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Complex Improvements Close to Home

Rochester Minnesota is experiencing a significant economic development initiative to position itself as a global destination for health and wellness. The \$5 billion Destination Medical Center (DMC) initiative began in 2014 and is being implemented over the next 20 years. With the growth comes a myriad of need for infrastructure expansion and capacity increases.

The project region is divided into six sub-districts. The Downtown Waterfront Sub-District includes the Mayo Civic Center, the Rochester Public Library, and the Rochester-Olmsted Government Center; the Zumbro River connects all these facilities. They are positioned just one block east of Broadway Avenue, which is the main thoroughfare to downtown and the renowned Mayo Clinic.

As part of the DMC project, the Rochester Public Works Department needed to improve a sanitary sewer along 1st Avenue SE to 2nd Street SE, the storm sewer along 2nd Street SE to 3rd Avenue SE, as well as a new siphon located from the 3rd Avenue SE Bridge from the Rochester-Olmsted Government Center to 2nd Street. The packaged result was the 1st Avenue SE Relief Sewer for the Government Siphon J7825 project design. Construction began in May 2019 and is anticipated for completion in July 2020.

The project award went to prime contractor Lametti & Sons, Inc. of Hugo, MN, which was established in 1953 and has been a longtime Akkerman customer. Lametti has been using tunnel boring machines, excavator boring shields and pilot tube guided boring equipment for trenchless installations for many decades. Their service offerings range from sanitary, storm, and water pipelines through trenchless new installation and rehabilitation services.

One of the critical pieces of this project was a 393-lf., 36-in. ID tunnel that runs northeast just feet from the side entrance to the Rochester-Olmsted Government Center, continuing under the Zumbro River to emerge to the siphon connection on the east side, across the street from the Rochester Public Library. The siphon casing was filled with two 8-in. and one 10-in. HDPE siphon carrier pipes and then encased in cellular concrete.



Continued from Cover...

Matt Crawford P.E., Project Development Manager for the City of Rochester Public Works Department, described the need for a trenchless solution for the alignment. “During the design, we found that we had a dropping rock layer being replaced with sandy soils and cobbles and were challenged to find a crossing location that was of a consistent soil type,” Crawford explained.

“The flood control walls limited the ability to open-cut the alignment,” Crawford continued, “and the costs would be significantly higher if the flood control walls, bike trails, and the river would have had to be modified. There were also space limitations that were considered, and it was determined that microtunneling was the most cost-effective way to proceed.”

“One of the biggest challenges for tunnel installation was groundwater control,” said Crawford. “We had sandy soils and fractured limestone that allowed the river and groundwater to move quickly.”

While not very long, the tunnel design was complex and ran the gamut of varying ground conditions – from flowing soil in a high-water table to rock. The final 15-lf. of the run required the MTBM to emerge into the reception shaft from a full-face of sandstone and dolostone up to one-third of the size of the internal diameter of the pipe and 30,000 psi compressive strength.

Several trenchless civil construction services are in their wheelhouse, but up to this point, Lametti & Sons, Inc. had never undertaken a microtunneling project. But, where there is a will, there is a way, and it’s especially convenient if their preferred trenchless equipment manufacturer is a mere 40 minutes away from the project site. Akkerman leased them an MTBM system and provided field technicians to train their crew.

Lametti crews mobilized to Rochester in May 2019 and began on open-cut storm and sanitary sewer construction.

Microtunneling was scheduled to begin in August 2019; however, an

exceedingly wet fall lead to project delays, which pushed the launch out until the week between Christmas and New Year’s Day.

The delay meant mining in January, which is usually the coldest month of the year in Minnesota. Provisions had to be made to keep the slurry lines warm for slurry movement, and a wooden enclosure was erected around the slurry separation plant.

Lametti Superintendent, Nick Cherveney commented, “Excavating 20-feet below river elevation is a special kind of feat, especially when it’s completed in the middle of a Minnesota winter, but we were committed to a quality installation which would meet the project deadline.”

The SL38 system was delivered, and on December 31, the MTBM was launched from a 40-foot deep shaft on the east side of the Government Center. The control container, remote hydraulic power pack for auxiliary functions, a job trailer, pipe staging area, excavator, and slurry separation plant were all nestled in the narrow region between the Government Center and 3rd Avenue Bridge.

