California's Water Resiliency Plan // Protecting What Matters Most // For the Long Haul

precast solutions®

WINTER 2020
UNDERGROUND
ISSUE

precast solutions

WINTER 2020
VOLUME 18 | NUMBER 1

ON THE COVER:
On the cover: Workers install a precast concrete box culvert as part of a tunnel project in Maine. The new tunnel allows toll workers to safely cross the highway while protecting sensitive personal data collected during electronic tolling.

Photo courtesy of Michie Corporation.

Precast Solutions
(ISSN 1934-4066 print, ISSN 1934-4074 online)
is published quarterly by NPCA,
the association of the
manufactured concrete products industry.

Publisher
Ty Gable

Executive Editor
Kirk Stelsel

Managing Editor
Matt Werner

Associate Editor
Sara Geer

Graphic Designer
Deborah Templeton

Advertising
Brenda C. Ibitz
(317) 571-9500
bibitz@precast.org

NPCA
Precast Solutions
1320 City Center Dr., Suite 200
Carmel, IN 46032
(800) 366-7731
(317) 571-9500 (International)
Email: npca@precast.org

WHAT'S INSIDE

CORRECTION: The previous issue of Precast Solutions included a Franchise Licensor Directory. VanHooseCo Precast LLC should have been included in the directory. The entry is below:

VanHooseCo Precast LLC
244 Blair Bend Drive
Loudon, TN 37774-6564
(865) 458-3998
www.vanhooseco.com
Jeff VanHoose
jvanhoose@vanhooseco.com

Product catalog

THE INNOVATIVE LEADER IN FORMWORK TECHNOLOGY

RATEC is trendsetter in the development and production of magnetic formwork technology and intelligent form solutions. Trust the specialists! For any formwork project we develop the suitable solution for you. Benefit from our experience and flexibility – **Meet the better ideas!**

The world of magnetic formwork technology!

Leading in precast magnets and magnetic siderail solutions.

Intelligent and innovative form designs!

Customized to meet your needs and "Made in America".

With upcrete® – visions become reality!

Production technology for highest quality surfaces and complex elements based on pumping technology for self-compacting concrete.

RATEC LLC
6003 126th Ave. North I Clearwater, FL 33760
Phone +1-727-363-7732
Toll free +1-877-337-2832
infous@ratec.org I **www.ratec.org**

BOOTH 1132
THE PRECAST SHOW

RATEC
MEET THE BETTER IDEAS

Specifier Q&A

This issue, Precast Solutions hears from Clay Tappan, P.E., BCEE, with CDM Smith.

What is your background and area of focus?

I specialize in water and wastewater pipelines and conveyance systems. I've planned, designed and/or constructed more than 1,300 miles of pipe ranging from 4 inches to 10 feet in diameter on four continents.

What projects do you typically focus on?

My primary focus is outside-the-fence pipeline systems as opposed to inside-the-fence plant/site work. These include major septic-to-sewer programs totaling more than 8,000 precast manholes and pump station wet wells.

What are some unique projects on which you specified precast concrete?

One of the more unique projects featured curved alignment box culverts, headwalls and very deep wet wells installed as caissons with tremie plugs at the bottom. This process involves placing the precast concrete structure (circular or square) that you are installing on bare ground. The interior is then excavated to essentially undermine the structure in a controlled fashion. Additional sections are stacked on top of the previous sections, and the excavation continues to the target depth. At that point, concrete is tremied into the bottom and keys into the structure to create the necessary anti-flotation mass and seal out groundwater from infiltrating or wastewater from leaking out. Sections are plant-cast with the desired lining system, which significantly improves quality control. This method is very helpful in congested areas where loose, difficult-to-dewater soils would result in a larger excavation affecting nearby structures or utilities.

Clay Tappan, P.E., BCEE

In the case depicted in the photos, Pinellas County Utilities was faced with replacing an outdated lift station located on a tidally influenced creek. The lift station was undersized and leaking. Because of site constraints including the creek, adjacent homes and a major county thoroughfare, as well as silty sands next to the water, it was important to limit construction impacts while keeping the existing station in operation. The caisson/tremie method using precast concrete sections is the go-to way to address these situations.

Photo courtesy of of CDM Smith

What benefits does using precast concrete afford you?

