

CONCRETE PIPE NEWS



The Magazine of the
American **Concrete Pipe** Association

2007 Project Achievement Award Winner

Braman
Road
Washout
Calls
for
Baffling
Solution

This issue:

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Concrete Pipe News is published four times each year by the American Concrete Pipe Association. It is designed to provide information on the use and installation of precast concrete pipe products for a wide variety of applications, including drainage and pollution control systems. Industry technology, research and trends are also important subjects of the publication. Readers include engineers, specifiers, public works officials, contractors, suppliers, vendors and members of the American Concrete Pipe Association.

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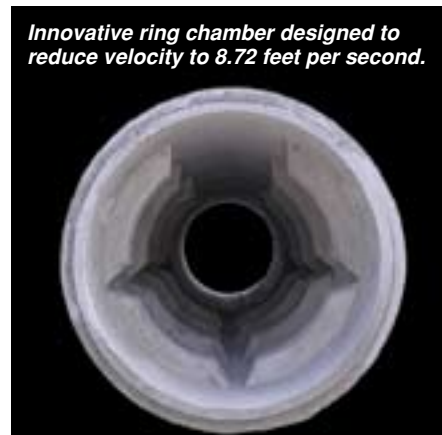
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Clarification Notice.
Additional information for the lead article of the Summer 2007 Issue (Vol. 59, No. 3) was received by the Editorial Staff after the copy had gone to press. The author provided the following clarification for the article, "Deep Bury Baumgartner Sanitary Sewer Tunnel Lined with Reinforced Concrete Pipe."
To enhance water quality, the Metropolitan St. Louis Sewer District of St. Louis, MO needed the construction of the Lower Meramec River Wastewater Treatment Plant along with a precast-concrete trunk sewer and outfall.
The first phase of the plant will have a capacity of 15 million gallons per day. The existing lagoons at Baumgartner and Meramec will be closed after startup of the new plant.
In addition to the tunnel, HDPE-lined concrete pipe was used for the outfall from the new plant. After primary and secondary treatment, the treated wastewater will flow from the plant by way of the concrete pipe outfall.
The project was started in July 2001 and went on line in March 2007 at a cost of approximately \$194 million.



Innovative ring chamber designed to reduce velocity to 8.72 feet per second.

editorial

*Matt Childs, P.E.
President*

American Concrete Pipe Association



DOT Project Achievement Award - Project Solves A Baffling Problem

ACPA's 2007 Project Achievement Award was won by the Pennsylvania Department of Transportation (PennDOT), District 4 for a specially designed culvert that replaced a failed corrugated metal culvert. The engineering team had to consider the high velocity of a stream, and design a solution for dissipating the hydraulic energy before the stream exited the outlet of the culvert. The team decided on ring chamber stations or "baffles." The baffle (dissipater) system was designed in accordance with Penn DOT HEC-14 procedures.

ACPA began the award in 2006 to reward creativity and excellence in precast concrete pipe and box culvert design and installation. The third Project Achievement Award has been launched by Tom Wheelan, Chairman of the Board of the American Concrete Pipe Association. Any state DOT may enter the competition. State DOTs and ACPA members are invited to submit projects jointly or separately. The winning award will be based

upon public involvement and education, use of new materials or large diameter concrete pipe or precast boxes, use of new technologies, innovation, complexity, cost effectiveness and environmental benefits. Entry forms for the 2008 Award are due March 1, 2008.

There were eight entries in this year's competition. All but one dealt with improving steam hydraulics and stormwater management. The unrelated project was a unique application for precast boxes used to construct a culvert under U.S.41 near Princeton, Indiana that houses a conveyer used to move coal from a mine to a nearby rail terminus. All DOT projects were deserving candidates for the award.

This issue of Concrete Pipe News is dedicated to the Departments of Transportation and all the companies and individuals who played a role in designing and constructing concrete structures. The projects were built with high quality precast concrete products to last for the design life of projects under conventional maintenance conditions. Projects considered for the award included the jacking of RCP under the ramps of the Fort Washington Interchange of Route 309 at the Pennsylvania Turnpike, replacement of a failing pre-WWII culvert with concrete pipe designed as an energy dissipater about two miles north of Lake George in New York State, replacement of a failed 60-inch diameter CMP culvert with 84-inch diameter RCP on Route 17 in Windsor, east of Binghamton, New York, direct jacking of 80 feet of 60-inch diameter Class 5 C-wall RCP under the heavily traveled New Jersey Transit/North Jersey Coastline Rail in Neptune, New Jersey, design and construction of a precast concrete box drop grade control structure near Little Falls in Minnesota, and the box culvert under U.S. 41 in Pennsylvania.

The award sets the context for a new category of membership in the ACPA. To mark the ACPA's 100-year relationship with America's engineers and recognition that concrete pipe and boxes are widely used to protect the health and safety of Americans, the ACPA has opened its membership to professional engineers. The Project Achievement Award and the opening of the ACPA to Professional Membership are the bookends for this issue of CP News that spotlight public works specially designed by engineers. ☺

Feature Story

2007 Project Achievement Award Winner

Braman Road Washout Calls for Baffling Solution

By Deborah Lommis • Cayuga Concrete Pipe (Montrose) • 215-788-5572

The Pennsylvania Department of Transportation (PennDOT) District 4 maintains more than 3,600 miles of state roadways and 2,076 bridges in Northeastern Pennsylvania, spanning six counties including the Pocono Mountain Range. When Mother Nature completed her thawing in late spring 2005, Braman Road (SR 1018) in Manchester Township, Wayne County Pennsylvania was washed out, exposing 150 feet of corrugated metal pipe. The culvert was deemed ineffective and the road became impassable.