The SL38 MTBM, although small in diameter, is mighty with a 75-HP water-cooled electric motor with VFD, equipped with a mixed-ground disc cutter head rated at 61-tons for a full face, and capable of 54,000 ft-lbs. of cutter head torque and 91,000-lbs. of steering load per cylinder (*35,000-lbs. dictated by disc cutter load limit). The MTBM system was remotely controlled by the operator in Akkerman’s newest

control container providing 250-HP, 575V cutter head drive VFD, and three 100-HP, 480V pump VFDs for slurry movement.

“The project required a lot of planning and labor,” said Cherveney. “Most of what we did was within moving water, so keeping things from freezing created a very complex situation.”

Once mining was underway, pipe installation moved along swiftly. At the 100-ft. mark, the MTBM was under the river. At around the 170-lf., the MTBM started to encounter consistent pockets of rock. At the 260-lf. mark, production was intentionally slowed down to allow for the completion of the reception shaft. At 290-lf., the MTBM was encountering a full-face of rocks, including limestone.

At the set of pipe number 32, evidence of timber coming back through the slurry lines made everyone a bit nervous. The wood was later identified as belonging to an old wooden floodwall that was buried 35 feet below the existing grade.

“Wood fibers have the potential to clog up the intake ports and slurry lines,” explained Cherveney. “It could have stopped the tunneling for an extended period, but the MTBM was able to drill through it without stall.”

After two weeks, on a day featuring negative 10-degree temperatures, the MTBM reached the reception shaft wall at the necessary grade. The Lametti crew expressed pride and satisfaction in their contribution to the DMC initiative.

Cherveney concluded, “The partnership between Akkerman and their innovative microtunneling equipment, combined with Lametti’s underground experience, made this project’s success very gratifying.”

CONTRACTOR:
Lametti & Sons, Inc.

LOCATION: Rochester, MN

OWNER: City of Rochester Public Works Department

COMPLETION: January 2020

GROUND CONDITIONS:
Mixed ground, high water, cobbles, limestone, dolostone

PIPE: 36-in. ID Permalok®



▲ Check out our project time-lapse video on our YouTube channel at >>
<https://youtu.be/teVrJs6CSe0>



Extreme Grade Basement Utility Connections in Toronto



Since the early 2000s, Enwave Energy has installed over 3.5 miles of 10-12-ft. tunnels to provide sustainable, low carbon energy services to Downtown Toronto. One of Enwave's current projects aims to extend the tunnels to connect the East Bayfront mixed-use waterfront community. The 11.5-acre property is home to a new 25-story, 763,000 square-foot tower named Sugar Wharf, where the bottom third of the building accommodates the Liquor Control Board of Ontario (LCBO) corporate headquarters.



In late 2019, Earth Boring Co. Limited (EBCL) was approached by C&M McNally Tunnel Constructors about the feasibility of drilling four, 18-inch ID tunnels to connect heating and cooling services in the basement of the new building. EBCL's resulting ingenuity to tackle the project illustrates the range of versatility for the pilot tube guided boring equipment line.

Anton Tsyhanok, Project Engineer-in-Training for EBCL, described the features of the installations as "Four identical 18-inch diameter bores in the utility room of the building basement, spaced 3.6-ft. apart, with entry points at approximately 3.6-ft. off the floor and a steep incline of 25.58%." The bores would be completed through partially fractured and highly saturated shale.

Tsyhanok explained, "Each bore was approximately 93-ft. long with strict line and grade requirements to ensure that appropriate connections could be made at the Enwave utility tunnel at the receiving end." The connecting tunnel was simultaneously in construction, which meant that a receiving shaft would not be available as is typical with a two-pass pilot tube installation.

Logistical challenges also compounded the complexity of the installations. The project location was at basement level

five, 70-feet below the ground surface, with the nearest access point being an underground parking garage in basement level four.

Tsyhanok described the utility room as "Thirty-foot wide, and irregular in shape, with a concrete column three feet from the centerline of the east-most bore, a floor that sloped by 1%, and a four by four-foot sump pit in the middle of the room."

Since the building was still under construction and shared by numerous contractors, the only available staging area for tools and equipment was outside the building, over 110-ft. away.

