

CONCRETE PIPE NEWS



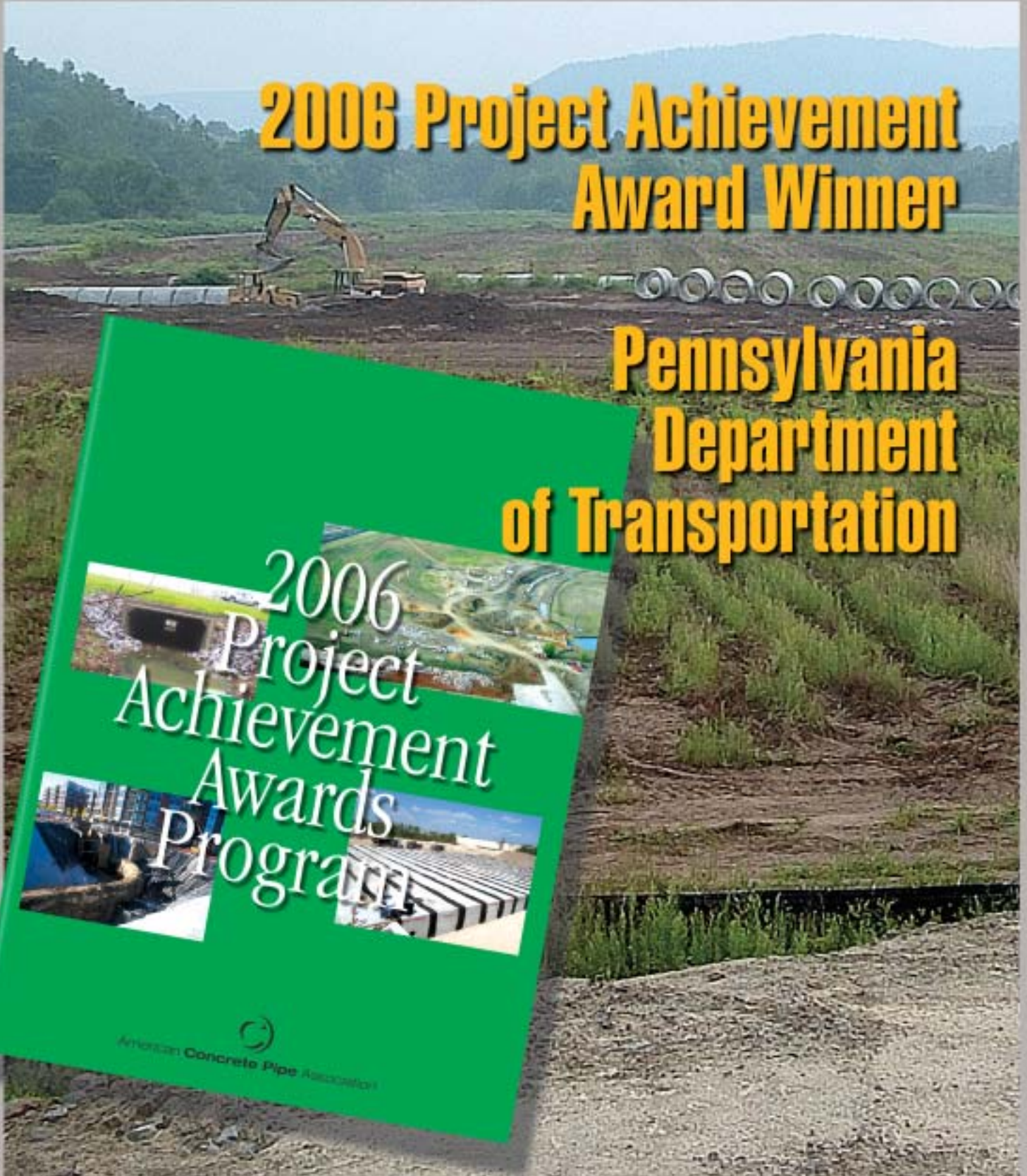
The Magazine of the American Concrete Pipe Association

2006 Project Achievement Award Winner

Pennsylvania Department of Transportation

2006 Project Achievement Awards Program

American Concrete Pipe Association



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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American Concrete Pipe Association

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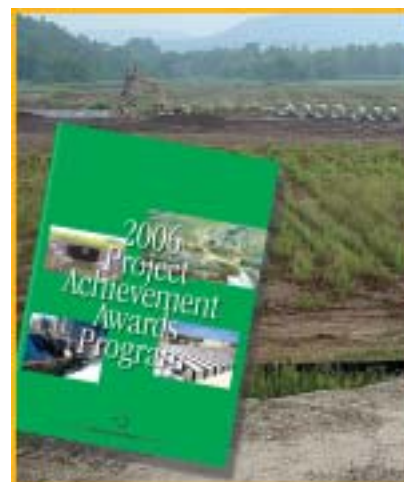
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Cover:
The U.S. Route 15 Improvement Project makes use of heavy wall reinforced concrete pipe for deep bury drainage crossings of new sections of highway.



editorial

Matt Childs, P.E., President
American Concrete Pipe Association



Project Achievement Award Is Good For Awareness of American Public Works

American civil and structural engineers are globally renowned for their public works achievements in saving lives and building healthy towns and cities. The American Concrete Pipe Association is aware of this legacy. It has called upon its members over its century-long history to develop standards and products that support the design requirements of the nation's road builders.

