



# CHANGING THE PLAN... AND STAYING ON BUDGET

## Pilot Tube & Vitrified Clay Jacking Pipe Lowest Cost, Best Option for Clinton Township, MI

By: Steve Matheny, P.E., The Logan Clay Products Company

*The worksite footprint was contained to one property*

The original plan for the Little Mack Road – Sanitary Sewer Relief project called for approximately 1,000 linear feet of trenchless installation and 1,000 linear feet of open cut installation of 18-inch pipe at depths of approximately 28 feet, and the budget was set. But everything about this project (except for the budget and end goals) changed when D.V.M. Utilities, Inc. (DVM) did a pre-construction review and looked at the project from a value engineering perspective.

The Charter Township of Clinton, Michigan is located near the shores of Lake Saint Clair. The Township is the largest and one of the oldest communities in Michigan. Celebrating 200-years in 2018, Clinton Township is confronting a challenge that is common to mature communities throughout the U.S.: Aging Infrastructure. The township needed to update two lift stations and create a relief sanitary sewer. DVM, headquartered in

Sterling Heights Michigan, was the low bidder on the project and was awarded the job in 2016.

### The Basic Challenges

The population density of the area is over 3,800 people per square mile, the roads are narrow and lined with mature trees, the roadway has only 50 feet of public right-of-way with gas, electric, water, storm and existing sanitary sewer lines. The existing utilities included a 66-inch diameter storm drain in the center of Little Mack Road.

The tight urban setting made 20 – 30 foot long stacked trench box shafts impractical and the limited space available for job staging was going to make the open excavation portion of the project a logistical nightmare.

The geotechnical report indicated a very stiff clay with pockets of soft clay. On the toughest sections, the report indicated

standard penetration test values of 50 blows per foot.

### The Details

The original bid was prepared using the design criteria provided by Giffels Webster, but once the project was awarded, DVM began researching the best means and methods for the full project.

Daniel DiLegge, Owner of DVM, did the initial research and identified the Akkerman Guided Boring Machine (GBM) as the best equipment for this project because of its ability to operate within a relatively small shaft.

Based on the equipment selection, Vinay Shenoy, Estimator/Project Manager for DVM researched the pipe material options and found that NO-DIG® Pipe was the lowest cost, best option for the limited footprint of both the shaft and the jobsite.

Several methods and materials were

# Longer life and expanded maintenance options provided by VCP serve the long-term interests of the community.

considered, but the space constraints meant the smaller footprint of a Pilot Tube Guided Boring Method (PTGBM) installation coupled with the shorter lengths of vitrified clay pipe (VCP) was the best solution.

“Their primary objectives were to explore viable trenchless solutions that would lower cost, decrease the construction schedule and make for a more efficient construction project,” according to Jason Holden, Director of Sales for Akkerman, Inc.

But vitrified clay pipe wasn’t included as an option in the original bid documents. And DVM was understandably concerned about the stiffness of the soil for a trenchless installation.

“They didn’t have experience with VCP as a direct jacked material,” according to Jeff Boschert, P.E., President of National Clay Pipe Institute (NCPI). “So they really did their due diligence. We’ve seen this same thing happen in many areas across the county. Once an objective review is completed, the pipe’s jacking strength, bearing strength, longevity and maintenance options make a compelling case for clay pipe as a strong choice.”

## The Solution

Once the trenchless method was selected, DVM’s research led them to install all 2,000 linear feet using PTGBM in a three-step process that includes the

use of a powered cutter head increase tooling during the final step. The urban setting with residential homes on narrow single-family lots, mature landscaping, the presence of multiple utilities and the tight space constraints were all drivers of this decision.

The Three-Step Installation Process Utilized:

Step 1: Installation of a 4-inch diameter

pilot tube from the jacking shaft to the receiving shaft

Step 2: Installation of an 11-inch reaming head followed by temporary thrust casings and augers, which increased the bore from a 4-inch pilot to an 11-inch thrust casing

Step 3: A 22.5-inch powered cutter head (PCH) advanced by the 18-inch ID clay jacking pipe.