EBCL proposed to C&M McNally Tunnel Constructors, the use of its Akkerman 240A Guided Boring Machine, powered by a P100E Electric Power Pack, and a custom open-face cutter head containing a lead auger to increase the diameter of the bore to 18-inches.

To install the pilot tube bores in fractured shale, they selected an Akkerman rock drill adapter as the leading tool that mates to a TriHawk® drill bit. The adapter houses the guidance system's LED target.

The continuous use of a bentonite polymer to cool the drill bit and provide viscosity to suspend and carry the cuttings is a crucial factor. EBCL added an Akkerman 1525B/E Electric lubrication pump for this purpose.

To upsize from the pilot tube diameter, Akkerman manufactured an 18-inch, open-face cutter head with a lead auger. The cutter head featured retractable wing cutters that could be pulled back from the steel casing interior. The center cutter bit lead allowed the cutter bit to follow the pilot tube path.

EBCL's engineering team designed a specialized jacking frame stand to position the bore entry point to meet the design's line and grade requirements. It had to be light and mobile enough to move around the utility room, and sturdy enough to sustain the applied jacking loads and rotational forces, with braces to connect and stabilize it to the basement wall.

The frame integrated lagging points around its base for the insertion of large anchor bolts for grounding. The quantity of anchor bolt locations was later increased, following the

discovery of numerous utilities, including a 600V power line, just four inches into the concrete floor slab.

Tsyhanok explained, "The increased number of anchor points allowed our team to select anchor locations as needed to avoid utilities on each bore while ensuring that the frame remains adequately fixed."

To connect the power and bentonite slurry mix to the pilot tube system with the power pack and lubrication pump from the staging area, extra lengths of hosing were necessary.

Each bore consisted of a pilot tube installation on line and grade, then the pilot tubes were pulled back. During the second pass, the cutting head increased the diameter of the bore to 18-inches, followed by the steel casing with enclosed augers. Spoils and groundwater were pulled back to the sending side using a string of augers, where a hydro-vac truck removed it at the surface.

At the time of this article, Tsyhanok reported the accurate completion of three of the four bores. Their success poses the potential for additional basement connections projects, in synch with Enwave's utility expansions.

Tsyhanok concludes, "Despite the challenging conditions, the two-pass pilot tube system proved to be quick and highly accurate. The machine allowed us to meet the strict alignment requirements and helped ensure that the future connections for the building could be completed with ease."



▲ EBCL's engineering team designed a specialized jacking frame stand to position the bore entry point to meet the design's line and grade requirements.

CONTRACTOR: Earth Boring Co. Limited

LOCATION: Toronto, ON

OWNER: Enwave Energy

COMPLETION DATE: April 2020

GROUND CONDITIONS: Shale

PIPE: 18-in. OD Steel Casing

TOTAL LENGTH/LONGEST RUN: 372-lf./93-lf.

AKKERMAN EQUIPMENT:

GBM 240A Jacking Frame, Rock Drill Adapter with TriHawk® drill bit, Open-Face Cutter Head with Retractable Wing Cutters, 1525B/E Bentonite & Lubrication Pump



▲ The 18-inch cutter head featured retractable wing cutters that could be pulled back from the steel casing interior and a lead for the cutter bit to follow the pilot tube bore path.



▲ The installation of 18-inch OD steel casing completed each bore, which will connect heating and cooling utilities to the new 25-story building.

Third Generation Akkerman Takes The Reins

We're pleased to announce the promotion of Justin Akkerman to President. Justin's official appointment as the third-generation President began on April 6, 2020. Current second-generation President, Maynard Akkerman will continue as CEO and Chairman of the Board.



He describes, "Oversight of the manufacturing side of the business was instrumental in gaining a solid understanding of the daily operations." In the last six years, Justin has incrementally undertook additional corporate duties, preparing him for his new appointment. He states, "When operating a small business, daily responsibilities vary greatly in scope and extent." Sometimes, this has meant driving 10-hours each way to deliver parts to a project site on a weekend because a common carrier was not available. At other times, it has involved organizing an impromptu picnic for some much-needed employee fellowship to celebrate the completion of a big order.

Justin states, "I am humbled to take the helm of the legacy built by my grandfather and father. Because of our employees' dedication to our core values and mission, and the certainty in the quality of our equipment and loyalty of our valued customers, I feel confident in taking Akkerman, Inc. into the future with conviction for a trajectory of continued growth and success."