To recognize great achievements and help build awareness of the engineering and construction that goes into building components of a major highway, ACPA has introduced its annual Project Achievement Award. This new award honors State Departments of Transportation that have developed creative and innovative public works projects, which have been designed using precast concrete pipe and/or boxes. Lynn Schuler, ACPA Chairman of the Board, presented the 2006 Project Achievement Award on May 22 at the AASHTO Roads and Bridges Subcommittee meeting in Snowbird Utah. The winner of this year's award is the Pennsylvania Department of Transportation (PennDOT) District 3-0 for Project SR 6015 in Tioga County. This

project involved the application of two runs of 72-inch diameter heavy wall pipe under 60 feet and 40 feet of fill to function as culverts under U.S. Route 15. Concrete pipe was supplied to the project by Cayuga Concrete Pipe, Montrose and Croydon, PA and Kerr Concrete Pipe, Folsom and Farmingdale, NJ. Both concrete pipe producers are companies within the NE Pipe Group of Oldcastle Precast, Inc.

DOTs and local members of the American Concrete Pipe Association entered six projects into the competition. This issue of *Concrete Pipe News* features the award-winning PennDOT project and highlights the other five entries that also show creative and innovative solutions using concrete pipe and boxes. Here's a sneak preview of the projects.

ALDOT along with Hanson Pipe & Products of Birmingham entered a project that used 12-foot x 10-foot precast concrete boxes for a four-barrel culvert that replaced a pair of bridges that were settling because of limestone sinkholes. INDOT and M&W Concrete Pipe & Supply entered a project describing the construction of a 144-inch diameter tunnel under Diamond Avenue in Evansville. The 4,752-foot tunnel was lined with 96-inch diameter concrete pipe. INDOT and M&W Concrete Pipe & Supply entered a second project that described the emergency culvert replacement project on Indiana State Route 66. The project was published in the Spring 2005 Issue of *Concrete Pipe News*. The Texas Concrete Pipe Association, in partnership with TxDOT, reported on the wide use of concrete pipe and boxes on the complete reconstruction of approximately 23 miles of the Katy Freeway and approximately two miles of IH 610, including the IH 10/IH 610 interchange. Completing the entries for 2006 was a submission by Puerto Rico's Department of Transportation and Public Works summarizing the use of five vertical lines of 12-foot x 12-foot box sections used to build a pump station that mitigated flows of storm water at a train station in the urban train rail system.

The quality of the submissions for the 2006 Project Achievement Award has set a high benchmark for the 2007 award candidates. ACPA's Board of Directors and staff are delighted with the level of innovation shown in this premier competition. ACPA looks forward to the competition for the 2007 Award and publication of the entries in *Concrete Pipe News*. ☺

Feature Story

Photos: Kerr Concrete Pipe



2006 Project Achievement Award Winner

Concrete Pipe – The Only Culvert Option for New U.S. Route 15

Submitted by Dave Crockett, Kerr Concrete Pipe • 609-561-3400

The U.S. Route 15 Improvement Project is a new 12-mile, 4-lane, limited-access section of highway through northern Tioga County, Pennsylvania, and southern Steuben County, New York. When completed in 2008, the highway will be known as I-99. It is the only major north-south transportation corridor through north central Pennsylvania and southern New York. Realignment of the highway was needed to reduce current congestion, ensure sufficient capacity for the traffic growth anticipated in this corridor, improve safety by reducing con-

flict between through and local traffic, and provide system continuity with other U.S. Route 15 improvements from Williamsport, PA to Corning, NY. Throughout the entire alignment project, communications were coordinated among several parties to offer solutions to the engineering and environmental challenges. The parties included the Federal Highway Administration, New York State DOT, U.S. Army Corps. of Engineers, Pennsylvania Department of Environmental Resources, Native American Tribes with ancestral ties to the project area, local residents and businesses, and the Pennsylvania Department of Transportation (PennDOT) District 3 officials.

This project, known as SR 6015, Section



Pennsylvania Department of Transportation

22B, extends approximately 6 miles, generally paralleling existing Route 15 on a western alignment from north of the Route 287 Interchange to the state line. Major features of the earthwork contract included:

- Grading and drainage
- Movement of 3.8 million cubic yards of earth and rock
- Relocation of one township road
- Mitigation of two acres of wetland
- Diversion of two streams

Concrete pipe is a major design element of the last section of the realignment through Pennsylvania before reaching the state line. Small streams and drainage courses in the area are susceptible to heavy rain throughout the summer and runoff from substantial snow-

fall. These drainage areas needed hydraulic solutions without affecting the local environment. In all, there were two runs of 72-inch diameter heavy wall reinforced concrete pipe (RCP). The first run was 528 feet with a fill height of 60 feet. The other run was 320 feet with a fill height of 40 feet. To facilitate the crossing of drainage courses by the highway, engineers designed a positive projecting embankment in one section of the highway for a concrete pipe culvert, 60 feet under the finished roadway. The solution proved to be cost efficient, while meeting hydraulic requirements of the pipe to accommodate the storm water and snowmelt volumes. Only a concrete pipe culvert would be able to accom-

Feature Story

modate the earth loads. In addition, geological reports indicating unstable ground conditions with shifting shale bedrock, bogs, and possible landslides, supported the decision to specify concrete pipe for the numerous culverts required throughout the highway alignment.

