WORKING THROUGH CONSTRUCTABILITY CONSTRAINTS:

Need for Precision in Maintaining Line & Grade

By: Steve Matheny, P.E., Logan Clay Products LLC

Riverview, Michigan is a suburb south of metro Detroit situated along the Detroit River with a population of approximately 12,000. Residents here expect a safe, small-town environment where community members care about each other. When neighbors living in this area experienced basement flooding from an overcharged sanitary sewer, it was a public concern.

The Huntington Meadows subdivision was built in the early 70s with footing drains connecting to the sanitary sewers. There is an enclosed drain in this low-lying subdivision with houses built over it. Heavy rain events are the most common cause of over-charged sewers in the area. The existing Reinforced Concrete sewer lines include some sections that have been lined with Cured in Place Pipe (CIPP). These sewers will stay in place and will remain a part of the collection system.

A new relief sewer main is needed in the Huntington Meadows neighborhood to expand the system's capacity during heavy rain fall events and eliminate basement flooding. There are existing utilities in the planned sewer line alignment that cause constructability constraints. Those constraints resulted in proposing the relief sewer to be constructed at a depth of 20 feet with a slope of 0.2 percent and with only 2 feet of vertical clearance at a utility crossing. Maintaining grade and clearances are paramount for the construction of the proposed overflow sewer line.

The Riverview neighborhood, built in the 70s, needs expanded sewer overflow service to eliminate basement flooding

Open cut construction at a depth of 20 feet + was ruled out as it is very disruptive to the neighborhood, not to mention the safety concerns it causes. The consulting city engineer, Souheil Sabak, P.E. and President of C.E. Raines Company, has vast experience with trenchless projects using a different pipe material and a different installation method. This project had challenges that made Sabak extra cautious when evaluating and considering

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all trenchless installation options. The need for precision in maintaining grade led to considering the Pilot Tube Method of Guided Boring (PTM) with Vitrified Clay Jacking Pipe (VCP-J) as the best installation option. The stiff gray soils in the project area with an STP (Standard Penetration Test) of 4, meant the geotechnical conditions are ideal for a PTM installation.

The proposed sewer alignment and method of construction were carefully considered as the sewer will traverse residential, commercial and state right-of-way zones before it connects to the Downriver Transport Sewer System.

The design solution for the relief sanitary sewer was completed in 2022 but was stalled due to delayed funding.

The Pilot Tube Method seemed to address all of the concerns as it offered reliable, precise controls for line and grade and limited surface disruptions. Sabak became more confident in the method and the materials when Jeff Boschert, P.E. and President of National Clay Pipe Institute, shared the most recent compression tests conducted by an independent lab for the City of LA. The minimum compression strength of the five pipe tested was over 30,000 psi. The average promised by the NO-DIG Pipe company is 20,000 psi and the minimum requirement of ASTM C1208 (Standard Specification for Vitrified Clay Pipe and Joint for Use in Microtunneling, Sliplining, Pipe Bursting and Tunnels) is just 7,000 psi.

> **"The excess strength represented by recent test results was compelling."**
>
> **- Jeff Boschert, P.E., President, National Clay Pipe Institute**

The ASTM standard is used to determine Allowable Safe Jacking Loads for NO-DIG pipe. With 24-inch NO-DIG pipe, the Allowable Safe Jacking Load is 230 tons with a 2.5 Safety Factor using the ASTM standard to calculate jacking force. As a point of reference, Akkerman's 4800 series GBM (Guided Boring Machine) has a maximum jacking force of 200 tons.

The difference between the ASTM strength specification for VCP-J and the actual compressive strength of the pipe as tested, represents over a twenty-fold increase in the safety factor for the jacking forces planned. The pipe strength far-exceeds the jacking forces created by the most commonly used equipment.

