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The Magazine of the American Concrete Pipe Association

Precast Concrete Pipe:
A Lasting Product of the Times.

- Richmond CSO Project Benefits from Precast Concrete Pipe
- RCP Used to Help Prevent Flooding at Devils Lake
- Accountability through Performance-Based Specifications

This issue:

Volume 51, Number 3
Winter 2000

Concrete Pipe News is designed to provide a communication forum for the concrete pipe industry to facilitate the exchange of information regarding product usage and applications, industry technology and trends among members of the American Concrete Pipe Association, contractors, engineers, vendors, suppliers and other interested parties.

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American Concrete Pipe Association

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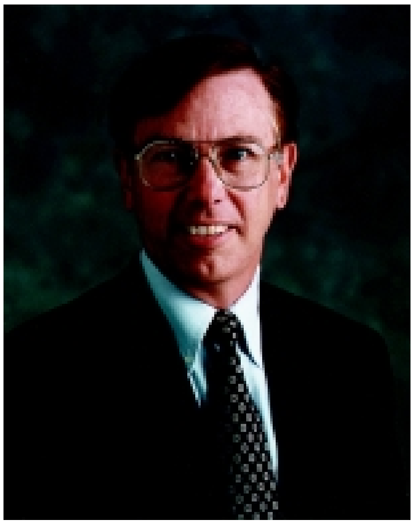
With concrete pipe as lifelines of our times, the precast concrete pipe industry will grow stronger in the New Millennium. Inset Photo: A 96-inch 5000 D-Load pipe being installed as part of the Devils Lake flood control project in North Dakota.

Computer furnished by Apple, Inc.

President's Report



John J. Duffy

Welcome to the 21st Century – and a New Era for the Concrete Pipe Industry

Our Association has now been championing the use of concrete pipe, and the standards of business set by its members, for more than 93 years. We can now claim that precast concrete pipe has been a vital product in creating the most prosperous nation in the world throughout the entire twentieth century. Moreover, precast concrete pipe continues to serve the fastest growing cities of North America as the lifelines of our built environment.

The American Concrete Pipe Association enters this new century, focused and determined to provide the public with the best product for conveying sewage and storm water to keep our urban centers and transportation routes functioning at peak performance, so that our society and economy continue to proper and grow. The ACPA is ready to take on the challenges of competitive products and updating standards and specifications that provide the best products available for their communities and neighborhoods. The health and safety of our way of life is predicated on buried concrete lifelines that continue functioning, *out of site and out of mind*, with decades-free maintenance. We can grow and prosper because our cities are free of disease caused by uncontained and untreated sewage, and free of reoccurring floods that disrupt industry and commerce. Much of this *freedom* is due to engineered sewerage systems and drainage plans. Indeed, precast concrete pipe sewers are the lifelines of the infrastructure of North America.

This issue of the *Concrete Pipe News* – the first issue of the 21st Century, and third millennium – heralds a new era for precast concrete pipe that will be used in future projects, yet undreamed. Design, manufacturing technology, concrete mixes and installation techniques will change and take the application of concrete drainage products to new heights. The feature stories and industry spotlight are testimony to what we can expect.

Retired, active and future leaders of our industry offer their recollections, comments on the state of the business, and visions of the decade to come… and beyond. These anecdotes will go into our archives and be revisited occasionally for guidance and direction. Some members may wish to pursue their ideas and develop them further. We have often seen examples where an idea once considered past or old, is revitalized, re-shaped and recycled for today's use. Look for the nuggets of knowledge in their messages that will advance our industry and keep our actions in perspective.

We have three feature stories in this issue that give testimony to the versatility of precast concrete drainage products in keeping our economy moving, and communities safe and healthy.

The U.S. Army Corps of Engineers was called upon to solve a disaster waiting to happen in North Dakota near the Town of Devils Lake. They designed a pump station to pump water from a closed basin (Devils Lake) and direct it away from the town. The pump station made special use of precast concrete pipe that had to be installed with precision during construction of the pump floor and walls.

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Industry Spotlight

Concrete Pipe – Lifelines of Our Time

There is more precast concrete pipe beneath our urban areas and interconnecting highways than any other pipe material. This is an undeniable fact. Most of the concrete pipe laid before the midway point of the 20th century is still doing its job, even though it may have been made with concrete mixes no longer in use, and designs that have passed with time. Today's precast concrete pipe, and the concrete pipe of the new century, will endure far longer than the early products. It will continue to be the lifelines of our time.

The precast concrete pipe industry is fortunate to have champions who stay with the industry for life — because they believe in the product. We asked six of our champions to share their thoughts with us as we turn the page of our rich history of achievements and enter a new era.

The Past

John H. Bailey, current Chairman of the Board of The Cretex Companies, Elk River, Minn., and R.W. Liston, W.T. Liston Co., La Feria, Tex., and former Chairman of the Board of the ACPA (1976), reflected on evolution of our industry from the early days:

Q: *What is the single greatest event that has influenced the current state of the precast concrete pipe industry?*

Bailey: The research work by Marston and Spangler is significant. We keep going back to their theories that were well tested and proven.

Liston: The R4 joint and round rubber gaskets were influential, as was the use of Packerhead machines.

Q: *You have seen a lot of changes in the industry. What has been the greatest change(s) to concrete pipe over your career?*

Bailey: The development of large reinforced concrete pipe and box sections.

Liston: I remember wheelbarrows being used, when I first started. I suppose that automation has been the greatest change.

Q: *Who do you believe was influential in building the ACPA and shaping the concrete pipe industry, and why?*

Bailey: Howard Peckworth, one of the past presidents of ACPA, was an engineer who came out of the consulting field when he came to the ACPA. He was with the ACPA for a long time and had the charisma to put the organization together and make it worthwhile. He had the capacity of organization.

Liston: Mac Albertson, Vice President of Marketing for International Pipe & Ceramics Corporation was ACPA Chairman of the Board when Rick Barnes was hired. Barnes served the Association as president from 1966 until 1990. Mac had great vision and leadership qualities.

Q: *When do you believe the concrete pipe industry moved from old technology to the technology of today? Was there a time when change happened quickly, or was change gradual?*

Bailey: Change was gradual. During the war years, the value of concrete pipe increased significantly with the construction of airports and munitions dumps. But it was through the mid 50s and early 60s that the industry really began to change.

Liston: Change occurred in the 50s. The R4 joint on Packerhead machines happened at that time, and put the Packerhead back in business.