Normal Class V pipe at 3000D strength would not have been adequate to withstand the loads, so a special pipe had to be designed. Guidelines of *Publication 280 Manufacturing Specification for Reinforced Concrete Pipe, Pennsylvania Installation Direct Design (PAIDD)* were used. A 72-inch diameter heavy-wall RCP was designed to withstand a D-

load of 4,841 lbs. per linear ft./ft. for the 60-foot fill crossing, and 3,232 lbs. per linear ft./ft. for the 40-foot fill crossing. The design solution was developed by engineers from the pipe supplier, Cayuga Concrete Pipe, a Division of Oldcastle Precast, Inc. Project SR

6015, Section 22B included runs of 30-inch and 36-inch diameter heavy wall pipe with 30 feet of fill in other culvert crossings of the new highway alignment.

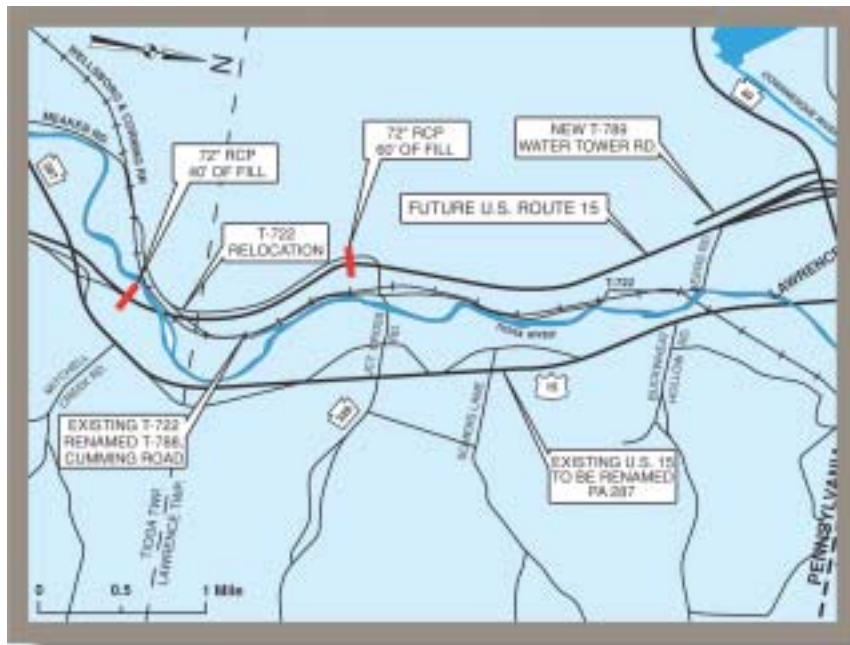
Designs were submitted to the Materials and Testing Division of Penn DOT. All material suppliers used in the pipe making process must be pre-approved in accordance with PennDOT Bulletin 15. After review and final approval, the 72-inch diameter heavy wall pipe sections were manufactured at Cayuga's

sister company, Kerr Concrete Pipe, also a Division of Oldcastle Precast, Inc. at their Farmingdale, NJ plant.

The 72-inch diameter concrete pipe under 60 feet of fill had a wall thickness of 14 inches with one-inch cover over the reinforcement. Using special forms and equipment, including additional vibration, Kerr was able to produce four 8-foot sections per day with a dry cast process. Each section weighed 17 tons. The steel area consisted of 0.616 sq. in./ft. inner and 0.190 sq. in./ft. outer mesh with a concrete strength of 6,000 psi.

The 72-inch diameter concrete pipe under 40 feet of fill required a steel area of 1.251

sq. in./ft. inner and 0.444 sq. in./ft. outer with a concrete design of 6,000 psi. This design required stirrups at the invert and crown supplied by Engineered Wire Products. The 7.75-inch wall thickness product had 1.25 inches of cover over the reinforcement. Four-inch diameter lift holes were in-



U.S. Route 15 Improvement Project is a new 12-mile, 4-lane, limited-access section of highway

stalled in both sets of 72-inch diameter pipe to facilitate the "teacup" lifting mechanism. Site-Blauvelt Engineers acted as the on-site PennDOT representative.

Careful planning of the plant's production and dispatching department was needed to move 1,250 tons of concrete pipe, which required nearly 200 truckloads. The 72-inch diameter 60-foot fill pipe weighed 35,000 lbs. per section, which limited payload to one 8-foot pipe per truck. The haul from the

Montrose plant to the site was 130 miles round trip and loads from Farmingdale NJ to Tioga County were 450 miles round trip.

The concrete pipe was installed with a Type A standard installation following the stringent guidelines for Publication 280 of PAIDD. The installation followed PennDOT specification RC-30 that details bedding and backfill.