Braman Road is a two-lane mountainous path passing over the culvert containing Little Equinunk Creek and intersecting Route 191. Residents living on Braman Road were concerned about emergency needs and the possi-

bility that the lengthy detour would cause life-threatening delays. Time was of the essence. Elected representatives and PennDOT officials were inundated with calls from frustrated residents demanding repair of the road.

PennDOT chose 96-inch and 78-inch diameter reinforced concrete pipe to replace the exposed culvert pipe. The pipe would have to be designed for fill heights up to 30 feet. In addition, the engineering team had to consider the high velocity of the stream, and a design solution for dissipating the hydraulic energy before the stream exited the outlet of the culvert.

PennDOT's project team included Charles Nihen and Vince Capoccia of the Roadway Unit and Gerard Babinski and Joe Marichak of the Bridge Unit. The team decided on ring chamber stations or "baffles." The baffle (dissipater) system was designed in accordance with PennDOT HEC-14 procedures.

The Northeast Pipe Group of Oldcastle Precast, Inc. consisting of Cayuga Concrete Pipe and Kerr Concrete Pipe analyzed the project and used value engineering to save the state and the taxpayers thousands of dollars and valuable time. Each section of the complete run was designed to the amount of fill that it would actually be supporting. This allowed the state to use a smaller percentage of 96-inch diameter pipe categorized as a special design deep fill. The pipe group also submitted an innovative and enhanced ring chamber design for approval.

Baffles are used to control the exit velocity of the stream. The 176-feet of pipe required installation on a slope of 11.3 percent. Without the use of baffles,



Photo: Deborah Lommis

RCP designed for dissipating energy of stream and 30-foot fill height.

the velocity would be 27.8 feet per second. The baffle design provided for velocity reduction to 8.72 feet per second. The baffle design allowed the water to flow through the 78-inch diameter pipe and tumble through the last 72 feet of the 96-inch diameter pipe, thereby reducing the exit velocity to values that do not damage or erode the downstream channel.

Little Equinunk Creek is classified as a high quality, cold-water fishery. Openings were provided in the baffle pattern at the invert of the pipe for fish migration. Soil nails were used for temporary support of trench to reduce the impact on adjoining property owners. Soil nailing is a stabilization method of reinforcing existing soil by installing threaded steel bars into slopes or cuts as construction proceeds from top down.

Little Equinunk Creek was diverted, temporarily, until the construction of the new drainage system was completed. Because the reconstruction plan involved a 250-foot impact on the stream and the ecosystem, various permits, erosion and soil plan approvals were needed from the Wayne County Conservation District, the Army Corp of Engineers and the Department of Environmental Protection.

The reinforced concrete pipe was ordered in October to complete product delivery before Thanksgiving weekend. November in the mountains presents varying weather conditions, and preparation for the delivery of the pipe necessitated careful planning. Weight limits on the standard delivery route required an alternate route causing the product to be delivered on the opposite side of the project from where it was needed. A road had to be built to transport the pipe to the job site.

Normally, products with the special design characteristics of the pipe specified for the project would require at least three months for completion. The Northeast Group partnered with The Department of Transportation to provide an expeditious solution. The special designs for the deep fill pipe and the baffle system were submitted to the state and approved within days of the design submission.

The next challenge was timely production of the special hydraulic energy dissipaters, which were labor intensive. The pipe was manufactured, tested and approved within PennDOT's schedule.

Twenty thousand cubic yards of excavated material were removed from the project. Fifteen cubic yards fit into each tri-axle. The material was hauled out of the trench, and then brought back to use as fill. Innovated thinking and technology, as well as cooperation between the organizations reduced the project completion time by 75%. Local citizens marveled at the accelerated site activity and Braman Road re-opened months before the scheduled deadline. ☺

Project:	PA Wayne Co SR 1018– District 4
Owner:	Pennsylvania Department of Transportation (PennDOT) District 4
Engineering:	PennDOT District 4 Engineering Department.
General	Minichi, Inc.
Contractor:	Dupont, PA
Inspection	PennDOT District 4
Agencies:	Site Blauvelt Engineers (plant inspection)
Producers:	Cayuga Concrete Pipe Montrose, PA
Quantities:	Approximately 150 feet of 96-inch diameter RCP with hydraulic baffles and 78-inch diameter RCP (special design pipe collared to 96-inch diameter special design pipe)

The Northeast Pipe Group of Oldcastle Precast, Inc. consists of two plant locations in Pennsylvania (Cayuga Concrete Pipe) and two in New Jersey (Kerr Concrete Pipe). Cayuga Concrete Pipe has been a presence in the pipe market for over 48 years. The Montrose Plant has been manufacturing concrete pipe for over 50 years. Kerr Concrete Pipe was founded in 1936. The Northeast Pipe Group manufactures 12-inch through 120-inch diameter rubber gasket and mortar joint pipe, 18-inch to 108-inch elliptical pipe, and flared ends 12-inch through 72-inch round and elliptical. See www.oldcastleprecast.com.

