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PipeLine

HOBAS®

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These fittings are manufactured of the same materials as CCFRPM pipe and almost any mitered fitting can be constructed. Here a wye with a tee base has been custom manufactured per job specifications.

Last-Minute Design Change Benefits Akron Project

The Great Lakes region was blessed with abundant fresh water for its rivers and lakes. Water as a resource and method of transportation were an important factor in Akron, Ohio blossoming as one of America's early manufacturing hubs during the late 1800s and early 1900s.

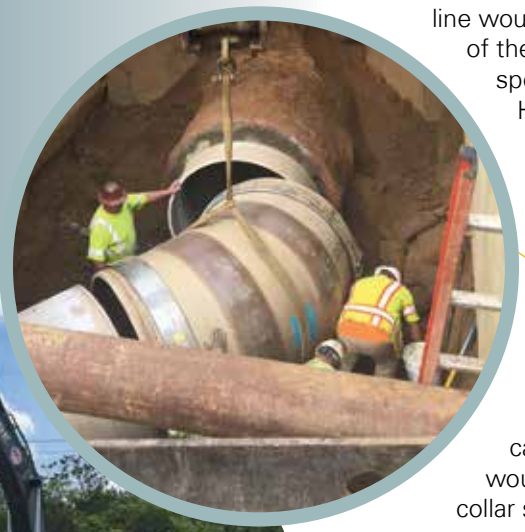
But it was this industrial past that led to the pollution that brought the EPA (Environmental Protection Agency) to issue a federal mandate for the City of Akron to comply with the Clean Water Act of 1972 to end pollution in local waterways. Because about a quarter of Akron's existing sewer system had been designed as combined sewers when constructed in the early 1900s, frequent overflows mixed storm water with sanitary sewage. This mix ultimately emptied into the Cuyahoga River, the Little Cuyahoga River, the Ohio & Erie Canal and Lake Erie.

As part of the solution, The City of Akron created a program termed, "Akron Waterways Renewed!" to control Combined Sewer Overflow (CSO) and improve water quality in nearby rivers. A portion of that plan was to create a 6,240-foot Ohio Canal Interceptor Tunnel (OCIT); three new storage basins; upgrade CSO racks, and upsize and reinforce the main outfall sewer cap. The 27-foot diameter OCIT sections were a feat in themselves, dug with a massive tunnel boring machine and constructed of reinforced concrete (RCP). The basins will hold combined sanitary and storm water overflow until it can be safely released to Akron's wastewater treatment facility.

Of particular interest is the design and construction of the influent line to the new Howard Storage Basin (CSO Rack 22) at the intersection of Howard and Cuyahoga Streets, which will provide temporary storage of combined sewer flow from the North Hill tributary area. With a 2.4-million-gallon capacity, It is the largest of the three new storage basins.

(Continued on page 2)

Year of construction
2017
Total length of pipe
920 feet
Diameter
57- and 84-inch
Stiffness class
72 psi
Installation method
Direct bury
Application
Combined sewer
Client
City of Akron, OH
Installer
HM Miller Construction
Advantages
Custom fittings, design flexibility



A large wye is lowered for connection to the already installed CCFRPM pipe. The lightweight pipe requires less equipment and is easy to maneuver on the job sites.

TOP
A two miter elbow is installed with closure couplings.

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Design Flexibility

HM Miller Construction was subcontracted for the site work for the Howard Storage Basin (CSO Rack 22), one of Akron's 34 sewer separation units, as well as relocating the existing waterline to accommodate influent piping. The HM Miller engineering staff saw a potential problem with the original design that called for elliptical RCP influent line to run beneath Cuyahoga Street. They realized that there would be difficulty in achieving clearance under the public road, even though the RCP line would be elliptical, and that could lead to inability of the RCP line to pass the required pressure test specification, according to John Smith, president of HM Miller Construction.

Smith called upon his resources at HOBAS to assist in devising an alternate plan for CSO 22 that would resolve the inherent difficulties surrounding installation and testing using the RCP. Together they came up with a design that saved time and money tying the Howard Storage Basin into the main line. In place of the elliptical RCP originally specified to be installed under Cayahoga Street, the new design called for twin 57-inch HOBAS CCFRPM pipe that would tie into the OCIT-1 main line with a concrete collar subsequently designed by the project engineer.

HOBAS provided 72 psi CCFRPM with FWC coupling:

- 100 LF of 84" FWC direct bury pipe for the overflow sewer;
- 820 LF 0f 57" FWC direct bury pipe under Cuyahoga Street to form the twin-line influent to the Howard Street Basin;
- 10 fittings that included various elbows, wyes and reducers.