Justin received his formal education from the University of Minnesota Twin Cities in Minneapolis, MN, earning a bachelor's degree in civil engineering in 2006 and his Professional Engineer licensure in the State of Minnesota in 2012. Justin, his wife Heidi, and their two children Grant and Stella reside in Austin, MN.

Justin has always been immersed in the family business and has traveled to many project sites and trade shows with his father in his childhood and adult life. After college, Justin's formal career began with CNA Consulting Engineers of Minneapolis, MN, as a staff engineer, project designer, and on-site field engineer for underground tunneling, and rehabilitation utility construction projects in the Twin Cities.

In 2014, Justin entered the family business, where he assumed the role of operations manager. He has been responsible for the corporate administration, providing direction for the management team, and managing the production and inventory control departments. Under his leadership, Akkerman, Inc. launched its ISO 9001:2015 quality management system, acquired several state-of-the-art machining centers resulting in production efficiencies, and formalized the businesses' key objectives.

Project Highlights



LA DWP RIVER SUPPLY UNIT 7

- CONTRACTOR:** Frontier-Kemper Constructors, Inc.
- LOCATION:** Burbank, CA
- OWNER:** LA Dept. of Water & Power
- MICROTUNNEL COMPLETION DATE:** March 2020
- GROUND CONDITIONS:** Firm, cemented soil with rock
- PIPE:** 102-in. ID Steel Casing
- TOTAL LENGTH/LONGEST RUN:** 520-lf.
- AKKERMAN EQUIPMENT:** SL82P Microtunneling System

Frontier-Kemper Constructors, Inc. (F/K) completed a 102-in. ID tunnel, 60-ft. below the Los Angeles River in Burbank, CA on the LA Department of Water and Power's River Supply Conduit Reach 7 project. The tunnel will house a pipeline to transport potable water to Central Los Angeles. In the next few weeks, the SL82P MTBM will return to Akkerman for refurbishment and receive a new cutter head in preparation for another LA DWP project, the City Trunk Line South Unit 3 - Whitsett Blvd. from Vanowen St. - Magnolia Blvd. Here, F/K will install 4,213-lf. of 79-in. ID steel casing in four runs, the longest at 1,085-lf. This project will replace a 102-year-old pipeline in North Hollywood.

INTERSTATE 75 RECONSTRUCTION PROJECT



- CONTRACTOR:** Capitol Tunneling
- LOCATION:** Toledo, OH
- OWNER:** Ohio DOT
- COMPLETION DATE:** 2023
- GROUND CONDITIONS:** Soft Gray Clay
- PIPE:** 66-in. OD Steel Casing
- TOTAL LENGTH/LONGEST RUN:** 2,450-lf./450-lf.
- AKKERMAN EQUIPMENT:** TBM 540 with Tunnel Boring System and 5200 Pump Unit, GBM 240A System

Beginning in February 2019, Capitol Tunneling of Columbus, OH embarked on the installation of 2,450-lf. of 66-in. OD steel casing storm sewers with Ashley Kay, their Akkerman TBM 540 on the Interstate 75 Reconstruction Project for the Ohio DOT as subcontractor to E.S. Wagner. The crossings ranged in depth from 5-28-ft. in soft gray clay. The project scope includes construction through 2023 for the widening of I-75 and reconstructing interchanges to enhance safety. Storm sewer installations with their GBM system are currently ongoing, totaling over 50 runs ranging from 16-72-in. ID.

A LEGACY OF AKKERMANS



▲ Donald "D.H." Akkerman after the completion of a 102-in. tunnel for the City of Mankato, MN in 1973.



▲ Maynard Akkerman as a TBM operator on a D.H. Akkerman Construction Company project in the mid-1980s.



▲ Justin Akkerman (center) on a Pacific Boring TBM 360 project in Santa Barbara, CA in 2001.

Project Highlights Continued

CHICAGO O'HARE INTERNATIONAL AIRPORT TERMINAL 5 EXTENSION

CONTRACTOR: L.J. Keefe Co.

LOCATION: Chicago, IL

OWNER: Chicago O'Hare Airport Authority

COMPLETION DATE: December 2019

GROUND CONDITIONS:

Silty clays

PIPE: 60/84-in. ID RCP

TOTAL LENGTH/LONGEST RUN:

84-in. 1,190-lf./830-lf.