Jacking Pipe the Answer to Traffic and Flooding Dilemma on Section of RT 309

By Bob Bee & Mel Oxenreider • Cayuga Concrete Pipe (Croydon) • 215-788-5572

The estimated \$330 million project to reconstruct and improve the 10-mile expressway between Cheltenham Avenue and State Route 63 (Welsh Road) includes construction of a reconfigured interchange at Fort Washington (adjacent to the Turnpike Interchange) that began in 2005. This section of the project presented the largest amount of traffic problems because it lies in the direct path of the Pennsylvania Turnpike Fort Washington Interchange. Along with the heavy traffic problems for this section, the area has been plagued with flooding. The reconstruction of the expressway will have a relatively minor impact on wetlands in the project area, but a positive one on alleviating flooding during heavy rains. Part of the reconstruction includes raising elevations of the low lying areas and adding reinforced concrete storm sewers.

Construction of the reconfigured interchange at Fort Washington (Phase four of the project) was an 82.6 million dollar section awarded to the joint venture team of James D. Morrissey and Nyleve Bridge Corp. This Phase was of particular interest to Cayuga Concrete Pipe because of the order for more than 15,000 feet of reinforced concrete pipe, in addition to the supply of RCP to be jacked through a steel sleeve.

The sleeve pipe requirements on the project consisted of 32 feet of 60-inch diameter O-ring gasket pipe under the Route 309 northbound exit ramp to Pennsylvania Ave,

and 152 feet of 42-inch diameter O-ring gasket pipe under the Route 309 northbound exit ramp to Pennsylvania Avenue and the PA Turnpike exit ramp for Route 309 northbound traffic. Jacking the pipe under the exit ramps reduced the impact of construction on traffic, and avoided additional costs and delays associated with building temporary ramps, if the jacking option had not been accepted.

With over 53,500 vehicles traveling daily on Route 309 in Montgomery County, officials at PennDOT District 6 knew they were facing some major obstacles during reconstruction. Due to the size of the project, PennDOT decided to break the project into five

separate mainline contracts.

Aaron Enterprises Inc. of Dover, PA was chosen to install the jacking pipe as a subcontractor to James D. Morrissey. Cayuga Concrete Pipe and Aaron Enterprises Inc. had worked on other highway projects in the past. On this project, Mark Myers of Aaron Enterprises Inc. ordered the jacking pipe with a threaded grout hole large enough to accommodate a cable for lifting the pipe and then for filling the void between the steel casing and the reinforced concrete pipe. The contractor used a collet to protect the threads during the installation process. During the installation of the 60-inch and 42-inch diameter pipe Cayuga Concrete Pipe representatives offered ongoing technical advice.

Laura Fanelli of Keystone Highway Products distributed the reinforced concrete pipe,



Photos: PennDOT

◀ **O-ring gasket pipe jacked under interchange ramps.**

Advice provided by ▶ Cayuga Concrete Pipe representatives during jacking.

produced by Cayuga and Kerr, to James D. Morrissey, Inc. through a facility located in nearby Montgomeryville. Once completed in 2008, the interchange will offer new acceleration/deceleration lanes, as well as a new northbound collector/distributor road. Total roadway width in the interchange area will increase from the current four lanes to eight lanes. ☺

Project:	SR 309 Sec 103 Montgomery County, Upper Dublin Township (from 330 feet north of Valley Green Rd. to 330 feet north of Fort Washington Ave.)
Owner:	Pennsylvania Department of Transportation (PennDOT) District 6
Designer	Gannett Fleming, Inc.
Consultant:	Audubon, PA
General	Joint Venture
Contractor:	James D. Morrissey, Inc. Philadelphia, PA Nyleve Bridge Corp. Emmaus, PA
Sub Contractor:	Aaron Enterprises Inc. Dover, PA
Producers:	Cayuga Concrete Pipe Croydon, PA
Quantities:	Approximately 15,224 feet of 12-inch through 60-inch diameter round, jacking and elliptical reinforced concrete pipe. Twenty-seven 18-inch to 36-inch round and elliptical concrete flared end sections.

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Collapsing CMP Culvert Replaced with RCP Dissipaters

By Joe Gawrysiak and Rex Busa • Cayuga Concrete Pipe (Montrose) • Kerr Concrete Pipe (Folsom) 215-788-5572

Imminent collapse of a highway shoulder caused an emergency repair project on Route 9N, two miles north of Lake George, New York. Inspection of the adjacent embankment revealed that the 36-inch diameter corrugated metal pipe (CMP) culvert was severely rusted and collapsing. Replacement of the culvert was necessary to ensure the stability of the roadway. The New York State Department of Transportation (NYSDOT) developed a solution that not only would replace the deteriorating CMP, but also prevent future erosion of the shoulder. The project, NYSDOT D260203, was let to Ketco, Inc. of Albany, NY on May 18, 2006 consisting of five separate locations in three surrounding counties. Ketco, Inc. began mobilizing to the Lake George location, known as Site 1, in early July.

Old plans indicated a pre-World War II culvert design comprised of a 4-foot x 4-foot box that fed into a 60-inch diameter stone arch pipe that then connected with the 36-inch diameter corrugated metal pipe. Along with the metal pipe collapsing and the highway shoulder eroding, it was also discovered that the connections between the boxes, stone arch

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and CMP were compromised and leaking. Furthermore, the New York State Department of Environmental Conservation (DEC) expressed concerns in how these problems were affecting trout spawning. The culvert was used to channel a cold-water stream used by migratory trout. Subsequently, Site 1 became a priority for Ketco.