Q: *Based on your experiences and knowledge of the industry, if you could give engineers and specifiers a word of advice, what would that be?*

Bailey: I would ask them to not jump to conclusions. They have to look past the propaganda of the flexible pipe industry. If you are going to see them to sell a product, you have to convince them of the worthiness of it, taking history into consideration to prove a point. They have to consider the proof.

Liston: My advice would be for them to be more precise in what they specify, and show less indecision.

The Present

We asked William L. (Bill) Quinlen, III of Choctaw, Inc., Memphis, Tenn., the immediate Past Chairman of the Board of the ACPA, and James A. (Jim) Aumann, American Concrete Pipe Company,

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VERSATILITY OF CONCRETE PIPE PROVES TO BE A MAJOR BENEFIT TO RICHMOND CSO

By John M. Blankenship, P.E.
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The City of Richmond, Virginia has recently completed a Combined Sewer Overflow (CSO) project consisting of three phases and encompassing both banks of the James River which runs through the center of the City. The purpose of the CSO project was to reduce the amount of untreated sewage discharged into the James River during peak flows, and to extend the discharge points further down the river below the fall line.

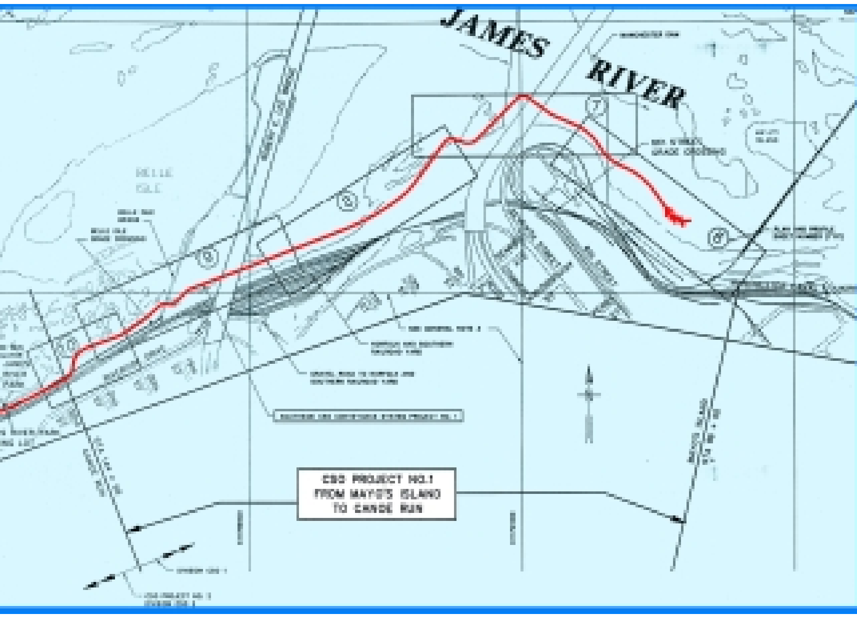
The City's combined system of sanitary and storm sewers has not had enough capacity to handle storage and treatment of all sewage and storm water during peak flows typically experienced during heavy rainfalls. When the wastewater treatment plant and the conveyance system, consisting of many thousands of feet of pipe, became over-taxed during heavy rainfalls, overflow discharges occurred at several locations above the fall line. The fall line is an area of sudden grade change in the river.

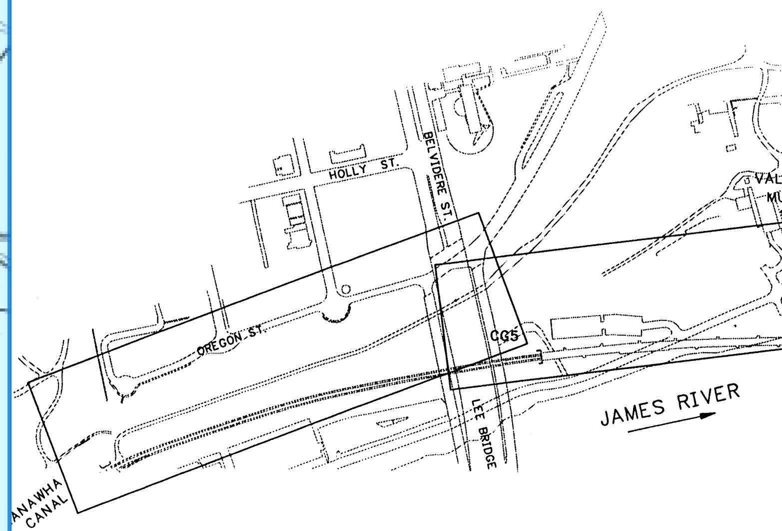
Existing discharge points were located at the 42nd Street Interceptor, Reedy Creek and Canoe Run on the south side of the river. Additional discharge points were located at the 12th Street, 6th Street, Gambles Hill and Park Hydro Combined Sewer just below Hollywood Cemetery on the north side. The EPA mandated Richmond to correct this problem, and the City responded by authorizing the CSO work. The first three phases have been completed and additional phases are in the design stage.

Workers lay 90-inch diameter pipe with 36-inch outlets near the outfall of Phase 1.

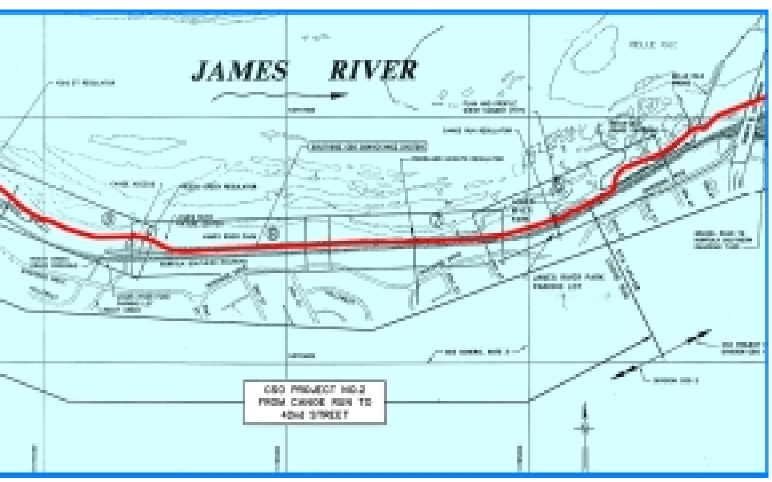
Greeley and Hanson performed the engineering design, and project engineering work for the first three phases of the CSO. Phases 1 and 2 of the project on the south side of the James River were constructed by general contractor English Construction Company, along with subcontractors Bryant Electric and Lennet for the Phase 1 work. G.L. Howard was the subcontractor for the Phase 2 work. Kewit Construction Company performed the work of Phase 3 on the north side of the river, which also included the renovation, and rebuilding of the historic Haxall and Kanawha Canals, as well as a turning basin. Hanson Concrete Pipe & Products' Hanover and Southside plants furnished all of the conveyance pipe and the manhole structures for all phases of the project. Hanson Concrete Pipe & Products is a member of the American Concrete Pipe Association.