60-in. 1,915-lf./750-lf.

AKKERMAN EQUIPMENT:

TBM 600 with Tunnel Boring System with 5200 Pump Unit



For over half of 2019, L.J. Keefe Co. of Mount Prospect, IL has been busy installing storm sewers with their Akkerman TBM 600C and Tunnel Boring System on the Chicago O'Hare International Airport Terminal 5 Extension project. Completed were two drives of 84-in. ID RCP totaling 1,190-lf. and three drives of 60-in. ID RCP totaling 1,915-lf. This project is part of the O'Hare 21 Expansion Program, where Terminal 5 will be completely revamped, adding ten gates and extending concourse M.

SR37 OFFSITE DRAINAGE OUTFALL STORM SEWERS



CONTRACTOR: Super Excavators, Inc.

LOCATION: Fishers, IN

OWNER: Indiana DOT

COMPLETION DATE: February 2020

GROUND CONDITIONS:

Varying Soft to Hard Stiff Clay

PIPE: 54-in. ID RCP

TOTAL LENGTH/LONGEST RUN:

4,372-lf./2,304-lf.

AKKERMAN EQUIPMENT:

MTBM SL60C System, AZ100 Total Guidance System, Akkerman Bentonite Injection System



In September 2019, subcontractor Super Excavators Inc. (SEI) of Menomonee Falls, WI completed a record 1,966-lf. microtunneling installation of 54-in. ID RCP on the SR37 Offsite Drainage Outfall Storm Sewers project in Fishers, IN using an Akkerman SL60C microtunneling system, AZ100 TGS tunneling navigation system, and the ABIS for bentonite lubrication.

In February 2020, SEI beat their own MTBM record on the same project with the forth and final alignment - a 2,304-lf. curved, 54-in. ID RCP tunnel. This alignment featured a 1,975-lf. straight section with a 329-lf. curve, and 1,929-ft. radius at the finish.

These two alignments, plus the two other storm sewer microtunnels will carry roadway drainage to natural surface water bodies.

▲ Above, pictured from left to right: Uriah Ballard, Paco Martinez, Jim Strane, and Sean Staniec.

SNEAK PEEK: ROCKING WITH PILOT TUBES

Since February, our GBM Team has been testing the capabilities of rock pilot tube installations by combining them with a small diameter pneumatic hammer with fantastic results!

Using a standard low psi air compressor, we've been able to precisely install pilot tubes in varying rock hardness.

Stay tuned for more updates on this exciting adventure!



◀ Drone footage of our test project site.

VISIT US AT THESE 2020 TRADE SHOWS & CONFERENCES:

October 5-6, 2020
5th Annual NASTT SC Texas/Oklahoma Trenchless Technology Conference
Sugarland, TX
Marriot Sugarland
Exhibitor & Presenter

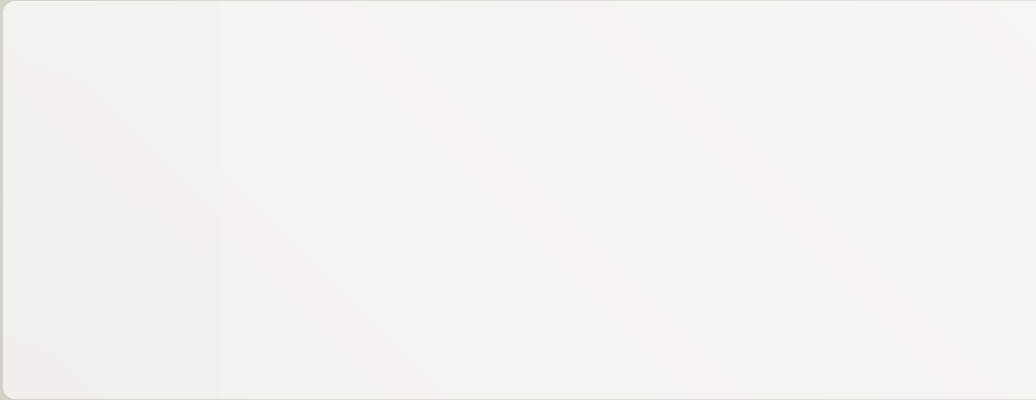
October 19-21, 2020
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