The project required the complete removal of the pre-war culvert and replacement with

fall was designed with a cast-in-place head-wall with a riprap stone apron. Kerr and Cayuga Concrete Pipe were required to submit design drawings for the dissipaters to the NYSDOT for review. Similar dissipaters had been used in Pennsylvania after design approval by PennDOT. The drawings were submitted to the NYSDOT on July 12 and approved August 22. With approximately eight weeks of production needed, delivery of the RCP and dissipaters would begin in late October.

Only one section of the roughness elements of the dissipaters can be poured at a time. After allowing the concrete to cure, the pipe is rotated and the next roughness element is poured into place. The baffles are reinforced by anchoring 3/4-inch dowels with epoxy rebar 4 inches into the pipe wall. These dowels are then wrapped with quarter-inch rebar to form a reinforcement cage. A custom-made form is then placed over the reinforcement and the concrete is poured inside of the pipe.

The 8-inch high x 12-inch thick dissipater baffles

are spaced at 75 degrees with slots between each. This design allows water and fish to pass through the dissipater sections of the culvert with ease.

When initial deliveries commenced in late October, the New York DEC expressed concern for the construction timing. The schedule interfered with the spawning season of the trout that occurs between the first of October and first of May. Construction was halted momentarily, but after realizing the severity of any delay in construction of the culvert, the work was resumed.



60-inch diameter RCP with dissipater baffles.

48 feet of 60-inch diameter RCP, collared into 80 feet of 84-inch diameter RCP with dissipater baffles. This combination, with a 60-inch diameter inlet flared end and a 96-inch diameter manhole drainage structure centered in the 60-inch diameter run, was installed on an 18.67 percent slope with a 2:1 roadway embankment. The 60-inch and 84-inch diameter pipes were bolted together and a concrete collar comprised of just over 10 inches of concrete was poured around the connecting pieces to hold them in place. Every other pipe in five locations contained dissipater rings. The out-

Construction at Site 1 was completed before winter, and the roadway shoulder was stabilized. The use of dissipaters reduced the velocity of the stream, which had been weakening the roadway embankment. Constructing the culvert with a smaller 60-inch diameter pipe at the inlet, connecting to a larger 84-inch diameter pipe downstream reduced the energy of the water. Slowing the velocity of the stream not only prevented further settlement of the shoulder, but also allowed fish to traverse the steep slope through the pipe during spawning season. The project was completed long before the 2007 spring snowmelt and summer vacation traffic. ☺

Project:	NYS DOT D260203 Culvert Replacement / Repair 5 Locations Site 1 — S.H. 418, Route 9N, Lake George, NY, County of Warren
Owner/ Designer:	New York State Department of Transportation Region 1
General Contractor:	Ketco, Inc. Albany, NY
RCP	Ameret Products, Inc.
Distributor:	Newburgh, NY
Producers:	Cayuga Concrete Pipe Montrose, PA Kerr Concrete Pipe Folsom, NJ
Quantities:	48 feet of 60-inch RCP and 80 feet of 84-inch RCP with dissipater rings installed every other pipe (five units).

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RCP Replaces Failed CMP Culvert on Future Interstate

By Deborah Loomis & Rex Busa • Cayuga Concrete Pipe (Montrose) • Kerr Concrete Pipe (Folsom)
215-778-5572

The crippling effects of the floods of June 2006 will be felt for many years in New York State. From June 26 through 28, close to seven inches of rain fell in the south-central region known as the Souther Tier. The Southern Tier consists of eight counties, including Broome and Chenango Counties, which were declared federal and state disaster areas because of the flooding. Residents living in the community for over a half of a century experienced damaging water levels for the first time.

Immediately following the deluge, the New York State Department of Transportation (NYS DOT) District 9 assembled some 20 crews to conduct a thorough inspection of the remaining stormwater infrastructure. Even though NYSDOT conducts periodic inspections of drainage culverts, they suspected that the flooding might have caused damage

that could lead to catastrophic culvert failures. Once it is determined that a culvert has deteriorated to the



13 truckloads of 84-inch diameter RCP installed in two weeks.



Photos: Deborah Loomis

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point that it may be placing the traveling public at risk, they are categorized as EMERGENCY REPAIRS projects. Emergency repairs bypass the normal lengthy process of designing and funding a project. Best methods of design are quickly determined. Project finances are acquired from an emergency fund, which has an estimated annual budget.

The receding floodwater left an urgent situation on Route 17 in Windsor, east of Binghamton. With the NYSDOT in the process of converting Route 17 into Interstate 86, inspection crews noticed a pavement slump near the Windsor exit. Upon close observation of the infrastructure, a 60-inch diameter corrugated metal culvert was discovered to have failed. The culvert invert was entirely corroded from environmental effects and the structural weakness had been exacerbated by the recent storm. The culvert was originally installed in the late 1970s. NYSDOT took immediate action to construct a new culvert with 84-inch diameter reinforced concrete pipe (RCP).

