AKKERMAN NEWS

Newsletter About Akkerman Underground Construction Solutions

Volume II, 2019

WHAT'S INSIDE

TBM PROVIDES VERSATILITY IN DIFFICULT GROUND FOR WATER CONVEYANCE TUNNEL IN EL PASO, TX

BRH-Garver Construction LP, a Houston based civil construction contractor pipe jacked 885-linear feet of 66-inch ID Permalok® casing filled with 48-inch carrier lines to convey treated water from the Canal Water Treatment Plant (WTP) for El Paso Water in El Paso, TX. The project risks and rewards existed in equal measure for all stakeholders.

The Canal WTP, also known as the Robertson Umbenhauer, was constructed 75-years ago and is situated between the Rio Grande River and a 100-year old BNSF rail yard. The new transmission lines culminate to tie in at San Antonio Avenue in downtown El Paso.

The water lines on the Canal Water Treatment Plant Discharge Main Tunnel project traveled under Highway I-85, and 18 BNSF rail yard tracks in soft ground conditions presenting many opportunities for settlement. El Paso's water table is prone to seasonal variability due to its proximity to the river, and the likelihood of contaminated ground, existing utilities and obstructions in the 100-year old rail yard posed a potential threat to tunneling personnel and loss of production. Since the launch shaft was in an active BNSF rail yard, frequent and diligent communication and coordination with the railroad personnel transpired for safety, and equipment and material staging.

Several factors contributed to project cost savings including the use of a more cost-effective Tunnel Boring Machine (TBM) system over a microtunneling system, a value-engineered design to initiate both bores from one launch shaft inside the rail yard to emerge into one reception shaft, the downsizing of casing diameter from 72 to 66-inch, and the avoidance of deep well dewatering, which also reduced settlement risk.

The contractor's pipe jacking experience informed the resolution of the project's more difficult challenges when completing the 570- and 315-linear foot tunnels. When unforeseen cobbles were discovered, the hydraulic doors on the TBM cutter head provided passage for the cobbles with minimal loss of production. When unpredicted boulders were discovered, although (continued)

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tunneling had to pause to allow chemical grout to be used to stabilize the bore, the hydraulic doors provided essential access for breaking the boulders to a size that allowed for their passage to successfully complete the tunnel. When the crew ran into unanticipated PPCA ground conditions, the crew persevered by using a full-face mask filtration system to resume mining operations.

The project was deemed successful, and the TBM named "Robbie" in honor of the 75th anniversary of the Robertson Umbenhauer WTP, proved to be the right method.

J. Breff Cooling of BRH Garver, comments on the equipment selection, "The versatility of the Akkerman TBM with hydraulically-operated doors, gave us some options that a MTBM would not have. A slurry machine may have been the preferred choice under critically located structures in ground that varies from clay, to sand seams, to running gravels. However, the small but real possibility of boulders, or steel fish plates and other obstructing debris sometimes found under rail yards, tipped the balance towards selecting a manned-entry TBM for accessing any obstructions. With the benefit of hindsight, we can say that the TBM turned out to be the better choice in this case because we ended up discovering unforeseen boulders."

Cooling also credits the railway stating, "We are grateful for the exceptional cooperation from BNSF for accommodating our field operations inside their busy 24-hour around-the-clock rail yard operations."

The Canal Water Treatment Plant Discharge Main Tunnel project was designed by a partnership between CDM Smith and Parkhill, Smith & Cooper who also provided site supervision and contract administration. Tunneling technical support, oversight and settlement monitoring was performed by Killduff Underground Engineering.

Cooling concludes, "This is the third time BRH-Garver has partnered with an engineering firm for a design-build project, and the first for time for a tunneling project. The partnership accepted transfer of nearly all risk for the client and proved very effective for BRH to apply three decades of tunneling experience towards the optimum tunneling solution for the design changes. Our preference would be for this type of project delivery all of the time."