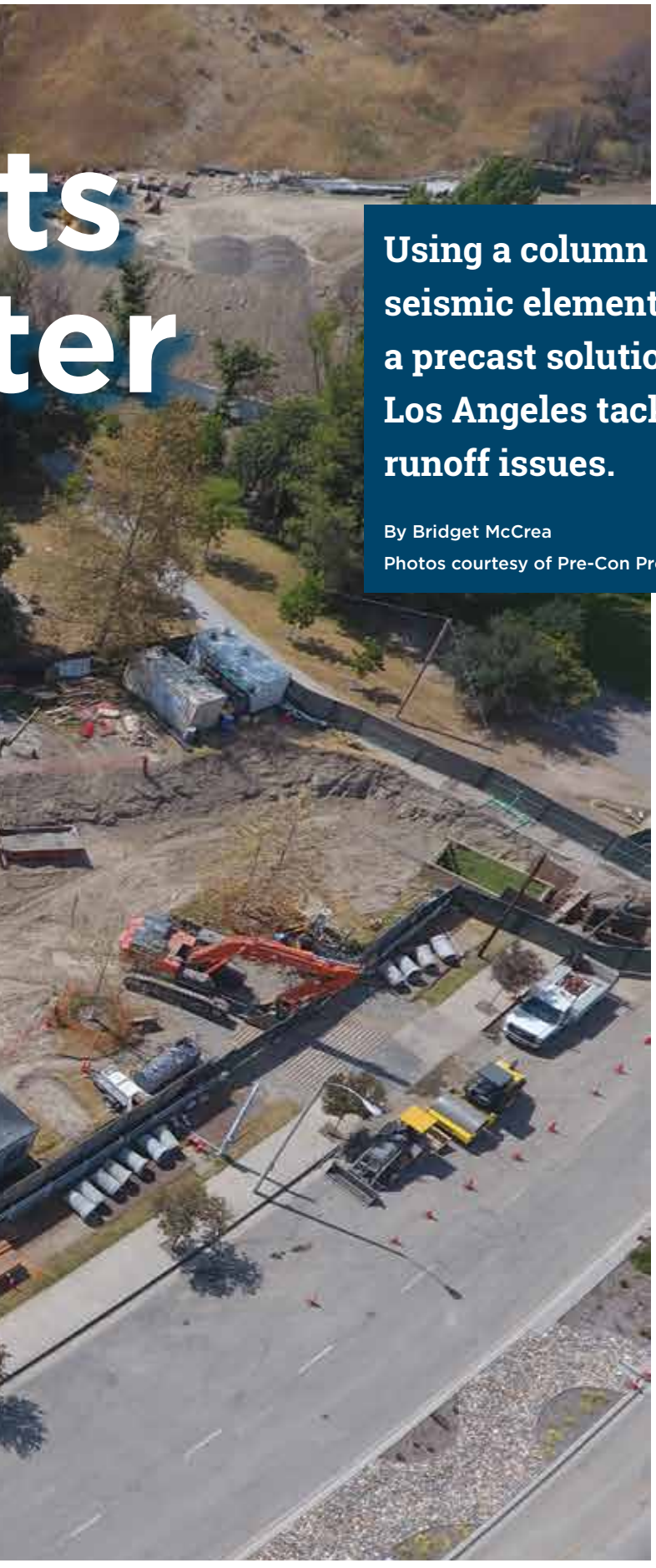
The biggest things are consistency on the product, plant quality control versus field quality control and weather being much less of a factor.

How do you see the market for precast concrete changing?

The largest, most significant change in the concrete industry is the introduction of alternate reinforcement materials such as FRP bars and polymer or steel fiber. How to design and approve these alternate systems will need to be based on an integration of industry standards to develop a level playing field. As with any new technology or approach, there can be a gap in time between introduction and general acceptance while performance is being proven. If inadequate standards or inefficient enforcement result in failures or performance issues, the entire industry can feel the blow. **PS**

Precast concrete played a major role in a Pinellas County, Fla., project. Because of site constraints, adjacent homes and silty sands, precast was chosen to limit construction impact.

Precast Suppor
California's Wat
Resiliency Plan



ts ter

Using a column design that incorporates seismic elements, Pre-Con Products offers a precast solution to help the County of Los Angeles tackle its longtime stormwater runoff issues.

By Bridget McCrea

Photos courtesy of Pre-Con Products

Every time the skies open up in Los Angeles, the city sends billions of gallons of "free liquid gold" down the drain. Now, instead of flushing that precious liquid out to sea – as it has done since the 1930s – Los Angeles and surrounding cities have put time and effort into learning how to capture and use runoff to replenish local groundwater supplies.[i]

In a state where water is nearly more precious than gold, brainstorming sessions among city engineers have segued into new opportunities, one of them being the Gates Canyon Stormwater Improvement Project. Located near Calabasas, the project is one of the most innovative stormwater projects to date in Southern California.

"With our frequent droughts and flooding, California is pushing to develop a water resiliency plan that's climate change-proof," said David Zarraonandia, president at Simi Valley-based Pre-Con Products. During the last drought cycle, for example, the water tables dropped dramatically, and wells stopped producing water. The state realized it needs to replenish the water table when it rains, which doesn't happen too often during the winter and not at all during the summer.

"As a result, any rain that does come basically flows down the creeks and out into the ocean and is lost forever," he said.

MEETING SEISMIC REQUIREMENTS

Known for its strict seismic requirements, California is one state where earthquakes have to be factored into the design. This is critical in an area of the country that experiences about 10,000 earthquakes annually, according to the United States Geological Survey (USGS).[ii] Most of the earthquakes are so small they are

not felt, and several hundred are greater than magnitude 3.0 and only about 15-20 are greater than magnitude 4.0.

"Seismic is a big deal here," Zarraonandia said. "Underground concrete structures don't generally have to meet seismic requirements because the ground just moves, and the concrete is in it, moving right along with it."

The American Concrete Institute (ACI) code for underground water storage structures includes seismic requirements. According to Joe Dietz, SE, president at DSC Engineering in Laguna Hills, Calif., ACI's specific code requirements cover both environmental engineering concrete structures (ACI 350) and seismic design of liquid-containing concrete structures (ACI 350.3).

A SHIFT IN DESIGN

For the Gates Canyon Park project, the underground structures had to be designed to accommodate both the seismic loading in accordance with ACI codes and the vehicle loading specifications from the American Association of State Highway and

Workers install a massive precast concrete stormwater detention system in Gates Canyon Park, Calif. More than 270 precast pieces were used for the project.

Transportation Officials (AASHTO).

"The ACI code requires that column elements of walls be provided with confinement reinforcement, spiral or similar," Dietz explained. "Fitting this required confinement reinforcement within the wall section required a thicker wall section for concrete placement and cover requirements than would otherwise be needed."

The stringent seismic requirements came about after several government agency engineers realized they weren't dealing with typical precast concrete products such as manholes, which have less stringent seismic design requirements.

"These are large, multi-segment structures," he pointed out. "If they don't meet seismic requirements, the failures can be catastrophic."

