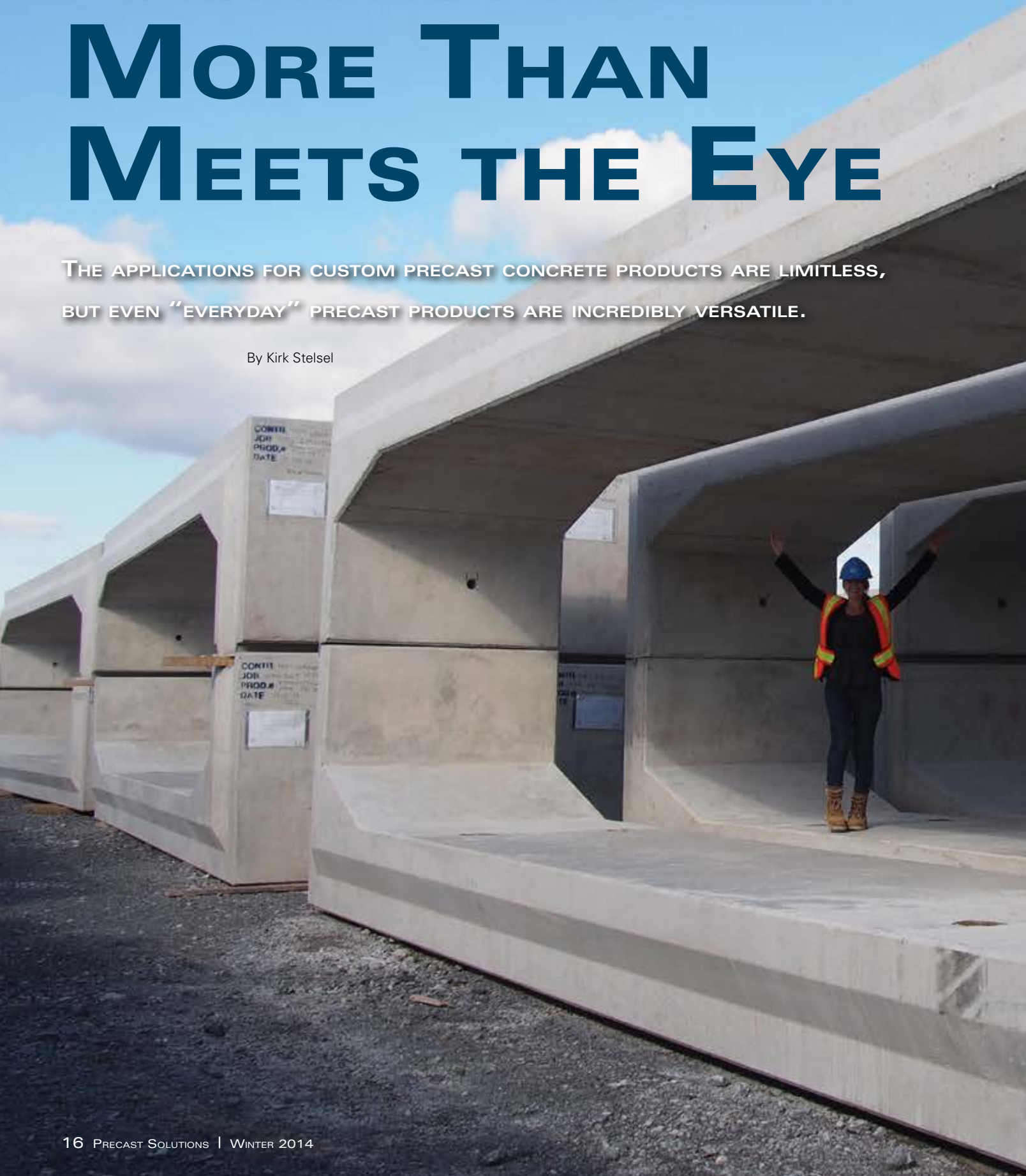


PRECAST CONCRETE CULVERT: MORE THAN MEETS THE EYE

THE APPLICATIONS FOR CUSTOM PRECAST CONCRETE PRODUCTS ARE LIMITLESS,
BUT EVEN "EVERYDAY" PRECAST PRODUCTS ARE INCREDIBLY VERSATILE.

By Kirk Stelsel





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ANCHOR
CONCRETE PRODUCTS
KINGSTON



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ANCHOR
CONCRETE PRODUCTS
KINGSTON



Anchor Concrete Products Ltd., located in Kingston, Ontario, manufactured innovative, two-piece "clamshell" culverts for a supersized highway project in the province.



▲
The Nature Conservancy in Tennessee used a modified box culvert from Oldcastle Precast in Lebanon, Tenn., to create an artificial bat cave as part of its efforts to save the Little Brown Bat from a population-devastating fungus.

In the 1980s, Transformers¹ burst on the scene as a must-have toy thanks to some ingenuity and creativity. They are, after all, “more than meets the eye.”

