

PRECISION LINE AND GRADE OVERFLOW PROJECT - ON-TIME & UNDER-BUDGET!

By: Ryan Haubenschild, Bore Master Inc.

The City of Milwaukee had a problematic sewer shed. The residents in the area were experiencing frequent basement backups during large rainfall events. The City hired Clark Dietz, Inc. to study the system and identify possible solutions. Installation of an overflow sewer was identified as the best option. It would reduce the hydraulic grade line, create greater capacity in the area and therefore minimize the probability of basement backups occurring in the system.

During design, the project had the expected challenges of figuring out how to install a deep sewer within a high-density urban area. The only location available within the already crowded corridor was in the parkway underneath a canopy of mature trees. The amount of tree removal that would be required, the cost involved in replacing those trees as well as the difficulties of installing sewers over 20 feet deep, ruled out installing the sewer by traditional open-cut methods. Trenchless installation was an especially attractive option for the project as the nature of an overflow sewer meant no laterals or extra connections were needed.

When trenchless options were explored, the largest hurdle was the slope of the proposed sewer. The design constraints required a slope of less than 1 percent due to the tie-in elevations of the existing sewer network. The Pilot Tube Method of Guided Boring (PTM) was the best solution for any project requiring this level of slope precision. In this case, it would also cause minimal disturbance to the residents in the project area during construction. Once the soil borings confirmed that PTM was an option for the area, the project was put out to bid in January 2022 with bids opened in February and project completion required by September.

Three contractors with PTM experience submitted bids on the project. Those bids ranged from \$2.2 to \$2.5 million.

“Pilot Tube installation is becoming the ‘go-to’ solution for crowded urban areas,” said Dave Gill, sales engineer with Logan Clay Products, the pipe supplier, “especially when designers need to avoid other utilities and municipalities need to maintain traffic flows.”

“Being able to rely on accurate drives gives system designers new options in the urban core,” according to Andrew Ashley, P.E. with Clark Dietz. “Projects with

The Pilot Tube Method was the best solution for any project requiring this level of slope precision.



High-density housing was just one of the reasons for trenchless installation on this project



The LED illuminated target is part of the steering mechanism for the pilot tubes

“VCP-J is available in 8- to 24-inch diameters and is the predominant direct jacked product pipe due to its jacking strength, corrosion resistance, and longevity.”

- Jeff Boschert, PE, President, National Clay Pipe Institute

**WHERE THE CONSTRUCTION INDUSTRY GOES FOR
COMPACT HDD SOLUTIONS**

PIPE BURSTING

HDD ASSIST

HORIZONTAL BORING

COMPACT HDD

PIPE RAMMING

SLICK BORE

SPLIT & PULL

WINCH APPLICATIONS

CABLE & PIPE PUSHING



GRUNDOPIT®
PIT LAUNCHED HDD

Install service lines in tight areas with the Grundopit!



GRUNDODRILL 5X®
COMPACT DIRECTIONAL DRILL

Main & service line installations in any location with the Grundodrill 5x!

Whether it's a pit launched HDD solution for a difficult water main installation under a busy intersection or high production gas service line installations with a compact directional drill, TT Technologies offers the most trusted and dependable trenchless equipment available today. Choose the most reliable trenchless equipment for your next project. Choose TT Technologies!

GRUNDOPIT

- 54" L x 43" W x 57" H
- 150-ft Bore Length



GRUNDODRILL 5X

- 12,000 lbs Thrust & Pullback
- Bluetooth Enabled





TT. TT TECHNOLOGIES

www.tttechnologies.com

1-800-533-2078

depth, space, and grade challenges are becoming commonplace and Pilot Tube installation is an approach I'll use again.”

The project consisted of six drives ranging from 220 feet to 435 feet in length. The jacking shafts were 26 by 12 feet with receiving shafts of 16 by 8 feet; the deepest shaft measured 25 feet.

Bore Master, the boring contractor, used an American Augers 36-600 auger boring rig with a 240A Akkerman Guided Boring Machine (GBM) mounted on the front to provide the guidance accuracy needed for the gravity flow sewer. They utilized 25-inch outside diameter steel casings which were manufactured by Bore Master. A good union was made with the thrust, torque, and speed of the auger boring rig, combined with the line and grade precision offered by the GBM.

Once the launch and reception shafts were constructed and shored, the auger boring rig was set up on tracks with the GBM mounted in front, secured to the track with adapter brackets. Line and grade were established by aligning the LED target, housed in the lead pilot tube which also included a soil-appropriate





An installation depth of 25 feet was another reason that PTM was the best option for this job

tube; no spoils were removed. Pilot tube line and grade can typically be maintained within a quarter of an inch at distances of approximately 500 feet in soil conditions under 50 blow count (Standard Penetration Test).