Knowing this, Pre-Con reviewed its original designs for the stormwater project, looking for ways to and ensure it would accommodate the seismic requirements. The project incorporates Pre-Con's patent-pending StormPrism EQ system, which features a column system to support the structure and resist applied loads. The cantilevered column system is efficient, while also providing area for the required confinement steel in the vertical reinforced core of the column element.

WHY COLUMNS WORK

Using a column design – which incorporated roughly 274 precast concrete pieces – was beneficial for several reasons. For starters, the cross-section of each column is large enough to be reinforced with confinement steel. This reinforcement is positioned around the vertical reinforcement extending the height of the column, and helps prevent bending.

"If there's an earthquake, then the column structure stays in place and won't collapse on itself," Zarraonandia explained.

He noted it also includes adjustable walls whose thicknesses can be changed based on the magnitude of the load. The column approach also allowed the precaster to adjust the thickness of the floor or "deck," making the design itself flexible.

"The column diameters and the footprint stay the same, but our deck thickness can be changed based on varying earth covers," Zarraonandia said.

While the design was simple for the project, the system is extremely flexible due to adjustable walls, floors and decks.

REDUCED MOVEMENT AND SLOSHING

To provide the increased rigidity needed to handle the site transportation issues and exceed the required moments from the seismic loading conditions, the column system also incorporates a flared cross-section at the top and bottom of each respective modular unit.

Designed to capture, treat, filter, and re-use local stormwater runoff, the project's cistern component required up to 3.5 acre-feet of storage in an underground structure with up to 14 feet of fill above.

"Precast concrete quickly became the preferred material for the construction of underground stormwater storage cisterns due to [its] quick construction time and high load capacity," Dietz added.

Once in place, Pre-Con's StormPrism system created a completely watertight stormwater storage system. The speed of construction met the expectations associated with the use of precast concrete, Dietz noted, while also providing quicker installation.

"The cantilevered column system allowed the rigid frames to easily survive transport to the site and not a single unit was rejected once it arrived on-site," Dietz said. "The StormPrism precast components also have potential uses beyond the use in stormwater capture projects, as the reduction in internal walls and increased open space allows it to be used for many other applications, including underground storage, shelters and agriculture."

Reyes Construction served as the prime contractor for the project and also touted the speed of using precast concrete.

"Precon's precast storage system was a vital component to meeting the major project milestones," said Project Manager Scott Mothershed. "The ability to manufacture a system off-site while excavation simultaneously occurred on the project saved nearly half the time it would have taken to construct the system as a cast-in-place alternative."

MAKING AND INSTALLING

Pre-Con handled both the precasting and the installation processes for the project. Zarraonandia said being involved with the installation on such a large, significant project helps the company to better understand the intricacies of the work and what it can do to facilitate future initiatives.

For example, Pre-Con has already come up with a number of changes it wants to make on the next go-round, mostly in terms of the process for assembling the precast pieces on-site.

"We've come up with some tooling that will make installation even easier," he added.

THERE'S MORE TO COME

According to Dietz, the Gates Canyon Park project wasn't the first to require the use of a modular precast concrete system for underground stormwater storage requirements.

"There are many other examples within the Southern California area of completed and constructed projects utilizing modular precast concrete units to build underground stormwater storage structures of varying sizes and shapes," he explained. "California Proposition 1 (a stormwater grant program) and the recently-passed Los Angeles County Measure W (a parcel tax for stormwater recycling) will provide a large funding source for regional and municipal stormwater quality improvement projects going forward.

"It's expected that precast concrete will continue to be used on these future projects as a proven solution."

According to Zarraonandia, the project's owner, Los Angeles County Department of Public Works, was pleased with the outcome. Looking ahead, Zarraonandia also sees more opportunities to use Pre-Con's StormPrism system to support

California's ongoing commitment to water resiliency.

"Stormwater systems lend themselves to precast because most of them are modular, and include repetitive pieces that are large, yet relatively simple to put together – kind of like Legos," he concluded. "This is a very good niche for precast concrete, especially for public works and other large projects." PS

Bridget McCrea is a freelance writer who covers manufacturing, industry and technology. She is a winner of the Florida Magazine Association's Gold Award for best trade-technical feature statewide.

Endnotes

[i] www.latimes.com/local/lanow/la-me-ln-stormwater-20170308-story.html

[ii] earthquake.usgs.gov/learn/facts.php

What about the Hatch?

Utility structures and traffic loading simplified

Alex Morales, M.Ed.

When underground precast concrete structures are used on a project, they are often one part of many components of the total project. Choosing a material for the access hatches for those structures, then, could become another detail. However, it's a decision that carries a lot of weight, pun intended.

Access hatches come in a variety of performance strengths based on the type of material (e.g. aluminum, steel, cast iron) and the amount of it used to cast the hatch. Specifying the exact load requirement of a hatch will help both standardize the cost for owners and ensure proper performance throughout the life of the structure.

PLANNING FOR THE UNEXPECTED

Although every effort is made to keep surface traffic away from underground structures, sometimes it is necessary. In a previous Precast Solutions article[1], the issue of traffic-rated precast tank design was addressed, and concluded that the entire precast structure carries live loads (e.g. wheel loads) and must be properly designed to handle stated traffic ratings. That discussion was specific to wastewater treatment structures, however, and access points for them are usually designed for only pumping equipment to enter the tank. A proper traffic-rated circular lid does the job. When looking at underground precast concrete utility structures, access to the utility equipment by humans is expected, and a hatch is used rather than a lid.

Utility hatches are square or rectangular and come in various sizes. The strength of the hatch must coincide with the strength of the precast concrete in order for the entire structure to function properly and handle the anticipated live loads. The surface area of a hatch exposed to live loads can be greater than a standard lid. Therefore, the type of traffic (e.g. live load) is important to address for preventing a needless overdesign or, worse, an under designed hatch.