"Sabak had done his research," according to Boschert, "but he was really focused on the compression

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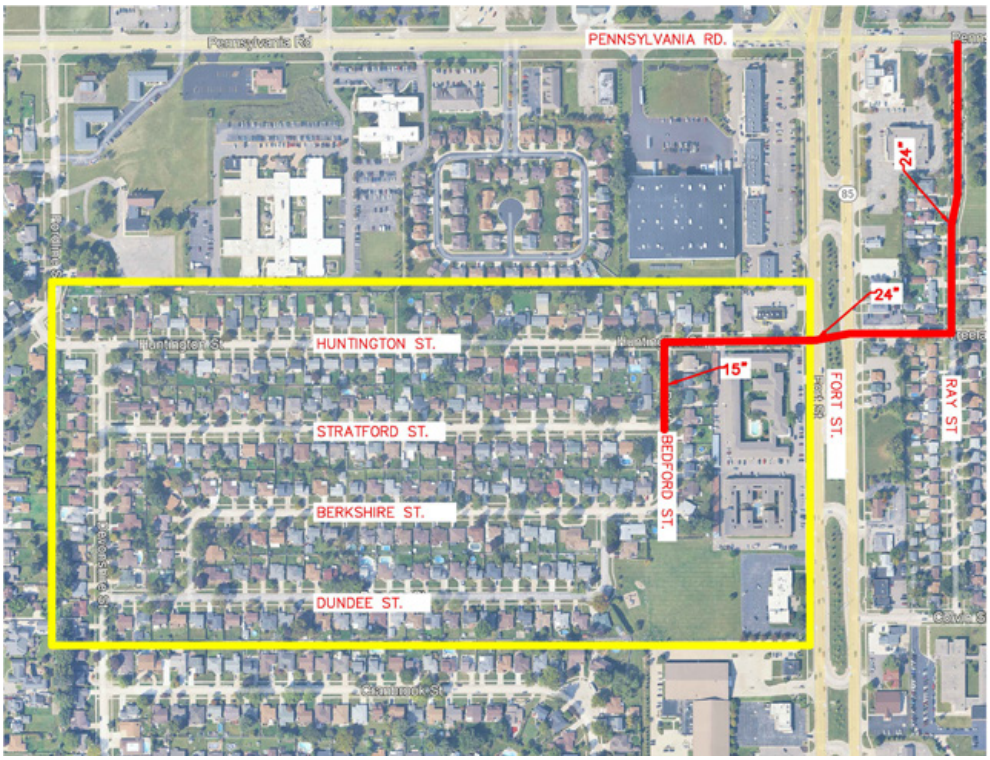

The planned new sanitary sewer line will affect many in the tight-knit community

strength testing. He was open about his concerns, which meant we were able to discuss them thoroughly. The excess strength represented by recent test results was compelling."

Sabak characterized the process, saying, "Extensive work was undertaken to develop this project. Hydraulic studies, coupled with evaluation of options to resolve the basement flooding issue, led to the most feasible approach which is to construct a relief sewer that connects to the Downriver Transport Sewer System. The relief sewer layout proved to be challenging due to the landscape, proximity to existing utilities, clearances and right-of-way limitations. Obtaining permits from the various governing agencies was also a very involved process. The construction methodology became key in addressing these challenges. Again, the Pilot Tube Method seemed to address all of the concerns as it offered reliable, precise controls for line and grade and limited surface disruptions. We are excited about this project and look forward to its successful delivery."

The Huntington Meadows Relief Sewer will include 400 feet of 15-inch and 1900 feet of 24-inch VCP-J. The jacking and receiving shafts will be created where the manholes are planned with the longest drive on this project slated to be 365 feet. The drives will average 287 feet with three drives over 300 feet.

A $20 Million bond issue that included funding for this project recently passed allowing the project to move forward.

The project went to bid in May of 2025 and will break ground in the Summer of 2025 with a budget of $5.2M. As the winning bidder, DVM Utilities is an experienced trenchless installer with over nine years of trenchless installation experience. Their main office is located in Sterling Heights, MI, approximately thirty miles from Riverview. The project will benefit from their extensive experience using PTM.

"We've intentionally been very conservative as we developed this plan," said Sabak. "The accuracy of the method, the compressive strength of the pipe and the reliability of the pipe material all played their part in making PTM the best and most economical option for this community."

"The Pilot Tube Method seemed to address all of the concerns."

- Souheil Sabak, P.E, President, C.E. Raines Company

ABOUT THE AUTHOR:

Steve Matheny, P.E., *is a sales engineer for Logan Clay Products. He is a Board Member for ASCE and has authored a number of papers and articles. He is currently consulting on multiple PTM projects. His bachelor's and master's degrees in civil engineering are both from Wayne State University. Steve is the current Chair of the MSTT Chapter Board of Directors.*