Phase 1 of the project included a series of twelve (36-inch diameter) outlet diffusers located





at the extreme outlet end of the line just east of the Manchester Bridge and below the fall line on the south side of the river. From the outlet, 5,600 feet of 90-inch diameter pipe proceeded westward along the south side of the river, continuing to a point west of the Lee Bridge and adjacent to Bell Island. At this point, Phase 2 began with 320 feet of 84-inch diameter pipe that proceeded westward

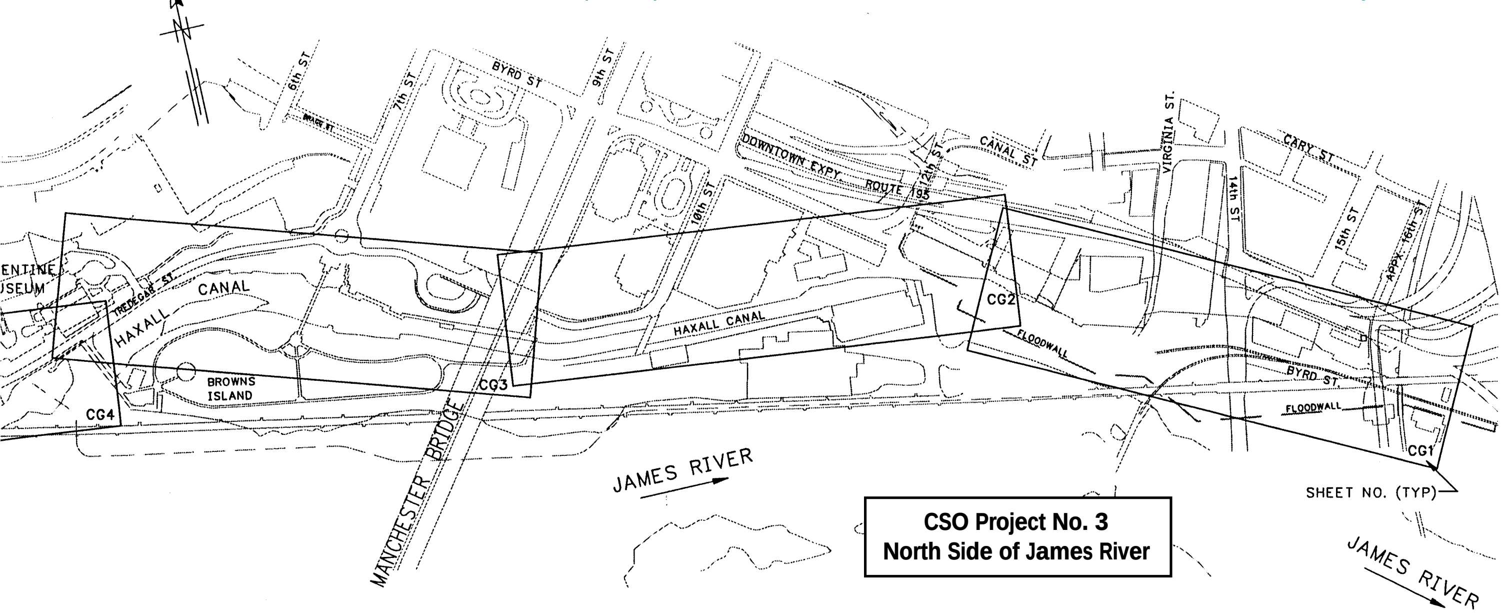


along the Norfolk Southern railway to the Canoe Run Regulator where an existing overflow point was removed. Continuing westward, 3,400 feet of 78-inch diameter pipe was installed parallel to the railroad. The pipe run passed through a new Woodland Heights Regulator near 26th Street and ended

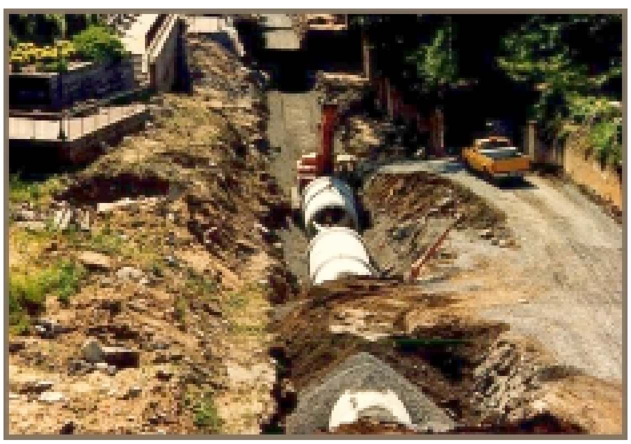
A unique pipe carrier was used to install 90-inch diameter pipe in a rock tunnel that extends under the James River on the southside for Phase 1.

at a new Reedy Creek Regulator near 33rd Street where another overflow point was eliminated. From Reedy Creek, 1,460 feet of 72-inch diameter pipe extended westward along the tracks and ended at a new 42nd Street Regulator.

The first 650 feet of 90-inch diameter pipe was installed in the river under the Manchester Bridge by the conventional open cut trench method with a cofferdam and pumps to displace the river water. The next 4,950 feet of 90-inch diameter pipe was installed by boring a 10 feet diameter tunnel, between two large access pits. The tunnel passed through the bedrock below the river bottom, and



the concrete pipe was installed with a unique pipe-carrying vehicle. The Phase 2 piping that runs along the railroad was installed by standard open cut trench methods. The removal of rock in the close vicinity of the railroad, as well as existing piping, made for a challenging installation.



Kiewet laying 84" pipe down the middle of the Haxal Canal on CSO 3.