To prevent any potential collapse and the closure of both lanes of Route 17, the corrugated metal pipe (CMP) was packed with flowable fill after the 84-inch RCP culvert was installed adjacent to the CMP. The RCP was supplied by Cayuga Concrete Pipe from stock at Kerr Concrete Pipe in Farmingdale. The 84-inch RCP had been designated for New Jersey Department of Transportation. A special inspection for NYSDOT compliance was expedited and 13 truckloads of pipe delivered to the project. The pipe was installed within two weeks.

Westbound traffic was detoured on August 23, 2006, to allow for the excavation the following day. The 208-foot run averaged a depth of 18 feet. The installation was completed on September 6, 2006 over a period that included 9 working days. Several days of construction were lost and a few were slowed due to inclement weather. During this timeframe, more than 6,200 cubic yards of material was excavated and stockpiled. Some 3,500 cubic yards of the original material and 2,700 cubic yards of gravel material were imported to the jobsite and used as backfill for the culvert. Traffic over one lane of eastbound Route 17 was maintained until August 29 when yet another storm hit the region. The NYSDOT was forced to detour the eastbound

traffic because of concerns about the inadequate hydraulic function of the corroded 60-inch CMP culvert that had not yet been filled. The cost of the culvert replacement was \$885,000.

The Southern Tier transportation officials and residents cannot escape the long-term consequences of the Flood of '06. Damage to public and private property estimated as high as \$250 million occurred to Broome and Chenango counties. Rebuilding roads, bridges, and neighborhoods will use data collected from the storm event as a benchmark for engineering design to avoid a recurrence of infrastructure damage of such magnitude.

The NYSDOT has instituted a transportation master plan applicable through the year 2030. One of the state's major issues is how it can best preserve its aging transportation assets. The successful partnering on this project could encourage the use of concrete pipe wherever and whenever it is practical. ☺

Project:	D259946 Broome & Chenango Counties Route 17 - Future Interstate 86
Owner:	New York State Department of Transportation District 9
Engineering:	NYDOT Internal Maintenance
General	Gorick Construction Company, Inc.
Contractor:	Binghamton, NY
Producers:	Cayuga Concrete Pipe Croydon, PA Kerr Concrete Pipe Hammonton, NJ
Quantities:	208 feet of 84-inch diameter RCP.

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RCP JACKED UNDER HEAVILY- USED RAIL LINE TO IMPROVE MUNICIPAL INFRASTRUCTURE

By Alex Gallinaro & Rex Busa
Kerr Concrete Pipe (Folsom and
Farmingdale) • 609-561-3400

Since the mid 1960s, the County of Monmouth, and particularly the Town of Neptune, has been seeking a solution to the drainage problems along the Route 33 corridor, which bisects this small coastal community in New Jersey. These problems would have to be solved before the town could attract new businesses and residents. Burdened with an outdated stormwater system and utilities, Neptune would need Federal Highway money to fund the \$16,663,426 infrastructure revitalization project.

After many years working with the New Jersey Department of Transportation, Neptune received Federal Highway dollars allocated for stormwater drainage infrastructure including; inlets, manholes, electrical junction boxes, widening of the road, pressure water, gas services, new sidewalks, street lighting, and traffic signals. Nestled between Asbury Park and Bradley Beach, Neptune is now in the midst of a complete revitalization. The widening of the roads and construction of new schools, businesses and housing is dependant upon improved drainage capacity. Taylor Wiseman & Taylor, based in Mt. Laurel, New Jersey was retained to provide engineering services

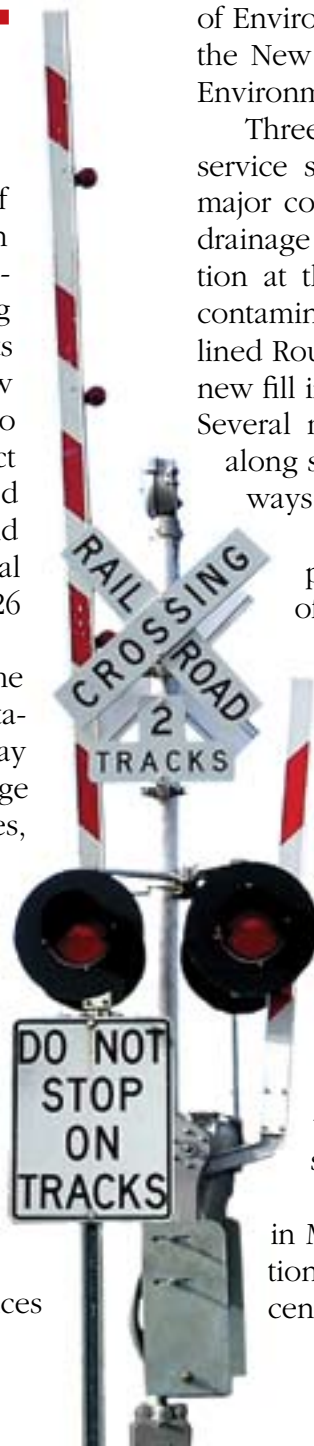
for the project.

Engineering challenges included an environmentally sensitive area with a high water table and a myriad of other issues. Native soils were contaminated. The storm and ground water would have to be controlled before being discharged into Wesley Lake in the neighboring Town of Ocean Grove. The infrastructure for managing this groundwater and run-off was built before construction of the main project. Storm water would be channeled, contained, treated, and then released. Part of the project was closely monitored by the New Jersey Dept. of Environmental Protection (NJDEP), as well as the New Jersey Department of Transportation's Environmental Department.