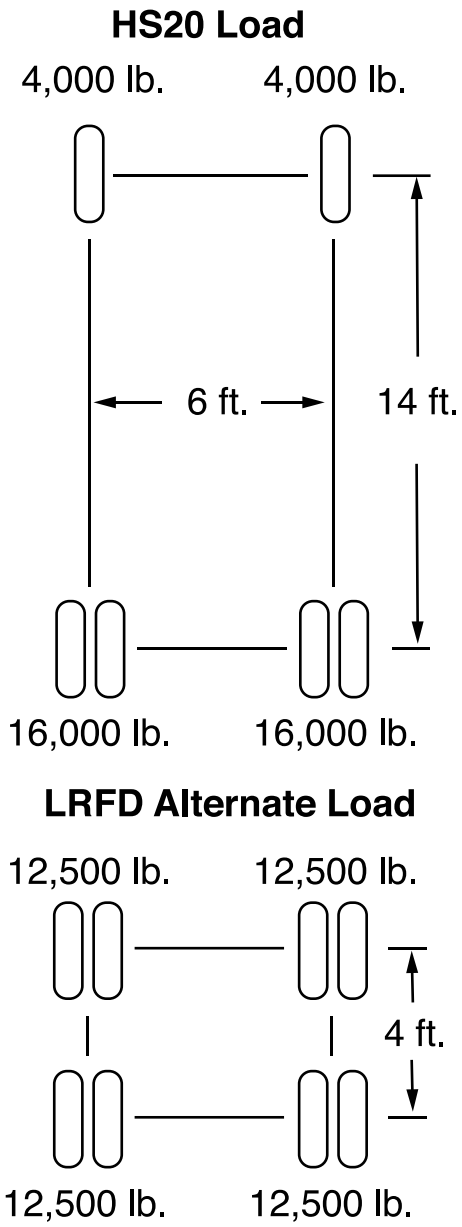
AASHTO TRAFFIC RATINGS

The American Association of State Highway and Transportation Officials (AASHTO) publishes specifications and guidelines in highway design and construction throughout the United States. The Standard Specification for Highway Bridges addresses load bearing requirements for manhole lids that had traditionally been applied to utility hatches. AASHTO has established the following categories for weight limits for regular vehicular traffic:

H20/HS20 = 16,000-lb. wheel load, 32,000-lb. axle

H25/HS25 = 20,000-lb. wheel load, 40,000-lb. axle

It is important to note that lids and hatches designed to meet these AASHTO loading requirements need to be tested to meet these minimums. If a specification requires H20/HS20 loading, it simply requires a cover meet



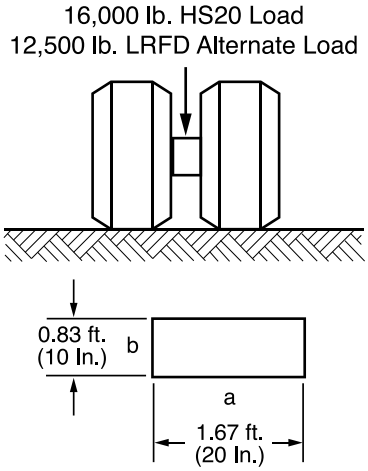
the design load of 16,000 pounds per wheel without a safety or impact factor or dynamic load allowance.

AASHTO M306, "Standard Specification for Drainage, Sewer, Utility, and Related Castings," was first published in 1989 and began requiring a 2.5 times safety factor in a proof load test, as stated in section 6.2 of the specification. A closer look at AASHTO M306, however, reveals the document specifically applies to cast iron and ductile iron castings. What about the other castings in the industry?

CSA LOAD CLASSIFICATIONS

A single-wheel HS20 or HS25 footprint load analysis is appropriate for structures using hatches in highways that may experience truck or semi-trailer wheel loads constantly. But what about lanes of traffic where semi-trailer traffic is prohibited? Or in a drive-thru where large trucks simply can't fit?

The Canadian Standards Association's specification B481 Series-12 (reaffirmed in 2017) addressed these scenarios in load testing for lids of grease interceptors, which must be installed as close as possible to the sources of fats, oils and greases and many times end up in various traffic conditions. In an effort to standardize the lid and cover requirements for various traffic scenarios, Section 6.1.1 of B481 Series-12 requires that tops and rims be rated according to the Load Classification Table below:



NPCA Graphic

In Table 1 of CSA's specification, a reference to various live load classifications exhibits a keen understanding that not all grease interceptors are exposed to large, heavy trucks. An H20 or HS20 requirement would be an overdesign in a load classification H (light trucks) scenario, and even more so in a load classification M (light vehicular traffic) scenario.

Load Classification Table

Load Classification	Safe Live Load, kg (lb)	Platen diameter, mm (in)	Minimum test load at failure, kg (lb)
No load rating (NR)	0	N/A	0
Light duty (L): foot traffic	135 (300)	90 (3.5)	270 (600)
Medium duty (M): light vehicular traffic (e.g. cars)	900 (2,000)	150 (5.9)	1,800 (4,000)
Heavy duty (H): light trucks	2,250 (5,000)	150 (5.9)	4,500 (10,000)
Extra heavy duty (X): heavy trucks	3,375 (7,500)	250 (9.8)	6,750 (15,000)
Special duty (S):	4,500 (10,000)	250 (9.8)	9,000 (20,000)