The Pennsylvania Department of Transportation Engineering, District 3 has jurisdiction for this project. District 3 covers the nine counties of north central Pennsylvania including Tioga, and is responsible for maintaining 4,300 miles of highway and 2,900 state bridges. The first construction contract on SR 6015, Section 22B was let in November of 2004.

The estimated cost of the project was approximately \$115 million. Funding was 80 percent Federal and 20 percent State. Based on the cost of the construction contracts bid to early 2006 and the estimated construction costs for the remaining contracts, the project construction cost is approximately \$100 million with approximately \$24.1 million for the earthwork alone. The concrete pipe component was approximately \$1 million. ☺

The Northeast Pipe Group of Oldcastle Precast, Inc. consists of three plant locations in Pennsylvania (Cayuga Concrete Pipe) and two in New Jersey (Kerr Concrete Pipe). Cayuga Concrete Pipe started in New Britain and has been a presence in the pipe market for over 48 years. The recently acquired Montrose Plant has been supplying pipe to Route 15 since the beginning of the project, and 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.

Cayuga and Kerr are known for their engineering innovations, and have designed and manufactured pipe for many projects with special conditions. This is their tenth PennDOT project involving special design heavy wall reinforced concrete pipe made under the PAIDD guidelines. See www.oldcastleprecast.com.

Project:	SR 6015, Section 22B, Tioga County, PA Deep Bury Heavy Wall Reinforced Concrete Pipe
Owner:	Penn DOT, District 3-0
Engineering:	Dewberry-Goodkind, Inc. Carlisle, PA
Contractor:	Trumbull Corp. Pittsburgh, PA
Quantities:	Over 15,000 feet of reinforced concrete pipe, including 848 feet of 72-inch diameter heavy wall pipe
Inspection Agencies:	Trumbull Corp. Mike Dwyer, Project Engineer Paul Cameron, Project Engineer Pete Kutcher, Project Superintendent Bill Bechtel, Pipe Foreman PennDOT Tom Nagy, Project Supervisor Lance Ridall, Project Engineer Bob Horwhat, Chief Structural Materials Engineer Serge Ter-Arakelov, P.E., Engineer Materials & Testing Division Site Blauvelt Engineers Tim Becker - In Plant Inspection for PennDOT
Pipe Material Suppliers:	<u>Steel</u> Engineered Wire Products, Sandusky, OH Insteel Wire Products, Mt. Airy, NC <u>Cement</u> Buzzi Unicem, Stockertown, PA
Producers:	Cayuga Concrete Pipe, Montrose & Croydon, PA Kerr Concrete Pipe, Folsom and Farmingdale, NJ (Both members of the NE Pipe Group, Oldcastle Precast, Inc.)

Precast Concrete Boxes Replace Interstate Bridges

Photos:
Hanson Pipe &
Precast, Inc.



By George H. Conner, P.E., Alabama Department of Transportation
Kelley Lloyd, Hanson Pipe & Precast, Inc.
205-808-2227

A pair of bridges on Interstate 20 near Oxford, Alabama between Birmingham and Atlanta, Georgia was settling significantly because of underground limestone sinkholes. These parallel bridges, located in Calhoun County, carried interstate highway traffic over an abandoned railroad and a creek. The rate of settlement and subsequent rotation of the bridge columns was so great that the ability for the Alabama Department of Transportation (ALDOT) to keep the bridges in service was at risk. The best long-term solution was to remove both bridges and replace them with fill and a culvert to handle the flow of the creek.

Total project and detour costs, ability to support staged construction and inconvenience to the public were important factors, especially considering the traffic on this section of I-20. A four-barrel 12-foot x 10-foot precast box cul-

vert was selected to replace the pair of bridges. The limestone sinkholes, however, were still an issue that required creative engineering. The design concept was a structure that would bridge the sinkholes and allow for an evenly distributed controlled deflection of the culvert system of up to one foot. Working with Simpson Gumpertz and Heger, and Sherman Concrete Pipe Company (now Hanson Pipe & Precast, Inc.), ALDOT designed a system consisting of a four-foot thick crushed limestone/geogrid mat

A four-barrel 12-foot x 10-foot precast box culvert was selected to replace the pair of bridges.





The precast box culvert was designed with additional reinforcing to allow the boxes to be connected with galvanized straps and bolts.

and 12-foot x 10-foot precast box culverts tied together to permit an even distribution, if any settlement were to occur.

This concept required that the precast box culvert be designed with additional reinforcing to allow the boxes to be connected with galvanized straps and bolts. When settlement occurs, the line of boxes will be placed in tension. The bolts would be the failure mode in the event of excessive deflection to prevent damage to the culverts. If excessive deflection were to take place, remedial repair such as pressure grouting would be done to stop deflection. The system is currently performing, as designed.

Project IM-1020(306) was awarded in Feb-

ruary 2002 and built in three phases. Precast concrete boxes permitted construction in stages to accommodate the required sequence of swapping lanes of traffic during construction. The outcome of this phased approach was no reduction in the number of traffic lanes during the length of the project. ☺

Precast concrete boxes are now being used in a variety of applications that go beyond innovative uses as small bridges and large culverts for channeling water under roads and highways. They are used for underground structures for storm water management programs, pedestrian and wildlife crossings of railways and highways, utility galleries, pump stations, and various marine applications.