Three miles of roadway once dotted with service stations and other businesses was the major contributing factor to environmental and drainage issues that necessitated soil remediation at the job sight. Forty thousand yards of contaminated soil from gas stations that once lined Route 33 in the late '60s was removed and new fill imported under strict scrutiny of NJDEP. Several miles of Route 33 were reconstructed along some of the most heavily traveled highways in the vicinity of Neptune.

A major aspect of the improvement project was the direct jacking of 80 feet of 60-inch diameter Class 5 C-wall reinforced concrete pipe (RCP) under the heavily traveled New Jersey Transit/North Jersey Coastline Rail. This line services a significant portion of central and northern New Jersey's beach communities, and terminates at Newark's Penn Station. Mass transit is vital to these areas, as many residents commute to jobs in New York and other parts of northern New Jersey. In the summer, these communities and local businesses rely heavily on the influx of tourists for survival. Closing the rail system for a trench installation of a storm sewer was not considered.

Construction on the project started in May 2006 and is scheduled for completion in January 2008. Union Paving, a large central New Jersey general contractor was



awarded the contract. Fifteen homes and a restaurant were acquired through eminent domain and demolished to make room for the road widening and staging area for the jacking pipe. Special dewatering systems were installed because of the high water table. A well point system was constructed using an 8-inch header and 2-inch diameter pipelines that lowered the ground water level to the pipe invert. Griffin Dewatering Corporation and Agua Bella supplied the dewatering and filtration systems.

Carson & Roberts Site Construction & Engineering, Inc of Lafayette New Jersey was contracted to jack the pipe while dealing with limited space, high volume traffic, and passenger trains. The custom-engineered RCP, supplied by Kerr



Photo: Alex Gallinaro

80 feet of 60-inch diameter RCP jacked under rail line.

Concrete Pipe (a division of Oldcastle Precast), would be jacked at a push rate of one foot per hour while maintaining tight tolerances for line and grade. C&R used a hand mining technique. The pipe was lowered onto a track and pushed by an American Auger 72 1200 machine, utilizing 400,000 lbs of the 1,200,000 lbs of available thrust to jack the pipe the full eighty feet of the alignment. A muck car was moved into the sewer line as it was advanced, and workers hand dug the tunnel face from within the leading pipe unit, filling the muck car with excavation spoil. Once the muck car was removed and emptied, the pipeline was jacked one foot. A special piece of cone-shaped steel manufactured by Edward Kurth & Sons, Inc. of Sewell, NJ was designed for the first pipe to act as a special nose cone.

The pipe was produced locally at Kerr Concrete Pipe's Farmingdale facility located minutes from the work site. It was produced on a Dri-Cast VUP (vibration under pressure) machine us-

ing a combination of VUP and Hawkeye equipment. This method of production uses vibration to consolidate the concrete into an extremely dense and durable product suitable for this type of application. Special steel reinforcement, along with a specially designed steel jacking band was cast into the pipe. This jacking band prevents the fracturing or spalling of the bell end of the pipe as its being jacked through the tunnel.

New Jersey Transit issued a twenty-four hour, seven day a week work schedule for the jacking operation. Along with the RCP, a 26-inch steel cased telephone line and a 3-inch steel conduit electrical line were jacked under the railroad. The jacking pipe installation took eight days. The project is expected to meet budget and is ahead of schedule. ☺

- Project:** Route 33 Section 9A NJDOT
From Union Avenue to Route 71 to Route 35
Monmouth County, Neptune, New Jersey
- Owner:** New Jersey Dept of Transportation
- Engineering:** Taylor Wiseman & Taylor
- Design:** Mount Laurel, New Jersey
- General Contractor:** Union Paving and Construction Co., Inc.
- Jacking Contractor:** Mountainside, New Jersey
- Contractor:** Carsons & Roberts Site Const. & Engineers, Inc
Lafayette, New Jersey
- Producers:** Kerr Concrete Pipe
Folsom and Farmingdale, NJ
- Quantities:** Approximately 10,300 feet of 15-inch to 60-inch diameter RCP used for storm sewers.
80 feet of 60-inch diameter Class 5 C-wall jacking pipe.

The Northeast Pipe Group of Oldcastle Precast, Inc. consists of two plant locations in Pennsylvania (Cayuga Concrete Pipe) and two in New Jersey (Kerr Concrete Pipe). Cayuga Concrete Pipe has been a presence in the pipe market for over 48 years. The Montrose Plant has been manufacturing concrete pipe for over 50 years. Kerr Concrete Pipe was founded in 1936. The Northeast Pipe Group manufactures 12-inch through 120-inch diameter rubber gasket and mortar joint pipe, 18-inch to 108-inch elliptical pipe, and flared ends 12-inch through 72-inch round and elliptical. See www.oldcastleprecast.com.

Precast Concrete Boxes Used for Stormwater Management and Stream Crossing

By Minnesota
Department of
Transportation
District 3

Joe Kelly
Hancock Concrete
Products, Inc.
952-835-4646

Longstanding severe flooding was associated with a section of T.H. (Trunk Highway) 371 and adjacent railroad near the Town of Little Falls, Minnesota. The flooding was generally attributed to Fletcher Creek, a meandering stream that passed under T.H. 371 and through a local campground before discharging into the Mississippi River. The preferred remedy to the chronic flooding was to manage runoff and floodwaters by increasing the hydraulic capacity of Fletcher Creek between the alignment of the new freeway, which paralleled old freeway 371, and the Mississippi. This remedy would control flooding without the construction of extensive storm sewers along the alignment of the new highway toward Little Falls where there was no well-defined outlet to the Mississippi.