Phase 3 on the north side of the James River included a 1,300 feet section of 96-inch diameter concrete pipe beginning at a tie-in point to the Shochoe Arch in the downtown area of the City. It then runs westward under the reconditioned Kanawha Canal bottom to a new Byrd Street Flow Control Structure, where it transitioned to 60-inch diameter pipe. Two hundred seventy five feet of 60-inch diameter pipe extended westward to 12th Street where a new spillway for the Haxall Canal was constructed. From 12th Street, 84-inch diameter pipe extended westward for 2,550 feet under the newly reconditioned Haxall Canal through a new 7th Street Regulator, and onward to a new Gambles Hill Regulator. Just west of the Gambles Hill Regulator is a new Headgate Structure, which regulates water flow into the reconditioned Haxall Canal. A 2,580 feet run of 42-inch diameter pipe extends westward along side of the CSX Railway tracks to the new Park Hydro Regulator.

Phase 3 also included 1,110 feet of 48-inch diameter pipe extending from a new 7th Street Regulator northward up 7th Street and then westward on Byrd Street to a new junction chamber at 6th Street.

The 96-inch, 84-inch, 48-inch and most of the 42-inch diameter pipe for Phase 3 was installed by the traditional open cut trench method. A unique transition near 15th Street was required where the 96-inch diameter pipe went under an existing 10-feet x 6-feet box culvert that had been installed a few years earlier as part of the floodwall project.

Fortunately, the box culvert was precast which allowed for easy dismantling in the intersection area. The 60-inch diameter run of pipe was jacked into an 84-inch diameter tunnel liner underneath a section of floodwall near 12th Street. A portion of the 42-inch pipe west of the Iron Works was jacked under Tredegar Street to avoid road closures and existing utilities. As with Phases 1 and 2, there was a great quantity of rock excavation required to install the pipe.

All of the reinforced concrete pipe for Phases 1, 2 and 3 in sizes 42-inch through 96-inch was wet cast in precision formwork in standard lengths ranging from 16 feet to 20 feet.

The pipe joints consisted primarily of concrete joints with o-ring gaskets. A 400 feet section of the 48-inch diameter pipe installed on 7th Street was required to withstand 50-psi hydrostatic pressure due to its location immediately adjacent to a 12-inch water main. This section of 48-inch diameter pipe was produced with steel joint rings. The joints that were furnished with two o-ring gaskets also had an air test port between the two gaskets to allow for pressure testing immediately after installing each section of pipe. Other pipe with a single o-ring gasket was tested during installation with an internal joint tester per ASTM C1103. Testing of the joints during pipe installation provided immediate information about the integrity of the joint seal. Any problems that were encountered were solved right away before additional pipe was laid. The high quality of the pipe and the joint testing procedure proved to be a great success during the final field hydrostatic testing of the pipelines.

A 78"x48" access manhole tee being set in Phase 2.

The CSO project benefited by using precast concrete pipe to store and convey the combined sewer overflow further down the James River. Precast concrete pipe was installed by the open cut trench method in a river where its inherent resistance to flotation was an asset. It was installed in bored rock tunnels, tunnel liner and by direct jacking methods where its axial compressive strength proved to be a major asset. The pipe was installed under as much as 35 feet of earth cover and was designed to resist the extremely heavy Cooper E-80 railroad live load, which illustrates its superior ability to support heavy external loads. With over 50 special fittings, including elbows, tees, wyes and reducers, and several thousand feet of beveled pipe to traverse the curved alignment of the James River, the versatility of precast concrete pipe proved to be a major benefit to the success of the entire project.

The dedicated employees of Hanson's Hanover Plant (shown above) helped make the Richmond's CSO Project successful.

Project:	City of Richmond Combined Sewer Overflow
Owner:	City of Richmond, Virginia
Designer:	Greeley and Hanson, Richmond, Virginia
Contractor:	English Construction Company, Lynchburg, VA
Subcontractors:	Phase 1 Bryant Electric, Archdale, NC Lennet, Alcoa, TN Phase 2 G.L. Howard, Rockville, VA Phase 3 Kewit Construction Company, Richmond, VA
Quantities:	1,300 feet – 96-inch diameter RCP 5,600 feet – 90-inch diameter RCP 2,870 feet – 84-inch diameter RCP 3,400 feet – 78-inch diameter RCP 1,460 feet – 72-inch diameter RCP 275 feet – 60-inch diameter RCP 1,110 feet – 48-inch diameter RCP 2,580 feet – 42-inch diameter RCP (All pipe were custom designed.)
Producer:	Hanson Concrete Pipe & Products, Richmond, Virginia John M. Blankenship, P.E.

Specially Designed Box Culvert Installed at Busy Ohio Airport

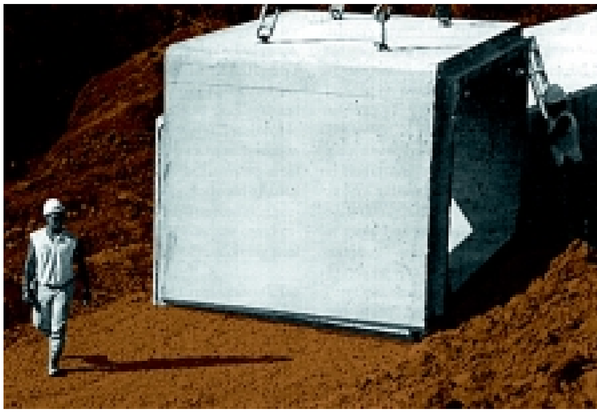
By David McClintock, P.E.
General Manager
CSR Hydro Conduit, Diamond, Ohio
330-654-2501

A specially designed 192-feet long box culvert lies in a shallow cover of four feet or less under Taxiway J at Ohio's Port Columbus International Airport. The 10-feet x 8-feet units were built to carry the design-load of a Boeing 727 – 200 series aircraft. A Boeing 727, with a two wheel, dual main gear assembly, has a maximum tire load of 48,000 pounds. Distributed downwards, through the flexible asphalt pavement and earth fill, this load results in nearly 16,800 pounds per square foot of load on the box units. ACPA-member, CSR Hydro Conduit Corporation, Diamond, Ohio, supplied the precast box culverts for the project.

Dave McClintock, P.E. of CSR Hydro Conduit, Diamond, Ohio, and Jim Shannon, P.E. of CSR Hydro Conduit, Houston, Texas provided the special box design that included an increased wall thickness and heavily reinforced section that was still reasonable to produce. The 12-inch wall and 12-inch haunch section conformed to the minimum design requirements shown in the plans and specifications designed by URS Greiner of Hunt Valley, Maryland. The heavily reinforced precast concrete box, with a 5,000 psi concrete compressive strength, weighed 3.15 tons per foot. With a laying length of 6 feet, each section weighed 18.90 tons.