Project:	ALDOT IM-1020(306) Calhoun County, Alabama
Owner:	Alabama Department of Transportation
Design:	Simpson Gumpertz and Heger
Contractor:	Great American Insurance Company Brian Sawyer
Quantities:	928 feet of 12-foot x 10-foot precast concrete boxes
Producer:	Hanson Pipe & Precast, Inc. Birmingham, AL

Hanson Pipe & Precast, Inc. is a diversified manufacturer of concrete pipe and a variety of supporting products including manholes, drainage structures, box culverts, bridge components, retaining walls and concrete block. Its plant locations throughout North America enable the company to serve the most rapidly growing parts of the U.S. and Canada. Hanson is an international building materials company. It is one of the world's largest producers of construction aggregates, and concrete gravity and pressure pipe, precast concrete, and is the leading manufacturer of facing bricks in Europe. See www.hanson.biz for details.

Photos: M&W Concrete Pipe & Supply Company

TUNNEL LINED WITH CONCRETE PIPE MINIMIZES PUBLIC INCONVENIENCE

By Jim White, P.E. • M&W Concrete Pipe & Supply Company • 812-426-2879

The Indiana Department of Transportation (INDOT) completed a major storm sewer improvement project in the City of Evansville, IN which provides short-term relief from flooding and excess capacity for future flood relief projects. INDOT awarded a contract to Affholder, Inc. of Chesterfield, MO in October 2003 to construct 4,752 feet of 144-inch diameter tunnel under Diamond Avenue, SR 66. This tunnel directs storm water runoff to Pigeon Creek, a major tributary in Evansville. Affholder chose to use 96-inch diameter reinforced concrete pipe as the final liner for the tunnel.

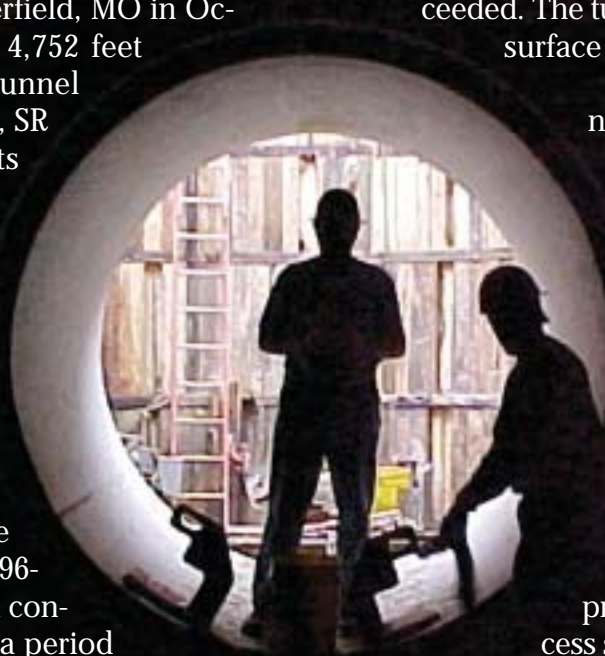
The contractor selected M&W Concrete Pipe & Supply to deliver 96-inch diameter reinforced concrete pipe (RCP) within a period of approximately seven months to complete the project on schedule. M&W is located in Evansville and has a production facility within a mile of the job site. Shop drawings were approved in late February 2004, and the pipe order was completed by May. As M&W was manufacturing the RCP for the final lining, Affholder was installing the tunnel access shaft and boring the tunnel. The contractor required that all products be ready before the first piece

was carried into the tunnel. Affholder completed boring of the tunnel and took delivery of the first piece of pipe on June 8. Delivery of the pipe was completed on July 14, 2004. Affholder used steel ribs and oak lagging to support the earth overburden as the tunnel excavation proceeded. The tunnel methods used minimized surface disruptions.

Many individuals and businesses along the route did not know that a project was ongoing, until the story was released in the local newspaper near the end of the project. By that time, all of the RCP final liner was in place. The public was amazed that the project was completed without major disruption and inconvenience.

During the term of the project, from sinking of the access shaft through installation of the RCP, to final cleanup, no more than one lane of the roadway was closed to traffic. When this closing occurred, it affected only a few hundred feet of roadway. The closing took less than a cumulative 30-day period.

A typical cut and cover project, with cuts ranging from 28 to 45 feet, would have required that at least one lane in each direction be closed to traffic for nine to twelve months, and closing



Tunnel lined with 96-inch diameter reinforced concrete pipe



M&W Concrete Supply located in Evansville, Indiana

of the entire facility for weeks at a time. With an average annual daily traffic volume of 37,740 vehicles, this could have had a disastrous and extremely expensive effect on the traveling public and commerce. Businesses who depended on SR 66 for access to markets would have suffered untold financial losses. Even a three-month closure might have cost the public and local businesses several times the \$6,950,134 cost of constructing the tunnel.

Minor utility relocations were required to accommodate the tunnel construction, and a shaft had to be excavated to remove the tunnel-boring machine, which affected traffic slightly. By anticipating and planning for these disruptions, neither traffic nor utility service was affected. Access to land parcels along the project was not affected. A cut and cover project would have disrupted every transmission and service line along the approximately one mile route. This would not only have been extremely expensive, but, as with the road closures, would likely have forced the shutting down of businesses along the route for extended periods.