CONTRACTOR:
BRH-Garver Construction LP

LOCATION: El Paso, TX

OWNER: El Paso Water

COMPLETION: May 2018

GROUND CONDITIONS:
Standing sand and cobbles

PIPE: 66-in. Permalok®

TOTAL LENGTH/LONGEST RUN:
885-lf./570-lf.

AKKERMAN EQUIPMENT:
TBM 480 Tunnel Boring System, P600E Electric Power Pack

Check out the time-lapse video courtesy of Parkhill, Smith & Cooper at >> https://vimeo.com/299545618

GUIDED BORING TO THE RESCUE FOR EMERGENCY RESIDENTIAL AREA STORMWATER REPLACEMENT

CONTRACTOR: Northwest Boring Co. Inc.

LOCATION: Mill Creek, WA

OWNER: City of Mill Creek

COMPLETION: May 2018

GROUND CONDITIONS: Glacial till with rocks

PIPE: 36-in. OD steel casing, 27-in. Vylon® carrier

TOTAL LENGTH/LONGEST RUN: 250-lf./140-lf.

AKKERMAN EQUIPMENT:
GBM 4800 Series, High-Torque Casing Adapter (HTCA), Guide Rod Swivel (GRS) 50 36,-in., Rock Drill Adapter with TriHawk® drill bit

Northwest Boring Co. Inc. (NWB) of Woodinville, WA was subcontracted by Shoreline Construction for an emergency replacement of the City of Mill Creek's failed 30-inch CMP stormwater pipeline that had been causing flooding in the suburban neighborhood, just north of Seattle.

The need for the stormwater system's repair became apparent when a sinkhole appeared in December 2017, between the Sweetwater Ranch and Douglas Fir neighborhoods. Temporary repair work was conducted, but another sinkhole developed in the same location just one month later. After inspection, it was determined that a failed coupler and damage to the 36-inch corrugated metal stormwater pipe was the root cause.

Because the City of Mill Creek had declared this an emergency project with a budget less than $300,000, a public bidding process was not required. Shoreline Construction was selected as the contractor, who subcontracted the trenchless work to NWB.

The alignments scheduled for replacement were positioned within a narrow easement between two homes at an 11-foot depth in difficult ground. With minimal real estate, the depth of installation and geological conditions, NWB knew that their guided boring system would be an ideal installation choice for the new stormwater connections.

NWB employed the use of their Akkerman GBM 4800 Series Jacking Frame with a high-torque casing adapter attachment for auger boring. The combination made it possible to install the pilot tube passes and 10-foot pipe segments with the torque and jacking force of an auger boring machine but within a smaller shaft. The design utilized one launch shaft to initiate the runs from both directions which further reduced disruption to resident's properties and saved on project costs.

The ground conditions present were glacial till with rock, which is typical for this region. This ground cannot be displaced with a standard pilot tube steering head so NWB arranged to use special tooling for up to 12,000 psi UCS ground. The drill bit of choice, the Rock Drill Adapter with TriHawk® drill bit, lead the pilot tube passes which established the 140 and 110-linear foot alignments at the necessary line and grade for gravity flow. Simultaneously, a soil appropriate lubrication regime was applied to flush the excavated cuttings back to the launch shaft for removal. (continued)

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Crews then prepared to direct jack the 110 and 140-linear foot, 36-inch steel casing. In advance of the casing, NWB launched a guide rod swivel with a 36-inch cutter head which matched the 36-inch casing diameter. The swivel portion of the tooling absorbed the auger rotation while the cutter head, equipped with durable carbide gage cutter bit tooling, excavated the difficult ground. This second pass was completed with the guide rod swivel with cutter head for both stormwater sections.

The alignments were then finished with 27-inch Vylon® carrier pipe was positioned inside the casing and connections to the existing infrastructure were made.

From start to finish the entire project was finalized in just under a month, resolving the City's dilemma in a timely manner with minor intrusiveness to residents.

Share Your Project Photos!

