intersections. "Here, precast's speed has another advantage, because having an intersection tied up for the several weeks that poured-in-place would require is a horrible idea from a traffic-flow and disruption-of-business perspective," Jensen said.

Quickly accomplishing such a project presents yet another advantage of specifying precast: It allows an excavation to be quickly opened and closed, reducing the risk of on-site injury and liability.

"There could be plenty of cases where a contractor is not pressed for speed, per se, and preplanning is involved," Jensen said. "But the case could be, 'Look, when we open up this hole, it's going to be a giant liability target for vehicles, people or critters to fall into this open excavation.' And bad things can happen."

BLAZING A TRAIL

Although advancements in tools and technology continue to alter the nature of the construction landscape, one constant remains: Jobs need to be completed affordably, correctly and on time. Precast concrete remains up to the task, and, like the Nissan GT-R, blazes a trail through the industry, zipping and zooming past competing materials on its way to the finish line. Luckily, there's plenty of room to come along for the ride. All you have to do is hop in.

Mason Nichols is NPCA's communication coordinator.



Sustainability Awards

NPCA's Sustainability Awards competition rewards excellence in sustainable products, practices and operations within NPCA membership, and to publicize the overall progress of the precast concrete industry toward sustainability.

The awards are divided into four categories: Producer Plant, Producer Project, Associate Plant and Associate Product. For complete descriptions of this year's winning projects, please visit precast.org/awards.

PRODUCER CATEGORY

FIRST PLACE PROJECT

SMITH-MIDLAND CORP. (WWW.SMITHMIDLAND.COM) PROJECT: NELSON HARVEY FACILITY, JOHNS HOPKINS MEDICINE CAMPUS LOCATION: BALTIMORE, MD. After decades of wear, the hand-laid brick envelope of the ninestory Nelson Harvey facility on the Johns Hopkins Medicine Campus in Baltimore began failing. The architects needed a solution that met two criteria: one, a system lightweight enough to prevent any need for additional superstructure or foundation costs; and two, that the facility would be able to stay operational during the exterior renovation.

The Smith-Midland SLENDERWALL system met both requirements. Its unique composite construction allowed for the recladding to take place without removing the old fascia. The project included 158 SLENDERWALL panels with an Endicott brick facing, maintaining continuity with the original exterior. Smith-Midland also applied its closed-cell "H20ut" foam insulation sealant to the panels. These options will provide savings in time and on-site trades, and insurance against air and water infiltrations. The project is to be certified under Baltimore City's Green Stars program, which is equivalent to LEED Silver.

FIRST PLACE PLANT

SHEA CONCRETE PRODUCTS (WWW.SHEACONCRETE.COM) PLANT: SOLAR POWER LOCATION: AMESBURY, MASS.

Shea Concrete went solar in the summer of 2013. The Shea facility in Amesbury powered up on Aug. 30 with a new American-made, \$1.4 million solar panel system installed on the roof of the plant. The 1,184 SunPower solar panels will produce an estimated 421,000 kw-hours per year. This makes Shea Concrete a Net-Zero electrical energy consumer, meaning that the solar panel system generates enough electricity to fully power the Amesbury location without requiring any additional sources of electricity. The



panels, which are American Recovery and Reinvestment Act (ARRA)-compliant, harvest an output that is on average 7% better than other panels annually and 20% more productive over the 25-year life of the system.

PRODUCER PROJECT HONORABLE MENTIONS:

Northeast Precast LLC – Millville, N.J. (www.northeastprecast.com) Project: Bimbo Bakeries Building Thin-wall Panels

PRODUCER PLANT HONORABLE MENTION:

READING ROCK INC. – CINCINNATI, OHIO (READINGROCK.COM) PLANT: CONCRETE RECYCLING PROCESS

NORTHEAST PRECAST LLC – MILLVILLE, N.J. (WWW.NORTHEASTPRECAST.COM) PROJECT: BOARDWALK CASINO AND TOWNHOUSES



Associate Category

FIRST PLACE PRODUCT

THE EUCLID CHEMICAL CO. (WWW.EUCLIDCHEMICAL.COM) PRODUCT: TUF-STRAND SF MACRO-SYNTHETIC FIBERS LOCATION: CLEVELAND, OHIO

The building sector is a major contributor to the carbon dioxide footprint in any developed community. One way that scientists refer to this footprint is by describing carbon dioxide equivalents or "CO2eq." An important way to decrease the CO2eq associated with building practices is to use materials that have a smaller carbon footprint.