Affholder's normal work schedule began at 7:00 a.m. and ended at 2:00 a.m. This caused some difficult scheduling and delivery problems compared to the typical public works construction schedule. Federal DOT regulations for total hours mandated that much of the hauling work fell to lease drivers. M&W was shipping to several other jobs during lining of the tunnel. These projects, combined with the Diamond Avenue project, made June 2004 the busiest month in M&W history. The delivery situation was complicated further by a very small staging area where the concrete pipe could be offloaded, and by the highly variable

times required to set certain pipes. Some days, there were no deliveries to the site, and some days there were as many as 52 pieces delivered.

The success of the tunnel project can be credited to the design and construction team, and to the public. All parties worked together to see that the project was completed with limited disruption to daily routines of commuters, local residents and businesses. ☺

Project:	SR 66, Diamond Avenue Tunnel Evansville, IN
Owner:	The Indiana Department of Transportation, Vincennes, IN Marston Fowler, P.E., Construction Engineer
Project Design:	Woolpert LLP, Indianapolis, IN
Tunnel Design:	Lyman Henn, Inc., Denver, Colorado Ray Henn, P.E., Project Engineer
Contractor: Public	Affholder, Inc., Chesterfield, MO
Review:	Pat Keepes, P.E., City Engineer Evansville, IN
Quantities:	4,752 feet of 96-inch diameter RCP tunnel pipe.
Producer:	M&W Concrete Pipe & Supply Company

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.

Photos: M&W Concrete Pipe & Supply Company



Here Today, Gone Tomorrow

By Jim White, P.E. • M&W Concrete Pipe & Supply Company • 812-426-2879

Damage to Route 66 pavement costs \$469,100 for emergency replacement

On August 3, 2004, the Indiana Department of Transportation (INDOT) awarded an emergency contract for the replacement of a collapsed large multi-plate corrugated metal pipe arch under Route 66. The engineers at INDOT specified a 12-foot x 6-foot reinforced concrete box culvert which was furnished by M&W Concrete Pipe & Supply to replace the metal structure.

The original corrugated metal structure was installed in 1972 and lasted only 32 years before it collapsed. Corrosion and abrasion had severed the plates at the interface between the wall and the invert. INDOT's emergency replacement contract of \$469,100 accommodated the closing of the road for 10 days while the failed structure was replaced. Speedy delivery by



12-foot x 6-foot reinforced concrete box culvert replaced failed multi-plate cmp arch

Failed multi-plate cmp arch



M&W, along with experienced and efficient placement of the box culvert by the contractor limited the closure to nine days, including three days of rain delay.

The detour around the road closure exceeded 22 miles, and took approximately 30 minutes to complete the drive. User costs resulting from this detour were high. Using a formula developed by Dr. Joseph Perrin, Jr. and Chintan S. Jhaveri¹ the traveling public incurred a "Delay Cost" of \$113,200 per day or \$1,018,800 for the nine-day road closure and detour. Combining the user delay costs of \$1,018,800 and

the contract cost of \$469,100 yields a total cost of \$1,487,900, or \$46,496 for each of the 32 years that this single corrugated metal structure was in the ground. That cost equates to over \$127 for each day the metal structure was in place.

Patriot Engineering and Environmental, Inc., retained to determine the pH of the soil surrounding this structure and the water passing through it, determined the pH of the soil to be 7.5 and the pH of the water to be 7.67. This is essentially a neutral environment and considered ideal to realize the maximum life of a corrugated metal structure. Using these values, and incorporating the *AISI Chart for Estimating Average Invert Life for Galvanized CSP* nomograph found in the *CSP Durability Guide*, then multiplying by the factor for the 10 gage metal thickness of the existing structure the estimated average invert life of the original structure was determined. Based on these calculations, this structure should have lasted in excess of 195 years. In the ideal conditions in which the culvert was installed, it lasted about 16 percent (32 years) of the mathematically calculated service life. Even if the design engineer had used half of the predicted service life of the metal arch, he would have missed the mark by 65 years.

Had INDOT chosen to continue replacing this structure with more CMP, two more replacements would have been required to achieve a 100-year design life. Even ignoring inflation this would have resulted in a total expenditure of nearly \$5,000,000 for this one structure in today's dollars.

If a reinforced concrete box culvert had been used for the initial construction, under normal conditions it would likely provide a 100-year service life² and only increase the cost of the structure by approximately \$3,500. Taxpayers could have saved the replacement cost and the user delay cost of approximately \$1,487,900.