Port Columbus International Airport, located within 500 miles of half of the country's population, has planned expansions from 27 to 57 gates. In 1997, the airport reached a new level of 6.5 million passengers per year with 400 arrivals and departures, daily. The airport is a very busy facility and construction activity involving taxiways and runways can be very disruptive to travelers, as well as costly to the Airport Authority. The production of the box units and construction of the culvert had to be fast-tracked. In addition, the culvert was scheduled as one of the first elements to be constructed.

Within days of the award of the project to George J. Igel & Co., Inc., Columbus, Ohio, the Delaware Ohio plant of CSR Hydro Conduit had an approved design for the box units. This speedy approval was only possible through the determined and coordinated work of the designer, contractor and box producer. Within one week of the design approvals, reinforcing steel and special equipment was on hand at the plant to commence production.



The precast concrete box units were produced by the dry cast method, which allowed for the flexibility of design and a greater rate of production when compared to wet cast production. Delaware plant superintendent, Bryan Reardon, and the production team were able to produce 32 six-feet long dry cast box units in four days (eight units per day). continued on page 15

Project:	Port Columbus International Airport
Owner:	Port Columbus Airport Authority Columbus, Ohio
Designer:	URS Greiner, Hunt Valley, Maryland CSR Hydro Conduit Dave McClintock, P.E. (Diamond, Ohio) Jim Shannon, P.E. (Houston, Texas)
Contractor:	George J. Igel & Co., Inc., Columbus, Ohio Steve Betsko Rich Thompson
Quantities:	32 (10 feet x 8 feet x 6 feet long) dry cast box units
Producer:	CSR Hydro Conduit, Delaware, Ohio Bryan Reardon, Plant Superintendent

Devils Lake Flooding Averted with Unique Pump Station and Concrete Pipe

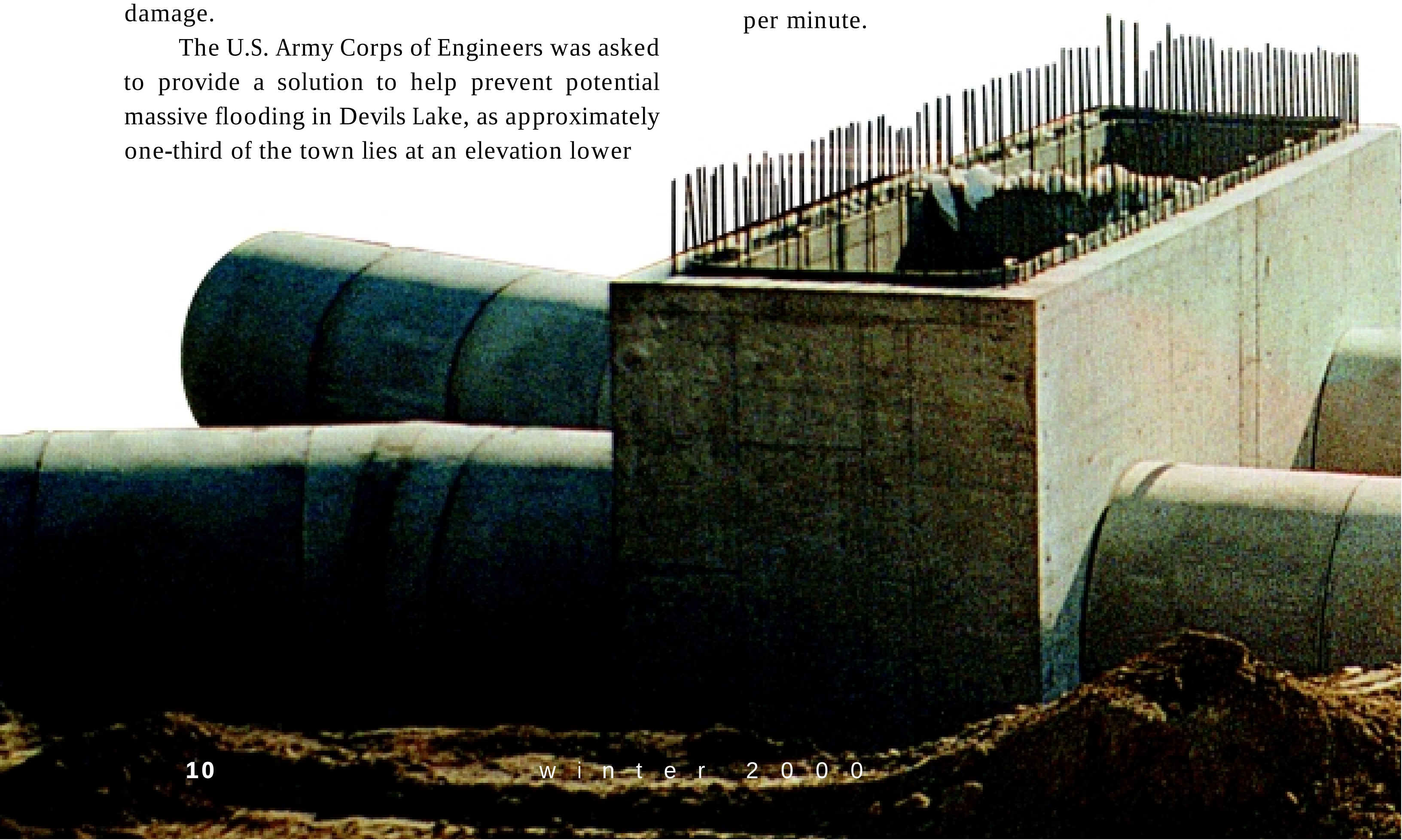
By Ron Almquist
Sales Representative
North Dakota Concrete Products Co., Bismarck, North Dakota
701-223-7178

Devils Lake lies in the northern reaches of the Great American Desert of North Dakota. Extreme climate changes dominate the lake basin, which has no natural outlet. After a period of particularly wet weather that started in 1993, the lake continued to rise to a level where flood damage had become a threat to farms, transportation routes and the nearby Town of Devils Lake. The area covered by the lake had more than tripled, increasing from approximately 30,000 acres in 1993, to more than 105,000 acres in 1998.

In July 1998, the lake reached its highest recorded level and caused over $250 million in flood damage.