While precast concrete products may not transform into robots with affable personalities and a penchant for saving the human race, looks can be deceiving all the same. For example, retaining wall blocks are made for holding back earth, but use them for amphitheatre-style seating at a Boy Scout camp and suddenly you have a way to help a mourning father create a lasting memorial for his son (precast.org/memorial). Walls are just walls, until the military uses a precast wall system to simulate an Afghan Village and provide life-saving training for soldiers in a realistic setting (precast.org/village). And box culverts make great bridges, but with a few modifications, they also help save threatened Little Brown Bats from rapid extinction (precast.org/bat). The options are limited only by what you and your local precaster can dream up.

GOING WITH THE (NATURAL) FLOW

Precast concrete culverts in particular can be used in countless applications – some expected and some unexpected. Replacing aging short-span bridges with precast culverts is a no-brainer. Precast culverts install fast, provide the highest level of strength and durability, are less dependent on backfill, require little to no maintenance, can withstand more aggressive compacting and are manufactured locally. But what about bridges that span natural waterways? A 3-sided culvert or a box culvert with modifications creates a critical passageway that restores stream-bottom habitat, and removes obstructions to the natural flow of fish and other aquatic species. Suddenly a piece of concrete allows fish to reach food or breeding grounds.

“We supply a lot of box culverts with precast tapered retention sills or baffles 6 in. to 12 in. high,” said Mike Worden, president of Concrete Systems Inc. (CSI) in Hudson, N.H. “The contractors can put soil material, stone or rock and reconstruct a natural streambed so it’s



good for the fish and helps maintain existing low flows and stream continuity for the movement of aquatic life.”

The Summer 2013 issue of *Precast Solutions* details important efforts such as this in the Great Lakes Basin (precast.org/passage). Precast concrete box and 3-sided culverts are ideal for undoing damage caused by man-made dams and stream diversions, as well as to replace perched culverts or those made with weak, inferior materials.

Clay Prewitt, general manager of H2 Pre-Cast Inc. in East Wenatchee, Wash., has found success converting road crossing jobs to precast, including those that specify stream restoration. And according to Mark Wieser, vice president of Wieser Concrete Products Inc. in Portage, Wis., the original spec often calls for cast-in-place concrete, but converting that to precast is a common occurrence in Wisconsin.

“There was a project last year that had four different box culverts on it for stream crossings under a street that was designed with an aluminum arch that we

converted to precast box culvert,” said Wieser. “The contractor really liked that because of horrible soil conditions on the site. The footings he would have had to construct in those soil conditions for the aluminum arch were cost prohibitive.”

In addition to the benefits for wildlife, the time and cost savings makes precast culverts the go-to solution for smaller towns and rural areas.

“I’ve built 72 precast culverts for bridge replacements for small municipalities, and I was working on 73 today,” said Mike Bean of M.A. Bean Associates LLC in Sanbornton, N.H., a construction company that works frequently with CSI. “I would guess that 75% of my work is design-build precast bridges, because precast works. You just can’t beat it – it saves time and it lasts for a hundred years.

“You can’t pour concrete like that in the field. They’re fast, they fit, there are no imperfections, it’s strong, it’s long-term and the price is feasible for these small municipal towns that can’t afford another way.”



Concrete Systems Inc., located in Hudson, N.H., manufactured a 40-ft-wide and 7-ft-tall rigid frame bridge that is skewed 25 degrees to meet site conditions.



The use of 3-sided culvert pieces manufactured by Sanders Pre-Cast in Whitestown, Ind., created an underpass on The Monon Trail, a popular pedestrian and cyclist trail in Indianapolis.

TUNNEL VISION

Safe passage for aquatic life is one example, but now take the same product and place it on a popular urban greenway and you have an underpass for foot and bicycle traffic. One example is located on the Monon Trail in Indianapolis, built with 3-sided culvert from local precaster Sanders Pre-Cast Concrete Systems Inc. in Whitestown, Ind.

Back in New Hampshire, Bean worked with CSI to convince the city of Manchester to convert a similar job to precast box culverts based on speed of installation, durability and functionality. "Originally, the DPW had specified a metal pipe for the bike path tunnel. I said to the city engineer, 'If you want a metal pipe I'll give it to you, but I think you should take a look at this first,'" Bean said. "I showed him a picture of the Delta Dental Root Canal in Concord [a similar precast box culvert pedestrian underpass CSI had supplied] and said, 'How about a 14-ft-square, 140-ft-long box culvert?'"

All of the precast sections – culvert, monolithic headwalls and sloped culvert sections – were manufactured by CSI and delivered and installed in one day, saving precious time and money. "We took a lot of

pride in this project," Bean said. "The city wrote me the nicest letter thanking me for the valued engineering bid."

Outside the United States, precast culverts are an equally popular product. In Ireland, Croom Concrete, located in Limerick, used precast box culvert to create an underpass for a farmer to herd his cattle to and from a milking parlor. The precast solution saves the farmer up to two hours daily, and now cows and motorists alike avoid unnecessary danger.