A trend toward required replacement of corrugated metal culverts that have failed prematurely^{3, 4}, or collapsed suddenly before the end of their design life has been developing for many years in southern Indiana and other parts of the country. The vast majority of cross drains that were installed with the original construction of Interstate 64 in southern Indiana have already

required rehabilitation by slip lining to prevent complete failure. As funds for infrastructure maintenance and the unplanned replacement of failed culverts becomes increasingly inadequate, municipal, county, and state highway officials must look to life cycle cost analysis of products and materials to determine what solution is best for supporting our roadways. This analysis should recognize the potential cost of detours and lost business in the event of catastrophic failure. The cost of raw materials, the cost of fuel, and the value of time are spiraling. Future failures will be much more expensive. All of us have to realize that in the end, the generations that follow get what we pay for. ☺

1. Perrin, Joseph Jr. and Chintan S. Jhaveri, *The Economic Costs of Culvert Failures*, prepared for Transportation Research Board, January 2004.
2. United States Army Corps of Engineers, *Engineering and Design, Conduits Culverts, and Pipes (EM 1110-2-2902.*, Washington, DC, March 1998
3. I-70 Colorado, 2003
4. I-75 Michigan, 2003

Project:	Route 66 CMP Culvert Replacement
Owner:	The Indiana Department of Transportation, Vincennes, IN Marston Fowler, P.E., Construction Engineer
Project Design:	The Indiana Department of Transportation, Vincennes, IN Marston Fowler, P.E., Construction Engineer
Contractor:	Blankenberger Brothers Incorporated Cynthiana, IN
Quantities:	246 feet of 12-foot x 6-foot reinforced concrete boxes.
Producer:	M&W Concrete Pipe & Supply Company

Editor's Note: This article is a shortened version of a more detailed article first published in the Spring 2005 Issue of Concrete Pipe News, which was used as the 2006 Project Achievement Award entry by M&W Concrete Pipe & Supply Company, Inc.

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.

Photos: Texas Department of Transportation

Concrete Pipe and Boxes Used On Massive Katy Freeway Reconstruction Program

By *Kenneth Waite, P.E.*
Board of Directors,
Texas Concrete Pipe Association

*Kyle Worrell, Technical Promotions Engineer,
Rinker Materials-Concrete Pipe Division*

The Katy Freeway Reconstruction Program involves the complete reconstruction of approximately 23 miles of the Katy Freeway and approximately two miles of IH 610 including the IH 10/IH 610 interchange. This \$1.4 billion construction program (\$2.2 billion total program cost) is one of the largest highway construction programs in the history of the state of Texas, and the first project in the nation to convert a portion of an interstate highway into toll lanes. The reconstruction program consists of nine major construction contracts ranging from \$30 million to \$263 million. Construction started in June 2003 and is scheduled to end in early 2009.

The Katy Freeway extends 40 miles from the Central Business District of Houston, west to the Brazos River. First constructed between 1960 and 1968, it was designed to carry 79,200 vehicles per day and to have a pavement life of 20 years before major reconstruction would be required. The Katy Reconstruction Program encompasses the middle 20-mile section from its intersection with Interstate 610 to the City of Katy. Since this section of Interstate 10 was built more than 30 years ago, when Houston was a much smaller city, the freeway design has become obsolete. Now, the freeway carries over 207,000 vehicles per day. There is congestion for 11 hours each day and for long periods during the weekends.

Most agree that Houston simply could not afford to wait until

2013 or 2015 to reap the benefits of the planned improvements along IH 10. The decision was taken by Texas Department of Transportation (TxDOT) to fast track the IH 10/Katy Freeway Reconstruction Program to meet a December 2008 completion date. This means that contractors must work at a fast pace. In all contracts for this section of the reconstruction program, there is a high use of precast concrete pipe and boxes being used for storm sewers and culverts. Precast concrete products are being supplied by Rinker Materials - Concrete Pipe Division, Hanson Pipe & Precast, Inc., and Oldcastle Precast, Inc.

The pipe producers, all members of both the Texas Concrete Pipe Association and the American Concrete Pipe Association, will supply over 53 miles of reinforced concrete pipe in all sizes, and approximately 25 miles of reinforced concrete boxes. In addition, the producers provided approximately 4,218 structures. ☺

Project:	The IH 10/Katy Freeway Reconstruction Program Katy, Texas
Owner:	The Texas Department of Transportation, Houston, TX Gabriel Y. Johnson, P.E. Charles E. Gaskin, Jr. P.E.
Contractors:	Williams Brothers Construction Company, Houston, TX Randy T. Rogers Balfour-Beatty Construction Company, Austin, TX
Quantities:	Approximately 285,024 feet of reinforced concrete pipe. Approximately 130,355 feet of reinforced concrete pipe 4,218 precast concrete structures.
Producers:	Rinker Materials - Concrete Pipe Division Hanson Pipe & Precast, Inc. Oldcastle Precast, Inc.

Florida-based Rinker Materials is a major supplier of construction materials, aggregates, and ready-mixed concrete throughout the United States. For more information on Rinker Materials - Concrete Pipe Division, visit www.rinker.com.

Hanson Pipe & Precast, Inc. is a diversified manufacturer of concrete pipe and boxes, and a variety of supporting products. Hanson is one of the world's largest producers of construction aggregates, and concrete gravity and pressure pipe, precast concrete, and is the leading manufacturer of facing bricks in Europe. See www.hanson.biz for details.

Oldcastle® is the North American arm of CRH plc, a major international producer of construction materials and building products. Oldcastle companies operate on 900+ locations in 48 states and 4 Canadian provinces and have 30,000 employees. See www.oldcastle.com.