Polypropylene fiber reinforced concrete (PFRC) is a versatile and high-performance material particularly suited for concrete construction. The Euclid Chemical Co. recently partnered with the University of Akron in a research study to establish the benefits and potential reduction of CO2eq when using TUF-STRAND SF macro-synthetic fibers in concrete. The results of the study indicated that the use of polypropylene fibers reduced the CO2eq emissions by 56% compared with steel reinforcement. This analysis can be carried over to applications within the precast concrete industry to help reduce CO2eq.

FIRST PLACE PLANT

THE EUCLID CHEMICAL COMPANY (WWW.EUCLIDCHEMICAL.COM) PLANT: "PEOPLE, PLANT, PROSPERITY" LOCATION: CLEVELAND, OHIO

The Euclid Chemical Co. continues to recognize that sustainability is a critical driver to both company success and employee satisfaction. Over the past several years, multiple projects have been deployed at Euclid's manufacturing facilities throughout North America to improve metrics on waste management, energy consumption, water use and safety. These initiatives are communicated to the company's employees and customers to demonstrate its commitment to being a good neighbor and a respected business partner.

Recognizing that sustainability is a process, Euclid promotes the foundational values of "People, Plant and Prosperity," where the social, cultural, environmental and economic factors of day-to-day business are blended into the global and political arena. The company has instituted a variety of programs to trim waste and curb energy use, and has established a Sustainability Leadership Team to track energy consumption and improve efficiency at its plants throughout North America.



TUF-STRAND SF MACRO-SYNTHETIC FIBERS



ASSOCIATE PRODUCT HONORABLE MENTIONS:

W.R. Grace – Cambridge, Mass. (www.grace.com) Product: AIRtrac Air Management Technology

HAMILTON KENT, LLC – TORONTO, ONTARIO (WWW.HAMILTONKENT.COM) PRODUCT: WATERTIGHT BOX CULVERT JOINTS

Associate Plant Honorable Mention: Hamilton Form Company – Forth Worth, Texas (www.hamiltonform.com) Plant: Improving Sustainable Manufacturing Processes

On the Beaten Precast concrete pavement projects across the

By Evan Gurley

Images provided by T-BO Photography, courtesy of Ayers Associates (ayersassociates.com)

Do you traverse a rough highway on your way home from work? If your answer is yes, it's not surprising. According to the U.S. Federal Highway Administration (FHWA), there are more than 4 million miles of roads in the United States, and of the nearly 1 million miles of major highways eligible for federal aid, 187,365 miles – or 18.8% – are in poor or mediocre condition and need repair.

Urban highways carry more traffic, of course, and thus get more wear and tear, and almost one-third of all arterial and collector miles are in poor or mediocre condition. The U.S. Department of Transportation's 2010 "Report to Congress on the Conditions and Performance of the Nation's Highways, Bridges and Transit," the most recent report, stated that all levels of government should be investing \$123 billion in highway improvements just to maintain current physical and performance conditions on the nation's highways and bridges.

A BETTER WAY

As the data above suggest, state DOTs and agencies are faced with many challenges when delivering transportation improvement projects. As a result, DOTs, engineers and public agencies seek more innovative construction practices, emerging technologies and new products to deliver transportation projects. There is a critical need to complete highway pavement repair and rehabilitation projects quickly, with minimal disruption to the users and local communities, and to result in pavements that are long-lasting. The effective use of jointed precast concrete pavement (JPrCP) technology for rapid repair, rehabilitation and reconstruction of pavements addresses this goal. JPrCP falls under the umbrella of precast concrete pavement (PCP) technology.

Because JPrCP technology is relatively new (but growing rapidly),



A precast concrete paving slab slips into place to repair a section of highway on I-94 near Hudson, Wis., within hours of cutting out a damaged section.







These diagrams show how precast concrete pavement slabs have become a more popular method for highway pavement repairs over the past several years. The diagram at right indicates which states have embraced the technology.



many highway agencies and industry partners have not fully embraced it. However, recent positive field testing results have been documented that should provide confidence for public agencies in the use of PCP technology to achieve rapid repair and rehabilitation.

HIGHWAYS FOR LIFE

Another directive funded by the FHWA is the Highways for LIFE (HfL) program. The purpose of HfL is to advance Longer-lasting highway infrastructure using Innovations to accomplish the Fast construction of Efficient and safe highways and bridges. And it is innovation that is the key to finding our way out of the highway maintenance challenge.