TABLE 1

Load Level	Area of Use	Design Load and Allowable Deflection
Load Level 1	**Light Pedestrian Load** Restricted to walkways and other areas that are totally inaccessible to all vehicle traffic	150 pounds per square foor/300 pounds on a 5.5 inch x 5.5 inch area; deflection limited to span/200 (not to exceed 3/16 inch)
Load Level 2	**Pedestrian Load** Restricted to pedestrian and light maintenance vehicle use and are inaccessible to all other vehicle traffic	300 pounds per square foot/600 pounds on a 5.5 inch x 5.5 inch area; deflection limited to span/200 (not to exceed 3/16")
Load Level 3	**Light Vehicular Traffic** Restricted to parking spaces accesible only to passenger vehicles and protected areas within close proximity of roadways	8,000 pounds on a 10 inch x 10 inch footprint without dynamic (impact) load/80 pounds per square inch on top plate surface; deflection limited to span/250 (not to exceed 3/16")
Load Level 4	**Occasional Truck Traffic** Restricted to parking spaces and protected areas within close proximity of roadways	16,000 pounds on a 10 inch x 20 inch footprint without dynamic (impact) load/80 pounds per square inch on top plate surface; deflection limited to span/250 (not to exceed 3/16")
Load Level 5	**Off Street Truck Traffic** Restricted to unrestricted parking lanes and alleyways where traffic speed is limited to 15 mph	16,000 pounds on a 10 inch x 20 inch footprint with 30% dynamic (impact) load/104 pounds per square inch on top plate surface; deflection limited to span/300 (not to exceed 3/16")
Load Level 6	**Two-lane Vehicular/Truck Traffic** Restricted to two-lane streets with a maximum posted speed limite of 35 mph	16,000 pounds on a 10 inch x 20 inch footprint with 33% dynamic (impact) load/106.4 pounds per square inch on top plate surface; deflection limited to span/800 (not to exceed 3/16")
Load Level 7	**Full Traffic** For use in multi-lane roadways with a maxiumum posted speed limit of 70 mph	16,000 pounds on a 10 inch x 20 inch footprint with 33% dynamic (impact) load/106.4 pounds per square inch on top plate surface; deflection limited to span/800 (not to exceed 3/16")
Load Level 8	**Occasional Aircraft Loads** For use in unpaved runway safety zones only	75,000 pounds with 250 psi tire pressure without dynamic (impact) load, or the specific airport design criteria; deflection limited to span/800 (not to exceed 3/16")
Load Level 9	**Aircraft Loads** For use in taxiways and aprons, not for use in runways	75,000 pounds with 250 psi tire pressure with a 33% dynamic (impact) load and a 0.70 gravity breaking load, or the specific airport design criteria; deflection limited to span/800 (not to exceed 3/16")
Load Level 10	**Special Equpment Loads** Such as mining equipment, port equipment, cranes, and earth-moving equipment	The axle load, the axle spacing, tire width, and tire pressure to be provided by thte purchaser; a 33% dynamic (impact) load shall be utilized; deflection limited to span/800 (not to exceed 3/16")

ASTM INTERNATIONAL LOAD LEVELS

The same overdesign concerns have existed with utility structures. If a utility structure was placed near a stoplight in an area that was periodically mowed with commercial equipment, it would only be exposed to actual traffic wheel loads (in the event a vehicle left the actual roadway). If that same structure was placed in a field away from traffic, it may never be subjected to traffic-rated live loads aside from the periodic lawn mower. Would the hatches need to be specified precisely the same?

ASTM C1802-18, "Standard Specification for Design, Testing, Manufacture, Selection, and Installation of Fabricated Metal Horizontal Access Hatches for Utility, Water, and Wastewater Structures," does not think so. This standard provides the designer added flexibility by ranking load levels from Load Level 1 for light pedestrian loads to Load Level 10 for special equipment loads.

SPECIFYING HATCHES

With each increase in ASTM C1802 load level, the cost of a fabricated metal hatch will increase the total cost of a structure. If no specific hatch load is specified, an H20 load might be assumed, but chances are the owner will be looking at quotes of various load levels, a situation ripe for comparing apples to oranges. Specifiers of fabricated metal hatches for underground structures who define their requirements to the specific loading described within ASTM C1802 can not only ensure they are getting a hatch properly designed for their particular situation but can better control their costs as they avoid unnecessary overdesigns. PS

Alex Morales, M.Ed., is NPCA's Director of Workforce Development.

Endnote

[1] precast.org/2010/07/traffic-related-tank-design

Protecting Wha Matters Most

A precast concrete tunnel keeps workers safe, modernizes the Maine Turnpike.

By Matt Werner
Photos courtesy of Michie Corporation


MICHIE
CORPORATION
NOT FOR LIFTING
MICHIE
NPCA
REED & REED
EXIT 44 INTERCHANGE
SCARBOROUGH, ME
PROJECT NO. 8070
PROD. 10X8 TT
BUILT BY
DATE
PROD ID:
CY: 9.74

Precast concrete box culvert sections created a 200-foot-long tunnel to allow Maine toll workers to safely get to their posts and protect highly sensitive data from open road tolling.

Cutting along the coast of Maine, Interstate 95 is a main thruway for the state, well-traveled by residents and tourists. In fact, the Maine Turnpike bills itself as New England's original superhighway and carries millions of drivers every year. The tollway was so revolutionary when it first opened in 1947 that it was even designated as a National Historic Civil Engineering Landmark in 1999.

But times have changed. Fast forward to today and more cars are on the road than ever. Fewer cars are stopping at a toll plaza to drop in money thanks to technological advances that allow cars to pass through an electronic toll booth at highway speeds.

Therefore, getting workers to their tollbooths safely has become a bigger challenge in recent years. And with lots of highly sensitive information being transmitted between the car and tolls, keeping that information secure is vital as well.