Urban Transit Pump Station Constructed with Precast Boxes

By Jaime J. Vega, Eng. • Atlantic Pipe Corporation • 787-788-5400

Puerto Rico's Department of Transportation and Public Works (DOTPW) proposed the construction of a public transit train system in 1989 to help alleviate traffic congestion in the San Juan Metropolitan area. In 1993, the Federal Transit Administration selected the proposed project as a turnkey demonstration project under the Intermodal Surface Transportation Efficiency Act of 1991. Seven design-build contracts were awarded between 1996 and 1997 for different segments of the project that became known as the *Tren Urbano* Phase 1 System.

Tren Urbano is the most important mass transportation project in Puerto Rico since industrialization in the late 19th century. The system is a 10.7-mile (17.2 km) rail network, which links the municipalities of Bayamón, Guaynabo, and San Juan. On a typical weekday, an average of 70,000 travelers use the train to move between the 16 stations located along the route.

Design of one of the stations, *Jardines* train station, made unique use of precast concrete boxes. The station was designed as an above ground station with a below grade track. Storm water management was a major concern, so a pump station had to be incorporated into the design to move large volumes of water from existing surface drainage systems to a tunnel and away from the site.

The Puerto Rico Department of Transportation and Public Works, Redondo Entrecanales, S.E., and Atlantic Pipe Corporation designed a pump station using five vertical rows of 12-foot x 12-foot precast concrete boxes. The box sections were designed with four small rectangular cutouts at each end to accommodate connectors between the box sections. The lower sections were fitted with a 36-inch diameter pipe to equalize the water levels entering the chambers. The boxes were produced and delivered to the site by Atlantic Pipe Corporation.

Unlike cast-in-place or sheet piling options, rainy days, tight scheduling, difficult terrain, and high water levels at the site did not delay construction using precast boxes. Atlantic Pipe

Corporation's expertise on precast structures and its rapid delivery of product to the site were key factors in the approval of the contract to supply the boxes.

Tren Urbano was inaugurated on December 17, 2004. The cost of the Phase 1 project is estimated at \$2.5 billion. ☺

Project:

Tren Urbano Phase 1 System
San Juan, Puerto Rico

Owner:

Puerto Rico Department of
Transportation and Public
Works (DOTPW)

Jaime Cabre, Eng., Design
Management Unit, PRHA,
DOTPW

Design:

H2A Engineers, P.S.C.
Nelson Hidalgo, Eng.

Contractor:

Redondo Entrecanales, S.E.
Raul Bras, Eng.

Quantities:

25 (12-foot x 12-foot)
precast concrete boxes

Producer:

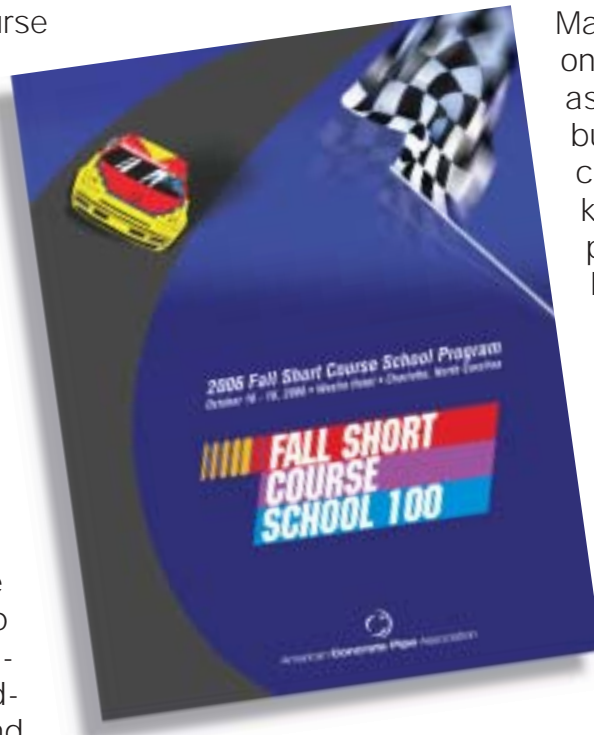
Atlantic Pipe Corporation
San Juan, Puerto Rico

Atlantic Pipe Corporation was founded in 1948 to manufacture and distribute concrete pipe in Puerto Rico. More than 50 years later, concrete pipe remains the core of a business dedicated to a modern diversity of liquid transportation and construction products and services for clients around the island and abroad.



Gear Up to Attend the 2006 Fall Short Course School!

The 2006 Fall Short Course School will be held at the Westin Charlotte Hotel in Charlotte, North Carolina from October 16 to 18. This training is an informative two-day educational event designed to help you learn more about the design, specification, and use of piping products for sanitary sewers, culverts and storm drain applications. There are three tracks to develop your competitive skills - Basic Engineering, Advanced Engineering and



Marketing. Sessions are offered on various pipe-related topics, as well as interpersonal and business skills. A seasoned pit crew will bring their personal knowledge and practical experience to each session and help you with the tools and strategies needed to win. Pick your track, chart your course, and rev up your engines for the educational race of a lifetime. For more information, please visit the ACPA website at www.concrete-pipe.org and look under "Education" or "What's New" or contact the ACPA office at 972-506-7216. ☺



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