The three goals of HfL are to:

- Improve safety during and after construction
- Reduce congestion caused by construction
- Improve the quality of the highway infrastructure

The HfL program has hosted numerous project showcases across the country highlighting JPrCP technology. These showcases have been instrumental in educating local DOTs, contractors and public agencies about JPrCP technology, not only through interaction but having the attendees physically see an installation at the project site. The following are two such projects documented with comments about the project and the advantages of using precast concrete:

SR 11/Broad St. Pavement Rehabilitation – Winder, Ga. About the project:

- The work was to be fast-tracked to minimize the number of construction days involving lane closures. It was estimated that JPrCP panels would save the contractor one to two months of construction time and keep user delays to a minimum.
- The high percentage of regular and truck traffic coupled with parking has led to varying levels of cracking and rutting both under and above the old pavement.
- The average rutting, measured at four intersections, ranged from approx. 5/8 in. to 1-1/2 in. The underlying base material also varied in thickness. This resulted in cracks and various forms of pavement distresses.

The Precast Advantage:

- The use of JPrCP panels allowed major lane closures to be done at night, minimizing the impact to the community and the traveling public.
- Fabricated off site by a local manufacturer in a controlled environment
- Allowed higher quality control standards
- Allowed uniform curing of the panels that controlled/eliminated shrinkage cracking
- Allowed higher compressive strengths and plant acceptance that resulted in greater durability



- Decreased the need and frequency for future maintenance on this stretch of roadway
- Eliminated the use of vibratory equipment due to the proximity of historic buildings and aging underground utilities
- Allowed the use of variable depth milling to remove rutting and correct cross slope

The use of JPrCP panels greatly improved the constructability process while providing a long-term pavement solution in downtown Winder. The technology allowed GDOT to accelerate construction time, reduce the exposure to workers as well as the traveling public, and reduce congestion delays caused by excessive construction work zone time frames. This emerging technology was found to be more cost efficient than the option of removal and total reconstruction of the roadway.

I-94 Repair Project – Hudson, Wis.

About the project:

- Pavement rehabilitation pilot project, the first project incorporating JPrCP panels in Wisconsin
- Involved the repair of approximately 500 joints using 210 precast panels and 300 cast-in-place panels over a five-mile stretch of I-94
- Repairs were to be performed on the middle lane of I-94, which meant the middle lane and another lane on either side had to be closed down
- Work windows were from 11:00 p.m. to 6:00 a.m. (lowest traffic volumes)

The precast advantage:

- Each of the 210 panels was custom manufactured to each segment needing repair
- The majority of slabs weighed 10,000 to 11,000 lbs each, meaning that three to four slabs could be transported per load
- Each panel was numbered and sequenced on the truck to ensure efficient installation at the job site
- Open to traffic the next day
- Precast joints last twice as long as cast-in-place methods, eliminating the need for a second round of repairs

Andy Wieser, president and co-owner of Wieser Concrete Products Inc. based in Maiden Rock, Wis., the precast manufacturer, explained the process of slab replacement: "The contractor goes out to the project and measures each spot needing replacement, and then we make each slab to fit those measurements," he said.

Once created, Wieser Concrete numbered the slabs in sequence and coordinated their placement on the truck for hauling to the job site. Everything was coordinated with the trucking company so that the slabs were stacked properly and wouldn't have to be handled after delivery. "So everything from production to delivery to installation was all sequenced to match that location on the highway," said Wieser.

Wieser reiterated how precast panels are particularly helpful in situations where the center lane of the highway cannot be shut down for more than a few hours at a time.

Randy Luedtke, an engineer with Wisconsin State DOT, stated that



JPrCP technology is something that Wisconsin is going to have to use moving forward due to the numerous locations with lane restrictions. The success of the I-94 project led directly to another repair project in Madison, Wis., using JPrCP technology:

Madison South Beltline Highway (USH 12)

About the project:

- Eight-mile section of 10-in.-thick JPrCP constructed between 1987 and 1989 is exhibiting isolated distress and in need of repair to extend its useful service life
- Six-lane urban freeway
- Carries approximately 120,000 vehicles per day
- High traffic volumes and lack of alternate routes necessitated keeping at least four lanes open at all times, and keeping all lanes open during the rush hours
- Patching the center lane requires a dual lane closure and is limited to a 7.5 hour work window

The precast advantage:

- Shortened the duration of construction
- · Provided the lowest life cycle cost through improved durability

"After learning more about the technology through the May 2013 NPCA/ACPA webinar, various FHWA webinars, meeting with a precast manufacturer and a site visit to the Hudson project, we felt the technology was a good fit to solve our project challenges," said David Layton, project manager with WisDOT Southwest Region. "Factoring in traffic control setup/teardown and cure time, you're only left with three to four hours of production. With almost 400 patches on the center lane alone, this would eat up seven to nine weeks of the schedule and not leave enough time for other repairs."