The Morrison County Board of Commissioners has jurisdiction over Fletcher Creek, known as County Ditch 14. The Board found the proposal to increase the capacity of Fletcher Creek

near the flooding acceptable and further agreed to be the lead agency with respect to the design and construction management of the public works. The state provided hydraulic and structural design support.

There are several unique design elements associated with the flood control project. The Board required that the existing character of the creek be maintained and that rehabilitation or restoration activities include little or no increase in high flows. A high flow cutoff channel (overflow channel) was constructed directly to the Mississippi River.

Precast concrete boxes were used for critical design fea-

tures including a drop grade control structure (leading to the high flow cutoff channel) consisting of a special reinforced concrete box (RCB) culvert with end sections under an access road to the Fletcher Creek Campground. The structure commenced at the prescribed inlet invert elevation where a skewed 16-foot x 7-foot RCB inlet and apron was installed. The box transitioned to a 16-foot x 13-foot RCB with a 6-foot invert drop for a length of 12 feet, and then to an 80-foot run of 16-foot x 10-foot reinforced concrete boxes. The run terminated with a 16-foot x 10-foot skewed box outlet apron. The 80-foot channel of the structure included roughness elements (baffles) on the floor of the boxes to reduce the energy of floodwater before discharge into the channel to the Mississippi.

Precast concrete boxes were used for two additional design elements to complete the required structures of the flood control works. These included a double-celled culvert under Trunk Highway 371 and a triple-celled box culvert under the adjacent railroad. Both of these culverts were designed with skewed inlets and outlets to accommodate the normal flows of Fletcher Creek and to channel the waters into the natural alignment of the creek downstream of the T.H. 371 crossing. Engineers designed the elevation of the inlet apron of the drop grade control structure, so that only floodwaters would be diverted, thereby maintaining the natural flows and character of Fletcher Creek. ☺



Photo: MnDOT
Concrete boxes used for drop grade control structure.

Project:	Fletcher Creek T.H. 371 A Minnesota State/Morrison County Flood Control Project S.P. 4912-53/S.A.P: 49-647-10
Owner:	Minnesota Department of Transportation District 3
Engineering Design:	The Morrison County Highway Department Minnesota Department of Transportation, District 3, MnDOT Bridge Office
General Contractor:	Landwehr Construction, Inc St. Cloud, Minnesota
Producer:	Hancock Concrete Products, Inc. Hancock, Minnesota
Quantities:	80 feet of (16-foot x 10-foot) RCB (Grade Control) 12 feet of (16-foot x 13-foot) RCB Structure) One (16-foot x 7-foot) RCB skewed end section One (16-foot x 10-foot) RCB skewed end section

Since 1917, Hancock Concrete Products has produced precast concrete pipe, culverts, boxes, manholes and arches for communities in Minnesota, Iowa, Wisconsin, and the Dakotas. The company has introduced innovative designs such as large span arch pipe and long span arch. See www.hancockconcrete.com for information.

Photos: Steven A. Sherwood

By Steven A. Sherwood, P.E., L.S. • M&W Concrete Pipe & Supply
812-426-2871

Unique Use of Precast Concrete Boxes Solves Coal Conveyance Problem



Gibson County, only a short distance north of the Ohio River, is located in southwestern Indiana bordering the Wabash River to the west. The city of Princeton is the county seat in this predominately rural county that is home to several coal mining facilities comprising some of the county's major employers. Gibson County Coal, LLC (GCC) is one of the mining facilities employing approximately 245. GCC has built a world-class underground mining facility and operation that produces approximately 22,000 to 25,000 tons of coal daily. Their facility is located immediately north of the city of Princeton, on the west side of U.S. Highway 41, a four-lane divided highway that extends from northern Wisconsin into southern Florida. All of GCC mining occurs between U.S. 41 and the Wabash River. The location of the facility, however, presented challenges to the shipment of coal from its mine due to the large daily volume.

The efficient transportation of coal became a top priority for the company. Coal was being hauled by truck to the nearest railway located less than a mile away east of U.S. 41, oppo-

site the GCC facility. The Wabash River was approximately 10 miles away, but there was no port facility to accommodate GCC needs. Trucking costs to the rail terminal continued to escalate and became an impractical long-term solution. GCC retained the services of Bernardin, Lochmueller & Associates, Inc. (BLA), a local engineering consulting firm, to solve the problem.

BLA proposed the creation of a new railhead and loading facility on the eastern side of the highway along the existing railway as being the most practical solution. The problem remaining was how to move the coal to the proposed railhead. The use of conveyors was considered the most practical and efficient means, but crossing U.S. 41 with conveyors was a significant issue. One option was to elevate a conveyor over the highway. This option was preferred by the Indiana Department of Transportation (INDOT), since traffic disruption would be minimal, but such a struc-

ture would not be aesthetically pleasing at the gateway to Princeton.