UPGRADING TECHNOLOGY, SAFETY

To solve these issues the Maine Turnpike Authority is wrapping up a 7-year, $125 million project to upgrade its tolling facilities as many are outdated and cannot accommodate highway-speed tolling. The newer facilities are designed to be more effective, cheaper to operate and easier to maintain.

One plaza, along Interstates 95 and 295 just outside the city of Portland, was in desperate need of renovation. The Exit 44 Open Road Tolling (ORT) Project included replacing the toll plaza with a new eight-lane tolling plaza that was more conducive for ORT, constructing an administration building and numerous other highway improvements to improve traffic conditions in the area.

Erin Courtney, Maine Turnpike Authority's public outreach and marketing manager, said the Exit 44 plaza was one of the last to be converted due to the complexity of the project. The toll plaza also had to be moved from its previous location.

With an administration building on one side of the highway, the problem became how to get workers to their stations safely as well as ensuring the electronics and utility lines were protected from Maine's harsh winters. Luckily, the solution came in the form of precast concrete.

HIGH DESIGN CRITERIA

Since the purpose of the tunnel was specific, there were a lot of unique requirements for the tunnel.

"The bearing surface of the structure needed to be large due to poor soil conditions," said Brian Holmes, project manager with Reed & Reed. "The turnpike also had a long lifespan

requirement that they wanted the tunnel to be designed for without any water infiltration. They had pretty high design criteria."

Henniker, N.H.-based Michie Corporation provided the 200-foot-long tunnel for the project plus other precast items like highway barrier, mechanical access structures, light pole bases and more.

"We have done numerous pedestrian and animal crossings of similar dimensions, but shorter overall lengths," explained Chad Poland, engineering manager for Michie. "What really made this structure unique was the length as well as the additional structures attached to the tunnel that needed to maintain a completely waterproof connection."

Poland said they had to get creative with the connections to ensure the tunnel was watertight, since groundwater was a serious concern.

"The tunnel was designed with a special watertight ring system and a sloped floor with a drainage trough cast in one side," he noted. "In the event water or condensation does build up, it would have a conduit to drain freely to an interior sump pump system. The contractor also installed an exterior membrane to maintain a dry environment throughout the system, which was critical due to the extensive utilities running throughout the tunnel."

With short construction seasons and trying to minimize traffic disruptions, the project was done in phases. This turned up the pressure for Michie. Poland estimated they were casting tunnel sections within six weeks of signing the contract.

MEETING DEMANDS AND EXPECTATIONS

Poland said once they started casting the 29 10-foot-wide-by-8-foot-tall tunnel sections, they had few production challenges. The median barriers were some of the largest they had ever produced ranging from the standard 48 inches tall all the way up to 66 inches, which required

Michie Corporation also provided highway barrier and other precast concrete elements for the project.

Advanced Wastewater Design

GIVE ME GOOD SCIENCE, NOT ANOTHER SALES PITCH!

Problem:

Mitigate Microbially Induced Corrosion of Concrete (MICC)

Solution:

ConBlock System of Products

Proof:

MICC@ConSeal.com

Visit them at:
#PrecastShow: 925

1. ConBlock MIC: Antimicrobial Concrete Admixture
2. ConBlock Topical: Concrete Surface Treatment; Fortified with ConBlock MIC
3. ConBlock CDA: Concrete Densifying Admixture
4. ConSeal CS-1800: Solvent-Free Waterproofing Membrane

SEAL OF SECURITY
BOND OF TRUST

CONSEAL™
CONCRETE SEALANTS INC.

800.332.7325 • www.ConSeal.com • An ISO 9001:2015 Company

Michie Corporation provided on-site technical assistance to make installation easier.

Michie to modify their forms to get to the needed height.

"The structural and geometric design of the staircase component was particularly challenging because there were grade beams in predetermined locations that had to be incorporated in the precast layout," Poland said. "This led to the unique sloped shape of the staircase structure."

Delivery also had to be streamlined and coordinated in order to meet the construction schedule, but Michie was on-site to ensure everything went smoothly. Michie's standard practice for large projects is to send a field assistance crew to help with installation.

"It was extremely helpful having their assistance as well as some of their specialty rigging and tooling," Holmes said. "We had not installed precast tunnel or culverts to this extent so their assistance was extremely helpful for what was a smooth installation."

From meeting the tight timeline to the challenging design criteria, all the benefits of precast were on display for the project.

"The precast tunnels are the best alternative

because they were faster and easier from a construction standpoint, had less of an impact on traffic and were less expensive," Courtney noted. "The precast tunnels also provided a better product because instead of being exposed, they were cured under controlled conditions."

Holmes echoed those points, adding additional benefits to working with precast.

"Using precast was very user friendly," he explained. "We could unload it off the truck and set it right into its final position. We didn't need any double handling or anything like that."

UNDER BUDGET, AHEAD OF SCHEDULE

From the precaster to the project owner, all parties consider the project a success. Holmes said Michie was great to work with given how extensive the review process was. He said the fabrication was done to meet their schedule, and that they were very happy with the product.

The Maine Turnpike Authority was equally pleased with the project.

"The whole project went very smoothly," Courtney noted. "In fact, the project just

wrapped up this month and was finished under budget and a month ahead of schedule."

For Michie, hearing that is what mattered most.

"We were happy with the way everything progressed, but more importantly the contractor and owner were happy," Poland explained. "This was our first time working with Reed & Reed, and since this project, we've worked on several other projects with them. We've begun to developed a very positive, hopefully long-term, working relationship with them, which is always our goal." **PS**

Matt Werner is the managing editor of Precast Solutions magazine and is NPCA's communication manager.

By using precast concrete, the project was completed one month ahead of schedule and under budget.