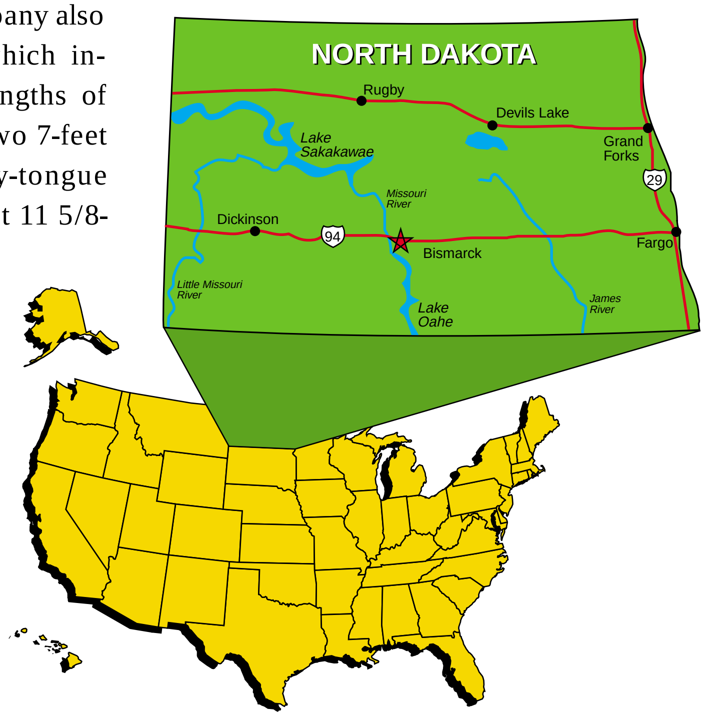
The U.S. Army Corps of Engineers was asked to provide a solution to help prevent potential massive flooding in Devils Lake, as approximately one-third of the town lies at an elevation lower than the current lake level. An existing dike system was in need of being widened and raised, and the lakeside of the dike covered with rip rap. Vital to the solution was a $4.2 million pump station, designed by the Corps and constructed by Park Construction of Anoka, Minnesota. The station was necessary to pump storm water runoff from the town, over the dike and back into the lake.

Park Construction contracted with North Dakota Concrete Products Co. of Bismarck, North Dakota, to manufacture the reinforced concrete pipe needed for the pump station. The station consisted of a discharge structure, slide-gate, and an intake-pump. The intake-pump structure houses six, 250 horsepower pumps, each with a 36-inch diameter discharge pipe. Each pump is capable of pumping 35,000 gallons per minute.



North Dakota Concrete Products Co., a member of the American Concrete Pipe Association, supplied 376 feet of 96-inch diameter rubber gasketed 5000 D-load pipe that included four 14+-degree bends and four 22-degree bends. The company also supplied specials, which included two 8-feet lengths of bell-by-butt pieces; two 7-feet lengths of tongue-by-tongue pieces; and two 5-feet 11 5/8-inch lengths of bell-by-tongue pieces.

The pipe installation was staged to coincide with the construction of the individual structures of the station. The first delivery of pipe started on July 23, 1998, and concluded on July 31. Mark Johnson and Rich Nolte of Park Construction installed the pipe. The pipe was laid approximately 38 feet on the north side of the gate well structure and approximately 59 1/2 feet out of the south side to the discharge structure. The walls of the gate well and discharge structures were then constructed.



Located in the northern extremes of North Dakota, flooding at Devils Lake threatened the town, surrounding farms and transportation routes.

The second delivery of pipe that began on September 9 and ended on September 14, 1998 enabled completion of the line from the gate well to the intake pump structure. The pipe run aligned almost exactly with the wing wall on the intake structure. Since the footing and floor of the pump station had already been poured and the walls formed, the installation of the pipe and the pipe tolerances were critical. The Corps of Engineers' inspector, Lowell Hanson, was pleased with the quality of the pipe supplied by North Dakota Concrete Products and work on the pump station by Park Construction.

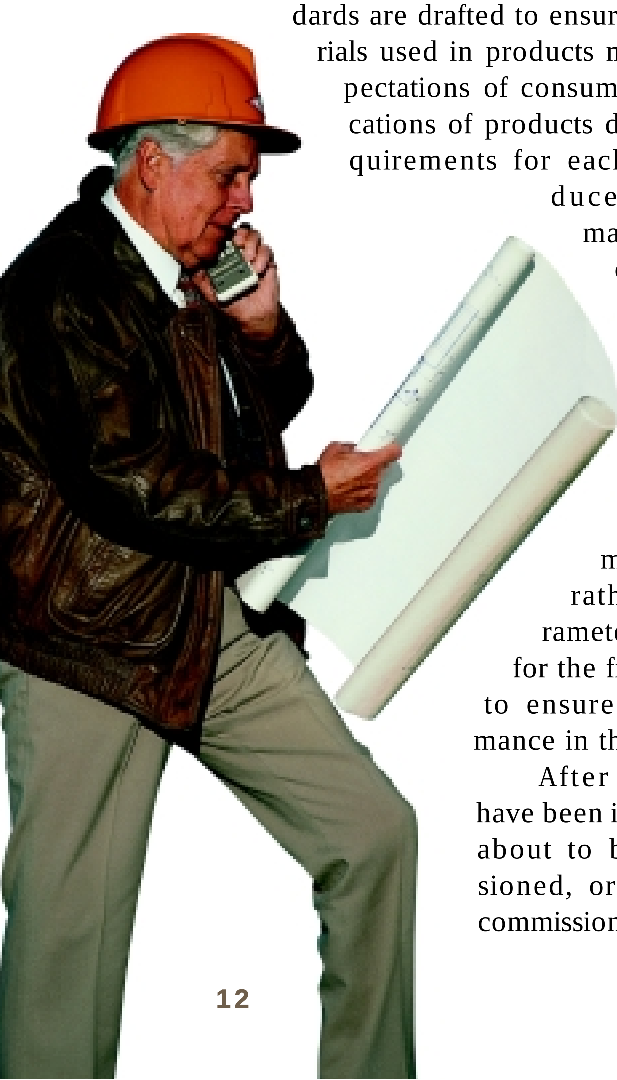
The Corps project did indeed provide a solution to the town's local drainage and flood problem. However, Devils Lake continues to present the threat of flooding to surrounding farms and transportation routes. Further innovative drainage solutions are required to stay ahead of the rising waters.

96-inch diameter rubber gasket 5000 D-load RCP was an integral part of the $4.2 million pump station at Devils Lake.

Accountability Through Performance-Based Specifications

There are many standards and specifications that govern the manufacture and installation of drainage pipe for sanitary and storm sewers. While one can argue whether or not these standards are adequate and/or state-of-the-art, one thing is clear. There is a lack of performance specifications for pipe products, and when present, they are not always followed and enforced.