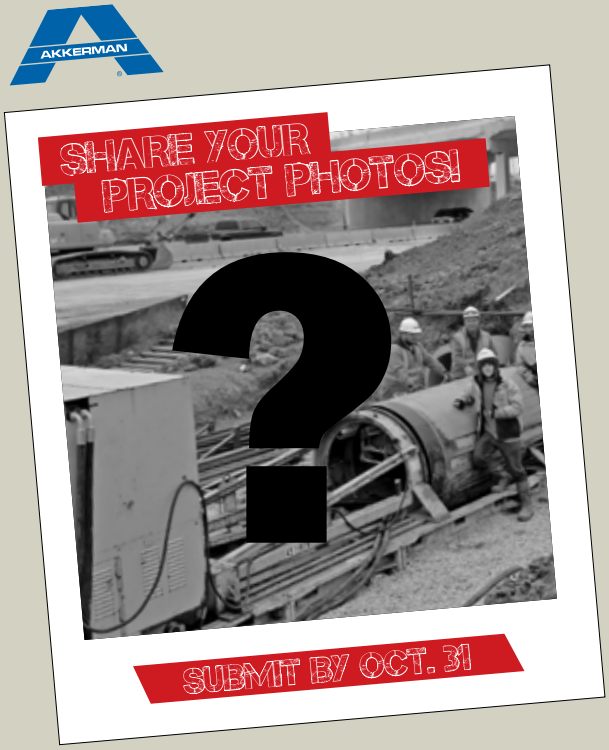
We're collecting project photos for the 2020 Akkerman Calendar!

Your photos should contain Akkerman equipment in good repair as the main subject, on a project that took place between October 1, 2018 and the present. See the image specifications below.

Please include the following with your emailed photos >>

>> Contractor's name
>> Project start and end date
>> Project name and location
>> Akkerman equipment
>> Ground conditions
>> Type of installation
>> Pipe material, ID/OD, joint length
>> Total footage installed
>> Number of drives
>> Crew members names and titles (if featured)
>> Additional information describing the image or project circumstances

Submit your photos to ***landerson@akkerman.com*** by **October 31, 2019** for consideration. If your image is selected, you will be notified and receive 10 copies of the calendar in mid-December.



IDENTIFYING PILOT TUBE WEAR

Thread wear and ballooning is what transpires over time and is caused by excessive side-loading and high torque. This reduces the thread's engagement and this loss of face adds additional stress to the female end of the pilot tube.

Use the thread gauge tool to compare the threads to new pilot tubes (see Figure 1), making thread wear more apparent.

If you look at a cut-away view of two mated pilot tubes where ballooning has occurred, you will notice that the thread teeth show rounding at each crest (see Figure 2). The rounding diminishes the rigidity of the connection, lessens the maximum rotational torque capacity and could fatigue the tube to failure.

When pilot tubes are in good condition, the exterior join region should be smooth (see Figure 3). When running your finger along this area there should be no step or overlap. When threads are worn and ballooning has occurred, there will be a noticeable overlap in this region (see Figure 4).

Another tell-tale indicator of worn threads is noticed difficultly when separating them at breakout. If the tube does not thread apart easily during removal in the reception shaft, it may simply require lubrication, however, this could also be an indicator of excessive wear and it may have the potential for ballooning. When tubes are difficult to separate, the crew should mark and set these pilot tubes aside for further inspection, cleaning and lubrication following the bore.

WHAT TO LOOK FOR >>

- **Loss of face at points of thread engagement**
- **Difficulty separating tubes during breakout**
- **Thread teeth show rounding at each crest**
- **Exterior join of two pilot tubes shows overlap**

Over time, seasoned operators will become familiar with the indicators for pilot tube replacement based on performance and visual inspection. Consistent observation of maintenance intervals will help contractors realize great distances.

Contact Aftermarket Support to get a thread gauge tool for your pilot tube inventory.

Figure 1. Pilot tube presenting a good thread wear pattern.

Figure 2. Pilot tube presenting worn threads.

Figure 3. Good, smooth pilot tube connection.

Figure 4. Pilot tube connection presenting ballooning.

BORING INTO THE FUTURE

Exciting changes are on the horizon for Akkerman. In mid-August we took delivery of a new Okuma VTR-350A Double Column Turning Center; the third of its kind to arrive on U.S. soil.