THE NEED IS NOW

JPrCP is an emerging technology with a lot of promise in the construction/transportation industry. Realizing the benefits of JPrCP will help the industry solve some of the issues with conventional construction methods for restricted project sites while keeping the disturbance to the traveling public at a bare minimum.

Evan Gurley is a technical services engineer with NPCA.

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A precast concrete solution saves a city time, money and headaches with a big block gravity retaining wall.

By Kirk Stelsel

Right-of-way restrictions. Close proximity to residential property lines. An unexpected, large-diameter pipe not in the plans. Existing utilities. Limited budget. Tight schedule.

These are challenges so commonly faced by engineers and contractors that they could be for any roadway project in the world. In Carmel, Ind., they were the hurdles that had to be cleared to create an earth retention system for an elevated roundabout. The project was part of a massive overhaul of the highly trafficked Keystone Parkway, so time was of the essence.

The engineering firm and contractor on the project reviewed a number of options, but each one either could not overcome the site challenges or left them scratching their heads on how they could make the math work given the costs of production and installation. Enter the precast concrete big block gravity wall and Reading Rock Inc. of Cincinnati. When Jill Fouts, a regional sales manager with Reading Rock, arrived on site, she and the general contractor realized that a big block retaining wall was the solution that eliminated all of the concerns, including cost.

"The GC said, 'If you look at the site, there's little room for excavation,'" Fouts recalled. "There was a temporary right of way, fences and property lines. It just so happened I had the face of a ReCon block in my car and told him, 'We have this, and you can use it as a gravity wall – you've got enough room for this wall.' They just had to make the cut and place the block in front."

The next week, the contractor called Fouts and told her it was perfect. Reading Rock went through the whole process of turning in budget numbers, getting an engineer involved, getting a contractor involved, and it ended up being about a quarter of the cost of other options.

The end product was approximately 15,000 sq ft of wall for all four



sides of the roundabout – the initial bid was for only one of the four walls – using block ranging from 24 in. deep to 60 in. deep. The product met all time, budget and location constraints, minimized excavation and required no soil reinforcement. "All parties were so relieved," Fouts said. "It's just such a great solution."

According to Fouts, poured walls or H-piles and lagging would have been much more expensive and not feasible given site constraints. She estimates the contractor was able to lay approximately 1,600 sq ft a day, which shortened the timeline considerably.

"ReCon Retaining Wall Systems was a life saver for the Keystone Parkway & Main Street project," said Craig Parks of American Structurepoint, the engineering firm for the project. "There was minimal excavation and no geogrid needed due to the size and weight of the units. It was the perfect solution for our project."

Reading Rock often finds ways to get its products on projects by proactively seeking out active projects and explaining the benefits precast can offer. In addition to fielding calls, Fouts regularly searches municipal sites such as INDOT for lettings and electronic plan rooms to try to find jobs that are bidding with her product or a competing product such as poured walls. She also stays on top of active projects in the area. "I knew this job was coming up for bid because of all of the work on Keystone," said Fouts. "I'll call engineers on a regular basis and ask them what's bidding and if they're working on anything, and that's how we found this job. One of my searches on plan rooms is for poured walls, so if I see a poured wall I'll call and ask if they'd entertain a budget number for our precast block.

"It's the economical solution, but you just have to find the time and get out and call people, and then they know you have it. We've sold a lot of jobs because they've known, and they say, 'How about that big block you have,' because it solves a lot of problems."

Kirk Stelsel is NPCA's director of Communication and Marketing.

Communication Is



KING

Better quality, faster installation and a longer service life are just a few of the many reasons why specifiers are turning toward precast concrete.

By Sue McCraven



Project plans for the NJDOT stormwater pumping station to repair some of the devastation left behind by Superstorm Sandy. Plans courtesy of Garden State Precast Inc. (www.gardenstateprecast.com)



With the pump station in close proximity to the shoreline, watertightness was a priority in the NJDOT specification. Photo courtesy of Garden State Precast Inc. (www.gardenstateprecast.com)





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42" DIE

6" DIP

4" DIP

24" DI

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HOLE SIZE

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12*

8

28

30'

30 X 4

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3408 CF SOLID

4155 CF SOLID

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The precast concrete industry has emerged as a major player in public construction projects throughout North America, as increasing numbers of architects and engineers learn more about the substantial benefits derived from manufactured concrete products. Some of the best educators are the precast manufacturers themselves, who are showing municipalities and contractors how the precast option can save time, increase service life, reduce site labor, gain LEED points and meet exacting specifications.