Standards for products generally address the function or purpose for which the product is intended, and the testing to ensure that the product meets that purpose. Government and industry standards are drafted to ensure that materials used in products meet the expectations of consumers. Specifications of products detail the requirements for each unit produced. Performance specifications do not necessarily outline the individual material requirements, but rather the parameters required for the final product to ensure its performance in the field.



After products have been installed and about to be commissioned, or soon after commissioning, systems comprised of drainage products are often tested for workmanship and proper installation techniques. Rarely are products tested for performance at appropriate periods following installation. Owners are responsible, after final acceptance, for whatever products and systems they purchased, usually within two years of construction. The problem with this approach is that many systems and products have not stabilized in such a short time. Soil/structure interactions continue, and conditions may change long after installation.

The notion that buried infrastructure is an asset is a trend that is gaining momentum. Drainage systems are being re-evaluated and many municipalities are developing asset management plans to be incorporated into the tax base. There is not enough preventive maintenance of the systems, and municipalities throughout North America are calling for an evaluation of pipe performance before accepting systems. They are looking for assurance that their maintenance programs will be adequate and not depleted prematurely by products and systems that do not meet anticipated performance. Canada has embarked on a five year project to develop an “Infrastructure Guide” aimed at municipal officials, engineers and suppliers to promote the use of knowledge and technologies that can prolong the life cycle of the country’s infrastructure.

Pipe maintenance periods are critical to asset management plans. It has long been recognized that flexible pipe systems do not react with soils in the same way as rigid systems. Outdated standards in many jurisdictions still allow flexible and rigid pipe systems to be installed with little variation, and with poor, or insufficient long-term inspection. This is now changing. Contractors are accepting accountability for ensuring a better installation regardless of the pipe material. Consultants are accountable for accurate designs and quality inspections, and owners must realize that initial low cost savings do not guarantee long-term satisfaction.

Often, the initial low cost is on pipe material only. When the backfill material and compaction requirements are added to the cost, rigid pipe systems can provide a lower initial installed cost when compared to flexible pipe installations. A life cycle cost comparison of pipe materials in the planning stage of a project would reveal long-term savings of concrete pipe installations.

In the U.S. the difference in piping materials is acknowledged by national organizations such as the American Society of Civil Engineers (ASCE), American Society for Testing and Materials (ASTM), and American Association of State Highway and Transportation Officials (AASHTO). ASCE developed Standard 15-93, "Standard Practice for Direct Design of Buried Precast Concrete Pipe Using Standard Installations (SIDD)", to outline the installation and design requirements of precast concrete pipe. ASTM is currently working on an installation standard for concrete pipe to complement the existing standards for plastic (ASTM D 2321), corrugated steel (ASTM A 798) and corrugated aluminum (ASTM B 788) pipe. In like fashion, the AASHTO Standard Specifications for Highway Bridges has three separate sections for concrete, metal, and plastic pipe design, as well as three separate sections for installation. These national standards note the differences in the products and the required performance criteria. These requirements are often ignored due to lack of time or funding. This short-term view can lead to long-term problems and additional costs.

Current research is being sponsored by the National Cooperative Highway Research Program to develop a more rational approach for plastic pipe. This research is being conducted so that engineers can evaluate such failure mechanisms as slow-crack growth, deflection, and local buckling, that have long been ignored by the codes.

In Canada, installations must satisfy the ASTM D 2321 guidelines (OPSS in Ontario). These ensure that trench dimensions satisfy pipe clearance requirements, the use of select bedding and backfill materials, control of water to maintain in-situ soil stability, prevention of trench supports from disturbing installed pipe, and uniform placement and compaction of bedding and backfill. Mandrel tests are required by Ontario Provincial Standard Specifications (OPSS) 410. In Québec, the Ministry of Transportation calls for deflection tests of flexible pipe after installation. Other municipalities such as the Region of Hamilton-Wentworth, Cambridge, Woodstock and Orangeville in Ontario, all call for mandrel tests within a period following the end of the construction maintenance period.

Industry and the public sector can work together to improve the quality and performance of buried drainage infrastructure by paying closer attention to the following:

- Design of installations based on pipe material. (Many specifications do not differentiate between flexible and rigid pipe materials and installation specifications do not account for the pipe material characteristics.)
- Evaluation of sub-surface conditions to ensure acceptability for all pipe materials.
- Inclusion of sufficient inspection times after installation and before acceptance. (Concrete pipe is delivered to the site with 80% of its performance built into the design at the plant. Any problems associated with installation or the product can be determined within days or weeks of the installation. Deflection and distortion of flexible pipe material and systems can occur over much longer periods than two years.)
- Making it mandatory for pipe suppliers of all materials to provide raw material test results that satisfy the specifications.

It is time to call for a higher level of accountability from all participants in the infrastructure industry. For too many years, flexible pipe products have been installed as if they were rigid, and this is not contributing to a legacy of durable lifelines expected to perform for generations. Action is being taken by the concrete pipe industry and many jurisdictions to change the way we look at buried systems. Buried infrastructure is an asset that we must carefully select and install to meet performance expectations as well as the budgets of asset management plans.

Concrete Pipe – Lifelines

continued fron page 4

Green Bay, Wis., to reflect on the present:

Q: *What is the greatest challenge facing our industry today?*

Quinlen: Concrete pipe is a high performance product, and tends to be priced accordingly. However, cheaper alternative products, especially HDPE, continue to promise the same high performance as concrete at lower price. The challenge is to expose this myth.

Aumann: Industry manufacturers must educate the engineering community as to our production capabilities. We have the ability to design and manufacture products to address H_2S problems, special jobsite loading conditions and innovative joints to meet stringent infiltration requirements. Manufacturers must be proactive to meet these challenges.

Q: *How is the concrete pipe industry meeting the current threats of competitive products?*

Quinlen: The industry first renewed its focus on the education of those who call on specifiers and owners. The resulting high quality technical promotion is already yielding very favorable results in markets all over the US.

Aumann: We are meeting the challenge by providing innovative new products, including linings and pipes with thicker and thinner walls. New joint designs are about to appear. We must market a product that is not reinforced such as C14 pipe, but we need the proper equipment to do this. We must look at tougher uses of concrete pipe such as jacking, tunneling, and storage for storm water runoff, and produce shapes other than round pipe.

Q: *What changes have you seen in the regulatory environment during the past 10 years?*

Quinlen: At the plant level, there is continuing emphasis on environmental issues such as storm water runoff and exposure to hazardous materials. Safety regulations are also tightening as well, with emphasis on workplace ergonomics and exposure to silica, for example.