Reliable and Dependable

HM Miller Construction, a civil and utilities construction contractor, had a long 40 year history of contracts with the City of Akron, and had installed over 11,540 feet of HOBAS centrifugally cast fiberglass reinforced polymer mortar (CCFRPM) pipe in the Akron area just since 2011. It was respect developed over this long history between the firm, the Public Service Department and local engineering firms that encouraged the consideration and acceptance of this major design change during the construction phase, long after the engineering design had been completed. In a true instance of teamwork, the owner (city of Akron), design engineer (DLZ/ McMillen &Jacobs/ Jenny) and Construction Manager at Risk (Great Lakes Construction Co.) accepted the alternate plan submitted by the subcontractor.

Product Profile:

The HOBAS FWC Coupling: Known to be reliable with USA installations dating back to 1985

What offers a better seal than consistently compressing a gasket between a molded pipe OD and a fixed coupling ID? The answer might just be why HOBAS CCFRPM pipes have so many leak free installations.

The HOBAS FWC is a thick, full faced elastomeric membrane with lip and compression sealing elements with an FRP structural over wrap. The FWC Coupling joint is used to assemble HOBAS pipes for direct bury, above ground, and some pressure sliplining and pressure jacking installations up to 250psi.

Standard qualifications tests per ASTM D4161 require the joint to withstand a two times pressure class test and a partial vacuum both while in an angularly deflected alignment and under severe shear load to assure an absolutely water tight joint. But, as usual, HOBAS has gone above the standard. Our FWC coupling joints have tested leak-free at over 1,000psi. Further, external pressure testing has also been done at more than eight times the equivalent required vacuum test. The HOBAS FWC full-faced elastomeric gasket offers up to 5,000 square inches of sealing surface, depending on diameter.

HOBAS FWC Coupling

- Zero infiltration or exfiltration
- Cut and join anywhere along the length
- Corrosion resistant
- Time proven

HOBAS pipes, because of their constant O.D. and their centrifugally cast mold smooth exterior surface, may be joined with the FWC coupling at any place along their entire length with no preparation or machining other than chamfering of the pipe ends. This assures the same leak-free seal even on field cut pipes.

For specifications on the HOBAS FWC Coupling, please see **page 24** in ***The Complete HOBAS Guide***

First Section of Anacostia River Tunnel Opens

Although the rivers and creeks that meander through Washington, D.C. are often noted for their historical significance, a deeper story – fueled by inevitable progress – presents a challenge that even our forefathers could not have predicted.

For more than a century, only sewer systems with separate pipes for sewage and storm water have been installed in our nation's capital. Prior to this however combined sewage and storm water pipelines were installed. In fact, about one-third of the District of Columbia has a combined sewer system, a distinction not unique in numerous other older cities. As these pipes aged and the population grew, combined sewer overflows (or CSOs) frequently occurred during intense rainfall when the combination of storm water and sewage exceeded the capacity of the sewer pipes. The result was an overflow to the closest body of water.

Protecting the Future

Because CSOs harbor bacteria and trash that can be hazardous for both people and nature, the District of Columbia Water and Sewer Authority (DC Water) is actively implementing its Long Term Control Plan (LTCP). The plan's goal is to meet requirements established by the US Environmental Protection Agency for pollution control and reduction of CSOs into nearby waterways. This exciting new chapter – a viable solution for present and future generations – will ensure protection of the environment today and for years to come.

The LTCP, deemed a far more desirable alternative to the combined sewage back-up in homes, businesses and roadways, is well under way. The first segment, DC Clean Rivers Project Division H – Anacostia River Tunnel, is one of several contracts in the overall plan of deep tunnels, sewers and diversion facilities, designed to capture overflows to Rock Creek as well as the Anacostia and Potomac rivers for treatment at the Blue Plains Advanced Wastewater Treatment Plant.

The Division H - Anacostia River Tunnel, which holds 100 million gallons of combined sewage and measures 23 feet in diameter, was commissioned in late March of this year. Together, with the new 225 million-gallon-per-day Wet Weather Treatment Facility at Blue Plains, this 7-mile tunnel segment reduces combined sewer overflows by more than 80 percent.

Deep Tunnel

Construction of the Division H - Anacostia River Tunnel was launched in 2013 with the construction of six reinforced concrete slurry diaphragm wall shafts along the tunnel alignment. The walls provided initial support during shaft excavation and also formed part of the permanent structure.