The first length of pipe pushes the powered cutter head



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The pilot tube arrives exactly on target in a pre-drilled hole

Scott Chabot, P.E. of Giffels Webster characterized it this way: “The Pilot Tube Guided Boring Method of pipe installation met the alignment and grade challenges that existed for this project. After evaluating all the present worth costs, hydraulic needs and physical challenges, this technology with the use of Vitrified

Clay Jacking Pipe was the best option for this Sanitary Sewer Overflow Relief Project.”

“We studied the geotechnical information, plan profiles and discussed costs associated with each method, said Holden. “Based on the culmination of that information, an Akkerman GBM 339A system was selected for the project with the primary intent to minimize the surface footprint of the jobsite.”

“I looked at viable pipe options and VCP was not in my original engineering consideration,” said Mary Bednar, P.E. CFM, Director of Clinton Township’s Department of Public Service. “After reviewing, technological advances to joints, corrosion resistance and cost, I chose VCP for this project.”

Because the Michigan Department of Environmental Quality was one of the funding agencies, their approval was also required. After extensive study, the Township and Giffels Webster provided submittals that resulted in approval of

NO-DIG® vitrified clay jacking pipe for this project.

The Akkerman Model 339A Guided Boring Machine (GBM) jacking frame selected is designed for a minimum one-meter pipe installation from a nine-foot shaft, allowing DVM to limit the size of the excavation to a 13-foot diameter shaft in the right of way to accommodate the two meter pipe joints. The pilot tube steering head, capable of soil displacement in difficult ground conditions, had no problems penetrating the stiff clay.

NO-DIG® clay jacking pipe met all requirements for this PTGBM installation and was selected because the standard lengths available (1 meter & 2 meters) were much more manageable within the tight space constraints of this urban setting. Two meter pipe lengths were selected for this project.

DVM excavated the jacking pit and receiving shafts with a standard excavator. The Akkerman GBM 339A jacking frame was utilized in 13-foot diameter jacking

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shafts that were constructed using steel rings and lagging. The receiving shafts were 8 feet x 12 feet and were secured using stacked trench boxes. A vacuum truck was used to remove the excavated spoils in the second and third step of the installation process.

DVM chose to start the project at the down-stream manhole and push upstream first. PTGBM reliably provides rifle-straight drives with accuracy within ¼ inch in 400 feet. For this project the engineer, Township and contractor selected drive lengths of 280 to 400 feet given the site conditions. On the north end of this project, DVM needed to tie into an existing manhole. DVM cored a six-inch hole into the wall of the concrete manhole first, and then pushed the pilot tube string with a 5 ½-inch steering head 285 feet towards the opening. This was only the second time this operator had steered a PTGBM drive, but the net result could not have been more precise (as shown in the picture on the facing page of the Pilot Tube and steering head arriving in the existing manhole).

## The Result

### On Time – On Budget – On Target!

At completion of the project, the Township and Giffels Webster tested the 18-inch Relief Sewer that was installed by DVM Utilities. The VCP pipeline was subjected to a low-pressure air test (per ASTM C828) and televised per the Township's and Engineer's specifications. The installation passed all tests and no deficiencies were found. Line and grade specifications were also realized.

"The Akkerman GBM system not only provided cost savings for the nearly 30-foot deep alignment, the surface disruption and social impact to the homeowners along the project alignment was also minimized," according to Holden.

"We were renting the equipment when we finished this project in early spring," said Shenoy. "Less than six months later, we've purchased the equipment and we've completed two more PTGBM projects."

This project is a classic demonstration of the benefits of the smaller construction

footprint made possible by PTGBM. The low-impact, high-accuracy installation method also gives the engineer and owner greater control over alignment and grade. The longer life and expanded maintenance options provided by VCP serve the long-term interests of the community. The ability to use more aggressive tools and greater jetting pressures to clean this new sanitary line are added benefits of VCP and just one more example of the long-term value realized. †

### ABOUT THE AUTHOR:



**Steve Matheny, P.E.**, joined The Logan Clay Products Company in 2016 as a business development engineer after more than 30 years in the field. He started his career with Wayne County (MI) department of public service where he served as a staff engineer and project manager on various road projects. He is currently consulting on multiple pilot tube guided boring projects throughout the Midwest.

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