Photo courtesy of of Oldcastle Infrastructure

For the Long Haul

Two precast concrete culvert projects in the Northeast offer durable, long-lasting solutions for one of the nation's most concerning issues.

By Mason Nichols

Since 1880, average sea levels across the globe have increased by 8 inches, with 3 of those inches gained in just the last 25 years, according to the National Geographic Society. At first glance, that difference may seem inconsequential, but even a small change can have a devastating impact on habitats, including erosion, an increase in dangerous tropical weather and higher rates of flooding.

The question then is, what can communities do to help mitigate flooding? Specifiers are turning to precast concrete, a durable, resilient building material that is designed to not only meet current needs but continue to provide an optimal solution for years to come.

A RIVER "RUNNINS" THROUGH IT

The towns of East Providence, R.I, and Seekonk, Mass., are separated by the Runnins River, an approximately 9-mile waterway that forms part of the boundary between the two states. For years, extreme storm events meant flooding issues for residents in the area. As a result, East Providence officials applied for and received a flood prevention and mitigation grant to solve a major issue for the crossing at Warren Avenue – one of the area's busiest thoroughfares.

According to Jan Greenwood, P.E., senior project manager for lead engineering firm Woodard & Curran, the existing culvert at the crossing was insufficient, necessitating a change.

"A hydrologic/hydraulic analysis of the river revealed that the existing culvert at Warren Avenue is undersized," she said. "Under high flow conditions, the water rises above the existing culvert and backs up into an upstream neighborhood."

To solve the issue, Woodard & Curran partnered with local general contractor J.H. Lynch & Sons and Scituate Concrete Products of Marshfield, Mass., to supplement the outdated culvert with the addition of two runs of 3-foot-tall, 7-foot-wide precast concrete box culvert. The new precast culverts provide additional flow area for the water to pass, reducing backup into the flood-prone neighborhood.

As a design-build project, the three entities involved worked closely, collaborating from the onset of the work to identify various culvert configurations. And while deciding on the ideal approach was relatively straightforward, getting the final go-ahead from officials was not.

"This project was delayed for over a year due to some issues between East Providence and Seekonk regarding who had jurisdiction," said Bill Griffin, sales representative for Scituate Concrete Products. "But the culvert was made ahead of time, so we were ready to go when they were."

With the approvals in place, J.H. Lynch & Sons got to work in Summer 2019. Because the Warren Avenue crossing is a heavily used roadway, the local department of transportation allowed a maximum of 30 days to complete the job. The bulk of that time was spent performing

Photo courtesy of of Woodard & Curran

prep work, including excavation, demolition, grading and dewatering. But according to Chris London, P.E., project manager with J.H Lynch & Sons, the precast culvert installation only took a few days, which was vital in ensuring the work was completed ahead of the DOT-specified timeline.

"This project would not have been possible to build in the manner that we did without precast concrete," he said. "If we were casting these culverts in place, it would have taken far more than 30 days, and in that scenario, we probably wouldn't have been able to detour the roadway. That would have resulted in a greater impact on traffic and a higher cost to the public as well."

Greenwood agreed with London.

"The precast products were instrumental in this project because of their quick installation time," she said. "It was important to minimize the time working adjacent to the river since rainstorms would cause a rise in the water level that could make the work more difficult."

Thanks to the use of precast, the entire project was completed in fewer than four


Photo courtesy of of Oldcastle Infrastructure

As cities across the country deal with flooding, many are turning to precast concrete to solve their problems. In Ellicott City, Md. and East Providence, R.I., a precast concrete culvert was installed in less than two weeks to manage the city's stormwater runoff.

Photo courtesy of of Oldcastle Infrastructure

weeks, meeting the DOT's stringent schedule and providing area homeowners with much-needed flood relief.

A CULVERT FOR THE AGES

Approximately 400 miles to the southwest, citizens of Ellicott City, Md., were dealing with their own flooding problem – but on a much larger scale. While 2018 saw a record amount of rainfall for the state overall, May 27 was a particularly catastrophic day for the city. In the span of just three hours, more than eight inches of rain fell, with some areas receiving more than 10 inches.[1] The storm came just two years after the city experienced another devastating rain event that caused severe land erosion and massive damage to buildings.

At the intersection of Main Street and Ellicott Mills Drive, an aluminum culvert installed in 1970 was all that stood between the roadway and the torrential rainfall. But as the storm continued to pound the city, the culvert failed, resulting in the loss of a 25-foot portion of the Ellicott Mills roadway.

According to Thomas Butler, P.E., deputy director for the Howard County Department of Public Works, the culvert failure – along with other residual damage generated by the storm – resulted in more than 200 cars being swallowed by the water. Faced with an emergency and the need to quickly rebuild the roadway, Howard County officials turned to precast concrete for

Photo courtesy of of Oldcastle Infrastructure

Precast concrete's durability, resiliency and speed of installation were all key to the project in Maryland.

the replacement culvert.

"The decision to go with precast was twofold," he said. "The weight of precast in the channel forever and a day is going to be a better product than what was there previously. Precast was also an optimal solution due to ease of construction – we needed to rebuild the roadway quickly."

Howard County officials got to work selecting their project partners, which included Oldcastle Infrastructure for the precast concrete and Allan Myers for the general contracting work. Oldcastle's plant in Fredericksburg, Va., produced the precast. Larry Ramsburg, Oldcastle's director of manufacturing, northeast region, said the assembled box culvert was approximately 200 feet long.

"This was produced as what we call a Type II culvert, or clamshell," he said. "You have the floor and half the height of the wall as one piece and the roof with half the wall on the other piece. These go together as a top and base, open-ended, and then there are 5-foot section lengths that go together end-to-end to make up the 200-foot run."