Next, microtunneling, a trenchless pipe installation performed by remote-controlled jacking, was used to insert the jacking pipes more than 100 feet below the ground under the CSX Railroad tracks and right of way to connect the CSO-018 outfall to the tunnel system. According to HOBAS Pipe USA Commercial Manager Rob Epstein, the company supplied 320 feet of 120-inch, 1765-ton jacking pipe for this project. Manufactured by HOBAS Pipe USA in Houston, Texas, HOBAS jacking pipes are known for their smooth, non-absorbent exterior surface, tight outside diameter tolerances, high compressive strength and lightweight construction.

Installation Challenges

DC Water Resident Engineer Scott Shylanski said HOBAS pipe was chosen for its availability and hydraulic considerations. "The machine

HOBAS supplied 120-inch, 1765-ton jacking pipe for this project although 600 tons of jacking force was all that was needed to complete the drives.

selected by the contractor could not accommodate the specified diameter for RCP pipe," he noted. "HOBAS was selected as it met the required head requirements and as the HOBAS internal diameter was slighter smaller than originally specified, the hydraulic specifications of the HOBAS pipe offset the reduced volume."

Shylanski said the HOBAS pipe was jacked from DC Water's CSO-018 shaft and was designed as the CSO-018 adit, approximately 300 linear feet long and 90 feet deep, to the Anacostia River Tunnel. "The ends of the line – both at the shaft and tunnel connection – terminate near the structures and were embedded in a reinforced concrete collar," he added.

HOBAS Pipe USA Engineering Supervisor Rene Garcia, P.E., said the HOBAS flush joint system used for jacking has been successfully tested at 100 psi external pressure, well above the field conditions on this project.

Special lead and lag pipes to be utilized with the intermediate jacking station were supplied. The use of an intermediate jacking station allowed Seca Underground Corporation to isolate different parts of the pipe stream to overcome friction, said owner Steve Leius, whose company was subcontracted by main contractor Impreglio Healy Parsons JV to perform the microtunneling operation.

"The maximum tonnage applied at any time during the run was approximately 600 tons," Leius said. "However, most of that – up to 400 tons plus – was required over time to overcome the face pressure because of the hydrostatic loads and the slurry pressure. It's very interesting that at the end of the drive, the machine basically holed through using approximately 50 tons generated by skin friction."

Leius described the process in greater detail: "Obviously, when you're jacking pipe, there's a reaction between a pipe and the earth. You try to isolate that with overcut and whatever suspension in that area to limit that reaction. We used a polymer because of the propensity for the clay to swell with

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water. Because of its smooth surface and the way the pipe is spun cast, basically we didn't have any rough areas which tends to keep the friction way down. Overall cost and outside diameter control are very beneficial to jacking operations."

Due to the efficient nature of the pipe installation, open trenches were not required and traffic disruption was kept to a minimum. Additionally, special storage areas were not needed for materials and equipment.

Long-term Solution

Upon completion of the jacking run, infiltration testing was performed to check for leaks. In addition to the visual leakage survey that was conducted pipe deflection was measured as well. Although one joint

had minor leakage, the problem was solved by following a plan already in place to laminate that joint.

About two weeks after its opening, the tunnel passed its first real-life test with flying colors when the District of Columbia sustained a pounding rainfall of two inches within three hours. The tunnel stored and treated millions of gallons of combined sewage that would have previously flowed to the river.

Mining for the next portion of the Anacostia River Tunnel System, the Northeast Boundary Tunnel, will soon begin. The tunnel will add approximately 90 million gallons of storage when it opens in 2023.

Once the Anacostia River Tunnel System is completed, overflows may still happen in rare, extreme rainstorms, but the tunnels will capture 98 percent of the CSOs in an average year.

According to DC Water, the project will lower the chance of flooding in the areas it serves from approximately 50 to 7 percent, an amount equivalent to a 15-year storm in any given year. The amount of nitrogen discharged to Chesapeake Bay will also decrease by approximately one million pounds per year.

Bloomingdale and LeDroit Park residents, who have been served by an undersized sewer for decades, will reap the benefits as well since the finished tunnel system is expected to provide greater flood relief to their neighborhoods.

Year of construction
2013-2018
Total length of pipe
320 feet
Diameter
120 -inch
Stiffness class
1,765 ton
Installation method
Jacking
Application
Combined sewer
Client
DC Water
Installer
Impregilo Healy Parsons JV
Advantages
High compressive strength, light weight

LEFT
Together, with the new 225 million-gallon-per-day Wet Weather Treatment Facility at Blue Plains, this 7-mile tunnel segment reduces combined sewer overflows by more than 80 percent.

RIGHT
The use of an intermediate jacking station allowed Seca Underground Corporation to isolate different parts of the jacking run to overcome friction.

THE TUNNEL WILL ADD APPROXIMATELY 90 MILLION GALLONS OF STORAGE WHEN IT OPENS IN 2023

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