In Canada, Anchor Concrete Products Ltd. manufactured a supersized, clamshell-design precast box culvert for a highway extension in Ontario. In total, 44 sections of precast culvert with a combined weight of more than 2,710 tons were placed in just four days. The design includes a cantilevered joint that allows the contractor to place pieces with only one crane and eliminates the labor and equipment needed to pull the pieces together. The large underpass – 11.5 ft high at its tallest point – will ensure not only safe crossing for wildlife underneath, but minimize potentially fatal collisions on the road above.

In Wisconsin, Wieser Concrete has done its fair share of unique precast culvert installations as well. Rather than creating a safe passage for bicyclists or animals, a local police station needed a way to ferry prisoners. With a precast box culvert, it can now access a new jail across the street without using public surface streets. Shifting to military needs, box culverts are being used to simulate the mountain caves soldiers are likely to encounter in Afghanistan and other war zones. And, for race fans, precast concrete provides underground access to the infield of the Road America racetrack in Elkhart Lake, Wis.

The list of one-off culvert projects for Wieser Concrete is long. "One of the more unique ones was for a large hospital that was doing an expansion and needed to get materials and supplies from one side of the street to the other," Wieser said. "The construction schedule had this taking place in January in Green Bay [brutally cold weather for construction] and they didn't want the road closed for more than a few weeks. There were also obstructions that prevented overhead access for a portion of the area."

Wieser Concrete solved the dilemma with box culvert sections that were installed without extending the project's completion schedule. Some were manufactured with steel bottom plates so they could slide into position on steel rails with a small dozer due to the overhead obstructions.



Croom Concrete, located in Limerick, Ireland, has worked on many unique culvert projects, including this cattle underpass that saves the farmer two hours each day and avoids a dangerous crossing on the road above.



A NOTCH ABOVE, BELOW GRADE

Wieser Concrete, headquartered in Maiden Rock, Wis., provided infield access to a racecourse using 3-sided culverts.

Inset: The infield entrance is adorned with a large graphic of a racecar, adding to the aesthetics at the Road America.

Natural waterways are not the only water that needs to be managed. Highly urbanized areas have turned one of nature's greatest gifts into a major problem. Rainwater is not able to naturally percolate into the soil during storms, thanks to roads and parking lots. The deluge can overload the capacity of local treatment plants and, in the case of cities with combined sewer overflows (CSOs), dump millions of gallons of untreated sewage into local waterways.

One answer is to use the same precast concrete products that transport people, wildlife and materials above ground, and simply move them underground to temporarily hold the water for either managed release or beneficial reuse. In New Hampshire, CSI is currently manufacturing twin-cell monolithic culverts – 144 sections in total – for a CSO project.

Wieser Concrete manufactured 160 precast culverts for detention of stormwater under a Walmart parking lot. "There were 134 arches weighing 26 tons apiece and with a 32-ft span," said Wieser. "They put them together

in two rows side by side and basically built a big pond under the parking lot."

In addition to various tanks and even underground garages, H2 Precast has used its 3-sided product to create wine cellars for clients. No matter how unusual or challenging the need is, Prewitt has found the same reasons as his peers for customers using precast.

"The 3-sided structures go in quite a bit faster," said Prewitt. "With some other products, there are a lot more pieces that have to be bolted together and assembled."

MADE TO ORDER

Whether it's any of the applications mentioned previously or others such as mine shafts, fire cisterns, vaults, wet wells, pump stations or more, precast culverts are being used to meet the need. But to truly live up to the Transformers analogy, precast culverts must also transform.

Any precaster who manufactures culverts will have standard sizes, but that's just the beginning. Need custom strength? Adjust the mix or wall thickness. Want



an additional aesthetical flair? Consider an arched look or custom headwalls and wingwalls with integral color or finishes achieved by form liners or post-production treatments. Does your site present specific challenges due to location, grade or use? That's no problem – your local precaster can work with you to solve job-site issues.

"We manufacture box culverts and 3-sided culvert sections with skewed end sections and/or skewed interior sections for curved alignments or when small-span bridge crossings are not perpendicular to the roadway," Worden said.

In Wisconsin, Wieser Concrete's customizations also run the gamut from skewed ends to corners in the run and access openings. But some jobs require more unique modifications than others. "One of the more unique ones was for steam piping for a large hospital, and the floor was sloped to one side with a small trough in it so any leaks or moisture had somewhere to go," Wieser said. "The floor was also broom-finished so they could walk in it."

Culverts are just one of the many versatile products precast concrete manufacturers offer, and perfectly represent the multipurpose nature of precast products and their ability to solve challenging construction problems. Precast concrete may not save the earth from an alien invasion of deadly robots as other Transformers undoubtedly would, but they are definitely "more than meets the eye." Contact a local precaster today at precast.org/find to see how precast concrete can help you on your next job. **ps**

Kirk Stelsel is NPCA's director of Communication.

(Endnote)

ⁱ Begun in 1984, "Transformers" is an animation/comic book/video game/film franchise co-produced between the Japanese Takara Tomy and American Hasbro companies based on alien robot toys.



More than 160 pieces, including 134 three-sided arches, were manufactured by Wieser Concrete's plant in Portage, Wis., for a stormwater detention system.