As Butler explained, the intersection needed to be rebuilt fast because it serves as a major connection for emergency responders and is located at a critical point along the city's evacuation route. With a short timeline, close-knit teamwork and collaboration were key to ensuring a successful project. According to Jeff Dremel, senior project engineer for Allan Myers, all three parties recognized this and operated accordingly.

"Through the design phase and with the selection of the culvert, everyone worked together," he said. "Even during the shop drawing review process and any of the changes that were made, everything went smoothly."

Oldcastle set up operations in Fredericksburg so a top and a base section could be poured each day. For easier installation in the field, the base sections were shipped upright, even though they are normally manufactured on their side. After production was completed, 59 loads – including accessories – were shipped from Virginia to Maryland over the course of seven days.

To prepare the site for the precast culvert installation, Allan Myers team members removed the debris, performed excavation work, prepped the subgrade and installed a pump-around system to handle the existing stream. While this system was essential to allowing the installation to occur, due to the geographic conditions in the area, any significant rainfall would be too much for the pumps to handle, causing slight delays in the work. Even with hiccups caused by rain, installation was completed in less than two weeks.

"First and foremost, precast expedited the installation, and even with the days that we lost due to weather, we were able to come back and just regrade the stone," he said. "Beyond that, we didn't have cure times, we didn't have to worry about shoring and re-shoring, and we didn't have formwork or rebar in the existing channel that we had to clean up or worry about losing."

Ramsburg tacked onto Dremel's assessment, noting precast's extreme durability as paramount for the continued service of the roadway.

"Typically, a precast concrete culvert has about a 100-year life expectancy before you have to do anything to it," he said. "In the long run, if you want to put something in that will withstand the test of time, precast is definitely the route to go."

FIGHTING BACK

To ensure roadways remain intact and transportation systems stay in operation, architects, engineers, general contractors and specifiers require a building material with the durability and resiliency necessary to fight back. Precast concrete culverts meet these needs, providing the long-lasting service life to support communities, the quick installation times required of emergency work and the flexibility needed to make nearly any imaginable project possible. PS

Mason Nichols is a Grand Rapids, Mich.-based writer and editor who has covered the precast concrete industry since 2013.

Endnote

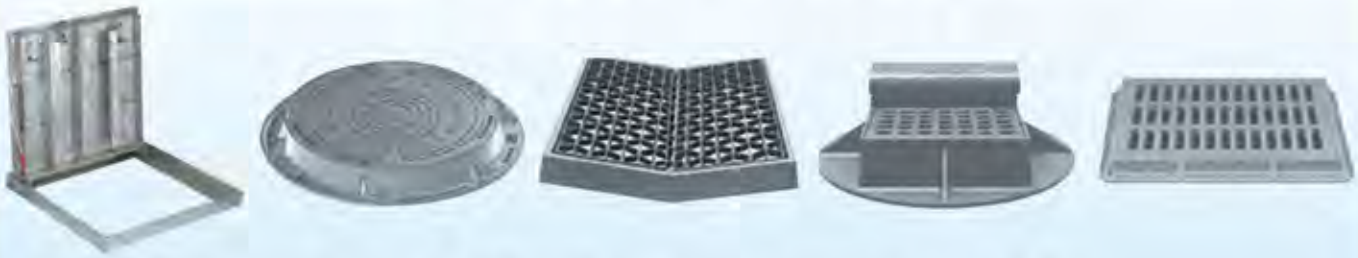
[1] www.washingtonpost.com/news/capital-weather-gang/wp/2018/05/28/the-second-1000-year-rainstorm-in-two-years-engulfed-ellicott-city-heres-how-it-happened/

EAGLE MANUFACTURING GROUP

BOOTH 1421
THE PRECAST SHOW

US FOUNDRY
AN EAGLE MANUFACTURING COMPANY

Providing quality products and excellent service to customers since 1916.



To meet all of your casting needs, US Foundry has a complete product line including:

- Manhole Rings & Covers
- Cast Iron & Steel Grating
- Municipal & Utility Castings
- Inlet Frames & Grates
- Trench Grating
- Tree Grates
- Valve Boxes
- Airport Products
- Hatches
- Aluminum & Steel Fabrication

For more information contact us at:

U.S. Foundry 800-432-9709
sales@usfoundry.com

Scan the QR Code using your smart phone to find out more about US Foundry.

www.usfoundry.com

USF FABRICATION
AN EAGLE MANUFACTURING COMPANY

Fabricating solutions since 1916.

We Manufacture:

- Floor Access Doors (Aluminum, Steel or Stainless Steel)
- Metal Grating
- Pump Station Accessories (Cable Holders, Guide Rail Supports, Hoists, etc.)
- Hatch Safety Nets and Hatch Safety Grates for Fall Through Prevention
- Mixer Mast Assemblies
- Ladders and Ladder Safety Posts
- Pump Tubes (for Submersible Propeller Pumps)
- Miscellaneous Metal Fabrication
- Rolling, Burning, Bending and Cutting Services

For more information contact us at:

U.S.F Fabrication 800-258-6873
service@usffab.com

Scan the QR Code using your smart phone to find out more about USF Fabrication.

www.usffab.com

THE PRECAST SHOW 2020

March 5-7, 2020 I The Fort Worth Convention Center
Fort Worth, Texas

ThePrecastShow.org

NPCA
precast.org

PCI
Precast/Prestressed Concrete Institute
pci.org

CPCI.ca
CANADIAN PRECAST/PRESTRESSED CONCRETE INSTITUTE
INSTITUT CANADIEN DU BÉTON PRÉFABRIQUÉ ET PRÉCONTRAINT

1927 CAST STONE INSTITUTE®
caststone.org

THE PRECAST SHOW