Aumann: Regulators are much more open to allow competitive products, which do not have any performance history. Flexible products are not required to test raw materials and final product to the stringent levels that are required of the concrete pipe industry. And, they often do not require flexible products to be installed properly. Critical items such as trench width, bedding and compaction specifications are not enforced.

Q: *Are current standards and specifications being changed and upgraded quickly enough for our industry to be competitive?*

Quinlen: I don't believe we can count on standards and specifications to change fast enough to make the concrete pipe industry more competitive. In any case, most changes in materials or installation specs will not reduce costs enough to tip the competitive scales. But I am optimistic. Designers and owners are recognizing the virtues of concrete pipe, and thanks to our renewed promotion efforts, beginning to understand the inherent weaknesses of competitive products.

Aumann: It behooves all producers to go beyond ASTM standards; particularly in such areas as pipe loading and joint design. In some instances, ASTM standards are not stringent enough for a particular project. Some producers have the capability to produce a concrete pipe to meet any project conditions that require special designs. Only concrete pipe products have the ability to meet these special requirements with ease. People must recognize this.

The Future

Larry Johnson of Johnson-Bateman Company, Ontario, Calif., and current ACPA Chairman of the Board of the ACPA, and Edwin Kling, Centennial Concrete Pipe & Products Inc, Cambridge, Ont., were approached to provide their visions of the future:

Q: *What is your vision of the concrete pipe industry in North America within the next 20 years?*

Johnson: There will be no revolutionary changes. Evolutionary change will continue. There will be a trend toward producing lower cost pipe to compete. Machinery improvements and design changes hold the potential for thinner wall concrete pipe to lower costs.

Kling: The machine operator of the future will have robotics and computer programming skills and will spend most of the time ensuring quality of products. An apprenticeship program will exist. Manpower/tonne values will be less than 0.45, and hand benched manholes will give way to machine-made units. Today's mega-mergers will open opportunities for small niche operations supplying the large producers.

Q: *What do you believe will be the industry's challenge in the decades ahead?*

Johnson: It won't be much different than today. We must show that our product is a more economical solution than competitive products. Our products are better, and they cost more.

Kling: In the future, we must automate, innovate, or evaporate! LCA will be used on many projects to justify the long-term benefits of concrete pipe.

Q: *How do you see the evolution of the ACPA and its industry relationship, delivering services to members?*

Johnson: The ACPA is no longer taking a passive role with competitive products and allowing them to set their own specifications. This will continue. Larger companies will continue to buy smaller companies. The trend of industry consolidation will continue.

Kling: The ACPA will develop programs that can be delivered quickly and cheaper than a company could on its own. Concrete design programs taught by renowned experts, and available only to members, is one example of what the ACPA can do for its members. Industry experts will be made available to members through the ACPA.

Q: *What do you believe will be the single greatest change in concrete mixes, precast concrete products, or manufacturing technology in the near future?*

Johnson: Further adoption of new bedding standards developed from SIDD, and significant potential for use of fly ash.

Kling: Cementitious materials will change, and polymers will become more prevalent. Admixtures will play an increasing role and chemical resistance will be achieved, easily.

Q: *What is your vision for the installation of concrete products? Do you expect installation technology to change dramatically in the future?*

Johnson: There will be efficiencies of installation with some contractors. There will be no people in the trench and pipe will be laid faster with greater accuracy.

Kling: Laborers will no longer be in the trench. Installation will be controlled from above ground. Safety legislation will move the industry in this direction. The net result will be more microtunneling like that in Europe over the past 25 years.

Special Designed Box Culvert

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All box units were produced and ready for shipment to the site within 2 1/2 weeks from the time of the contract bid opening. Under the supervision of the Igel staff, Steve Betsko and Rich Thompson, the contractor was able to take delivery of the 32 units and completely install the culvert within a day and a half. The busy airport continued to operate without any disruption of service.

(Sources of information for this article: "Airport Creates Rigid Culvert Requirements" in First Quarter, 1999 issue of IKOCPA Conduit; and www.port-columbus.com.)

President's Report

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Miles of concrete pipe in eight sizes were installed in Richmond, Virginia using a variety of installation methods along the James River, through the city center, to solve a major problem with old combined sewers. The precast concrete pipe was produced from two plants supplying the pipe and 50 special fittings including elbows, tees, wyes, reducers and several thousand feet of beveled pipe. This project alone is testimony to the versatility of concrete pipe and fittings used for the lifelines of a major U.S. city.

In Columbus, Ohio at one of the nation's fastest growing airports, a local producer worked with the contractor and designer to install a shallow-bury box culvert under a taxiway used by Boeing 727aircraft. This vital facility, being upgraded to service an ever-increasing traveling public, could not be interrupted for construction activity. The culvert was specially designed to carry very heavy loads for the safe passage of huge passenger aircraft and quickly installed.

Let's embrace the challenges of this new century with the confidence that our industry will continue to play a vital role in providing reliable and enduring lifelines of our society. We are an established industry providing a new precast concrete pipe in a new era.

Significant Milestones for Over 10 Decades

1900 – 1910: American Concrete Pipe Association founded as the Interstate Cement Tile Manufacturers Association.

1910 – 1920: Theory of Loads on buried pipe published by Marston and Anderson.

1920 – 1930: Tamping and packerhead machines developed as were the cast, vibrocast and centrifugal processes. The first jacked installation using precast concrete pipe was completed.

1930 – 1940: Precast concrete pipe was used for sanitary sewers in the construction of sewage treatment facilities.

1940 – 1950: The ACPA worked with U.S. Corps of Engineers on new specifications for reinforced concrete pipe.

1950 – 1960: The ACPA produced report on study of industry's design procedures and published, "*D-Load Design and Tests of Concrete Pipe*." Jointing of concrete pipe evolved to flexible joints using rubber-compound gaskets.

1960 – 1970: The concept of square pipe introduced by the ACPA.

1970 – 1980: ASTM specification published for concrete box sections. Long range research program initiated leading to SPIDA soil-structure computer model.

1980 – 1990: Industry faces significant challenge from alternate products in the small diameter pipe market and launches education programs through marketing and technical support material.

1990 – 2000: Industry sponsored research projects on pipe performance and produced computer software programs for specifiers and designers. The industry introduces 21st century concrete mixes, products, and quality assurance programs, and begins to introduce robotics into production processes. ASCE specification for SIDD beddings adopted.

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