Here are two examples where precasters presented their cases to decision-makers and showed them how to improve their projects with precast.

WHAT ENGINEERS CAN LEARN FROM A JERSEY PROJECT

Our first case study, a post-Superstorm Sandy road rehab project from the Jersey Shore, illustrates how communication pays off and includes some seasoned advice for architects and engineers.



"We continuously mine public advertisements for bids," said Paul Heidt, engineer manager with Garden State Precast, Farmingdale, N.J. "This is where it starts. From our staff member who follows all potential work in our service area, we learned that nine stormwater pumping stations were going to be part of NJDOT's rehab of 10 miles of Route 35." Route 35 is near the Jersey Coast, the area ravaged by Superstorm Sandy in 2012.

Heidt and the Garden State Precast staff quickly completed the legwork, including precise engineering of a precast concrete pump station with a 2 ft by 3 ft concept drawing that could be presented to the resident NJDOT engineer. "We put a detailed plan together prior to the bid and presented it to the successful bidder, telling the contractor that we could offer an engineered plan that was the best, most efficient solution for watertight pumping stations", Heidt said.

The Route 35 project presented difficult conditions, including a very high water table, restricted work site access and restricted installation hours. The photo on page 28 shows the reason why NJDOT's specifications made watertightness a priority for the pumping stations. A high water table also impacted buoyancy designs for precast element size and weight.

Armed with engineering plans that met NJDOT's exacting specifications, Heidt was able to address the specific concerns of the project engineer, which included differential settlement, watertightness and installation schedule. Precast offered NJDOT better quality, a faster installation and longer service life than cast-in-place (CIP). A CIP alternative would have required driving steel sheeting 60 ft into the ground in addition to forming and curing time requirements.

For this challenging construction project, good communication among the manufacturer, contractor and engineer of record resulted in the smartest solution for Route 35's underground infrastructure. What does Heidt think is the most important thing to relay to engineers and architects? "Whether construction calls for CIP or precast, there's no difference - the engineering concepts are the same, with the exception that precast is more amenable to design," he said.



THE ROCKINGHAM TRAIL TUNNEL: ALUMINUM OR PRECAST?

Proposed as a paved trail to connect the City of Manchester to the coastal town of Auburn in New Hampshire, The Rockingham Trail would run along the right-of-way of the abandoned Boston & Maine Railroad corridor.

"Original trail specifications called for a metal tunnel section where the bike path would run under Peabody Avenue," said Mike Worden, president of CSI Concrete Systems in Hudson, N.H. "Specs showed an aluminum, multiple-plate arch with CIP footings." Worden's first thought was: "Precast's service life would be much longer than a threeplate aluminum arch, and a metal arch would require CIP footings and depend on proper backfill to be structurally sound," he said. "We could manufacture an SCC precast box culvert for the project that would be delivered as a load-bearing structure, ready to install, with a 75- to 100year life."

CSI approached Dubois Excavation Co., a contractor bidding on the tunnel work. "We gave them an alternate quote for 120 linear ft of 11-ft span by 12-ft rise box culvert with sloped and tapered end sections on inlet and outlet, approximately 19-ft long, to serve as wingwalls, which allowed the structure to be installed in one day," Worden said.

Michael Bean, P.E., and vice president for Dubois, explained what happened next. "The (tunnel) area was in an older, well-established neighborhood, and my feeling was that a precast box culvert installation would have a much more appealing appearance to the residents," said Bean. "I knew that the culvert approach would probably run at least 25% more than the metal pipe, but I also knew bolting and installation of pipe sections would take two weeks, thus increasing project costs. We worked with CSI on successful projects in the past, and I knew that the precast option would offer the city more than twice the design life."

When Bean and Worden presented their alternative precast tunnel proposal to the city engineer, he received their estimate as very well thought out. The city engineer asked CSI to proceed with shop drawings, which required only three days. As a result, the final precast tunnel proposal was approved by the city and the contract was signed.

"We took a lot of pride in this project. CSI delivered all the precast sections in one day, and all the tunnel work was complete in four weeks," said Bean. "In fact, the precast was installed in one day."

As these projects illustrate, great things happen when engineers and architects get together with precast concrete manufacturers at the start of a project. Taking advantage of the precast concrete solution requires ongoing communication, upfront planning and a well-prepared proposal. But after that, precast concrete sells itself. **P5**

Sue McCraven, NPCA technical consultant, is a civil and environmental engineer.





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