The GBM frame was then removed, and the auger boring rig assumed regular operation to install the 25-inch diameter temporary casings. Spoils were removed via auger retrieval. This second step followed the pilot tube installed in step 1 with a 25-inch reaming head and 25-inch temporary steel casing pipe. The reaming head contained a cutting edge that matched the O.D. of the 21-inch NO-DIG Clay Jacking Pipe. During this second step; as one section of casing was installed, a section of pilot tube was removed from the reception shaft.

Once the 25-inch diameter casings were installed from each jacking to receiving shaft, the auger boring rig and tracks were removed to accommodate a custom-built jacking frame. This frame was used to install 21-inch NO-DIG Vitrified Clay Jacking Pipe (VCP-J) which was supplied in 2-meter section lengths by Logan Clay Products.

“Twenty-one-inch NO-DIG pipe is rated for an allowable jacking force of 192 Tons which includes a 2.5 factor of safety,” according to Jeff Boschert, PE, President of the National Clay Pipe Institute. “This allowed the pipe to be direct jacked in the third step on this project. VCP-J is available in 8- to 24-inch diameters and is the predominant direct jacked product pipe material



The American Augers 36-600 auger boring rig installing the 25-inch diameter by 10ft length temporary steel casings in the second step

steering head. The camera and theodolite were mounted independently of the GBM frame for protection from movement during installation of the pilot tubes.

Operators accessed and controlled the progress of the target on a monitor mounted to the top of the GBM frame, above the controls area. The first step was completed with the pilot tube installation on line and on grade for the full drive length. The soils were displaced by the 4-inch diameter hollow steel pilot

in these sizes due to its jacking strength, corrosion resistance, and longevity which have yet to be matched by any other pipe material.”

This eliminates the need for a permanent external casing pipe. A pipe adapter was utilized at the end of the casings and in front of the lead jacking pipe section. No spoils were removed in this third step as the OD of the NO-DIG pipe was equal to the temporary casings installed in the second step. The 21-inch VCP-J pipe pushed and advanced the auger casings to the reception shaft where they were removed and cleaned to be ready for the next drive.

The process was complete when the carrier pipe entered the reception shaft, and the bore was lined with the 21-inch product pipe. The accuracy of the



PPI
Plastics Pipe Institute
MUNICIPAL & INDUSTRIAL

HDPE PIPE Designers & Owners

Update your Specs per the latest
AWWA M55-20, C901-20, C906-21

For More Information:
www.plasticpipe.org
MAB Publications



HDPE
MUNICIPAL
ADVISORY
BOARD



Given the high-traffic surroundings and the need for quick restoration, the backfill method of choice for the shafts consisted of a sand/gravel slurry mix

installation method meant Bore Master was able to tie the new alignment into the existing system as designed.

The tunnel shaft locations were designed for manhole (maintenance hole) construction after the completion of the sanitary sewer runs. Precast manhole structures 48 inches in diameter were set in place and connections were made with the 21-inch VCP pipe from the shaft face to the manhole. CLSM bedding was utilized for the pipe embedment and poured from the shaft bottom up to the top of pipe elevation. Once the CLSM embedment was set; a sand/gravel slurry was used as the complete shaft backfill. This eliminated the need for any compactive effort in these tight spaces while allowing final restoration to be completed immediately.

“Prior to submission of bids, Contractors were required to provide pre-qualification documents verifying their past experience with pilot tube guided boring using vitrified clay jacking pipe,” said Robert Seleen, Flood Hazard Mitigation Manager for the City.

“We felt confident given Bore Master’s 12 years of experience with PTM and parent company Globe Contractors, Inc. proven expertise with installing deep tunnel shafts for the City of Milwaukee.”

With the current stresses on supply chains, we were fortunate to have utilized Logan Clay Products which provided multiple shipments of VCP-J pipe with zero delays. This, in combination with great installation production rates and value engineering for final tie-in locations, meant we were able to complete this project on time and under budget. †

ABOUT THE AUTHOR:



Ryan Haubenschild is Operations Manager for Bore Master, Inc. specializing in trenchless construction throughout the Midwest. His 20 years of experience helps Bore Master tackle challenging projects in the water, wastewater, oil, and gas industries.



KEEP YOUR PROJECT FLOWING FORWARD!

WE ARE WITH YOU FROM START TO FINISH

No matter the size of the project, it’s critical to find the right pump solutions partner. You can count on the professionals at Sunbelt Rentals to provide complete engineered solutions along with the equipment you need for your projects. We’re committed to adhere to stringent safety and emission reduction standards and your timelines.

Our systems and support include full time monitoring whether on-site or remote. Through our PumpSentry technology, you can access the information you need to keep things running smoothly directly on your smart device!

Find us at www.sunbeltrentals.com
or call 800-257-6921



©2022 Sunbelt Rentals. All Rights Reserved. 3649-0922