Another option was to bore a tunnel, but that would be expensive as the material beneath the highway was 10 to 15 feet of bedrock. A minimum 10-foot diameter tunnel would be required with a steel liner to achieve the necessary cross-section to move the coal by conveyor. A third option was to open-cut the highway and install a precast concrete box culvert through which a conveyor belt system could run. GCC officials, BLA design engineers and the local precast concrete company, determined that 376 feet of an 11-foot span and 6.5-foot of rise precast concrete box culvert would be required. INDOT initially had concerns about the time required to perform the installation, because the highway could not be closed for any lengthy period. BLA determined that since the highway was a 4-lane divided highway with a grass median, closure could be avoided. Traffic could be diverted across the median with temporary crossover lanes into two single file lanes in the construction zone, while each half of the roadway was closed for installation of the boxes. All parties agreed that this would be the best solution, and INDOT issued a permit.

The precast concrete box culvert option was estimated to cost \$540,000 (not including maintenance of traffic) compared to the cost of tunneling, which was estimated to be in excess of \$1,200,000. The overhead conveyance system, strongly opposed by the local community, was estimated at \$725,000.

Due to varying loading conditions of the highway, the precast boxes were designed and produced in two different strengths. Twenty-nine pieces required a heavy loading condition and 18 required a lesser load design. Each box section was 8 feet long with 12-inch thick walls and weighed approximately 43,500 pounds. The pieces were produced ahead of the scheduled construction period to avoid undue traffic delays when construction started.

Blankenberger Brothers, Inc. (BBI) was the

local contractor selected for the installation. The temporary crossover lanes on both sides of the highway were first constructed including any other work that could be completed prior to diverting traffic. Once installation for the box sections commenced, BBI constructed the box culvert within 5 working days. All construction activity required only 7 weeks, including weather delays.

Precast boxes provided all parties with several long-term benefits. GCC obtained a long lasting structure for conveying coal across U.S. 41 that minimizes the company's transportation costs. INDOT benefited from a reduction of daily coal trucks using U.S. 41, improved safety on its highway, and the peace of mind associated with the structural integrity of the precast concrete box culvert. The City of Princeton benefits from additional economic prosperity generated by GCC, an aesthetically pleasing approach to the city, and safer local roadways due to the reduction in coal truck traffic. ☺

Project:	Install a Box Culvert to Facilitate a Conveyor Belt System under U.S. 41 A2949-6-320279 Gibson County
Owner:	Indiana Department of Transportation (INDOT)
Engineering:	Bernardin, Lochmueller & Associates, Inc. (BLA), Indianapolis, Indiana
General Contractor:	Blankenberger Brothers, Inc Cynthiana, Indiana
Producer:	M&W Concrete Pipe & Supply Evansville, Indiana
Quantities:	376 feet of (11-foot x 6.5-foot x 8-foot) precast concrete boxes – 47 units

M&W Concrete Pipe & Supply is located in Evansville, Indiana, supplying Southern Indiana and Western Kentucky with quality reinforced concrete products for more than fifty years. M&W produces a full range of precast concrete boxes, reinforced concrete pipe for storm and sanitary sewers, manholes, inlet boxes, and miscellaneous precast products. See www.irvmat.com/concretepipe.asp for information.

ACPA Marks 100 Years with Open Doors to Engineering Professionals

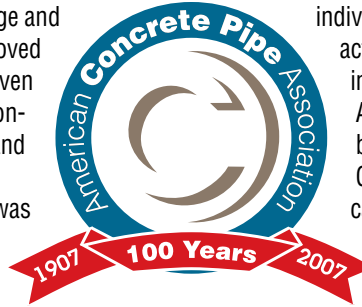
Concrete pipe has taken its place in America's history as an engineered product essential to the improvement of our nation's health and safety. It was documented first as a sanitary sewer in Mohawk, New York in 1842 and in at least 10 other urban areas prior to the yellow fever epidemic of 1873 that broke out in Memphis. After the epidemic and deaths of 5,150, concrete sanitary sewers were constructed to collect sewage and transport it safely underground to outlets far removed from settled areas. Because concrete was a proven material, delivering long-term performance, concrete pipe was called upon to control disease and flooding in urban areas.

The American Concrete Pipe Association was founded in 1907 in Ames, Iowa as the Interstate Cement Tile Manufacturers Association and renamed the American Concrete Pipe Association (ACPA) in 1914. For one hundred years, the Association and its members have participated on ASTM committees and worked with state highway officials and university researchers to establish the principles used for gravity pipe standards. Without the presence of a strong association of concrete pipe producers and the companies that develop the equipment and supplies to produce pipe and boxes, the quality of America's buried infra-

structure could be quite different.

To mark the ACPA's 100-year relationship with America's engineers and recognition that concrete pipe and boxes are widely used for public works that protect the health and safety of Americans, the ACPA has opened its membership to professional engineers. Professional membership is limited to any individual, firm, partnership or corporation which is actively engaged in specifying, designing or providing consulting or other professional services to the ACPA, its members, or the precast concrete pipe and box culvert industry, as defined by ASTM Committee C-13. Details of the new "Professional Membership" category are posted on the ACPA's website at www.concrete-pipe.org.

Precast concrete pipe and boxes get stronger over time. So too, has the American Concrete Pipe Association. Throughout its history, ACPA has learned to depend upon sound engineering and to change with the times and expectations of consumers. Opening membership to professional engineers to mark its centennial recognizes the role that concrete pipe and boxes play in ensuring public health and safety. It also recognizes the role that engineers have played in building an industry that has lasted for more than 100 years. ☺



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