Machine installation has been ongoing since mid-August, representing the final but shortest phase of the process. Most of the work has been occurring behind the scenes since last fall, precisely six feet below the surface of the plant floor.

The necessity for this type of machining center had been considered for many years. A large volume of complex parts progress through the machining department, which can cause a bottleneck in production. This was balanced by implementing a second shift, but an opportunity for improvement still existed.

Six months ago, we consulted with an engineering firm to survey the production floor and to design a foundation for the nearly 100,000-pound machine. From this time until early Summer of 2019, relocation of the existing machining center, rerouting of heating and electrical lines, excavation of a 40 by 40-foot hole in the shop floor and installation of a foundation and pit took place.

Morty, a.k.a. Morty the Sewer Rat, was onsite to assist with the excavation and concrete construction. You can see him standing by the volume of soil removed from this space.

The height of the machine allowed us to make some choices about machine positioning. We opted to mount the machine in a pit below the shop floor for ease of access to the table and to eliminate the risk of interference with our overhead bridge cranes.

At the end of August, seven truckloads containing all the intricate pieces that constitute the complete assembly arrived for installation, along with an installation crew and Okuma technicians. Machine installation took six weeks.

This new Double Column Turning Center is designed for high rigidity, stable accuracy, and process-intensive machining of big-bore and tall work pieces. The machine can turn up to 138-inches in diameter. But the benefits do not stop here.

In simplistic terms, previously, when we needed to machine a large intricate part, it was turned to size, then transferred to an indexing table for milling and hole drilling then moved to the shop floor for manual drilling of horizontal holes at a 90-degree angle on the exterior. The new machining center will consolidate all of these steps with just one program set-up, increasing accuracy and throughput of parts done carefully and safely.

The uniqueness of this acquisition also allows Akkerman to continue innovating for larger diameter machines and positions us as a premier manufacturer in our area. Justin Akkerman, operations manager, states, “As Akkerman equipment designs move into new realms of industry demands, this machining center enables us to build larger and more complex designs to get us there. It has an anticipated life expectancy of 30-years, and we’re confident it will prove to be a worthwhile investment”.

The Okuma replaces our old tried and true Cincinnati-Hypro vertical turning lathe, first installed in 1986, and manufactured in 1940. It has served us well, but its workload will be significantly reduced.

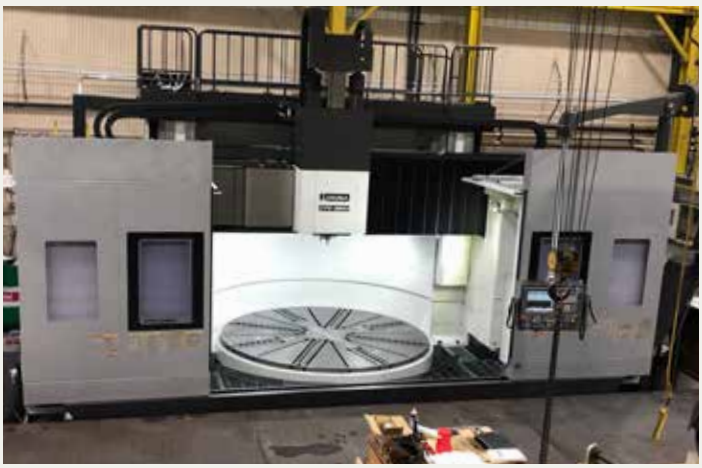
Once it is in operation, our staff will also receive several weeks of onsite technician support—they’re anxiously waiting to start running parts on the new machine. Our first build of a periphery drive SL60P MTBM will be the first piece of equipment to be run completely on the new machine.

A glimpse of the mass of individually wrapped components delivered on seven tractor and trailers.

Installation of the boring mill.

"As Akkerman equipment designs move into new realms of industry demands, this machining center enables us to build larger and more complex designs to get us there."

Two of our chief machinists viewing the control screen functions.



Nearing the final stages of installation.

Special thanks goes to...

Akkerman believes in the value of hiring local contractors and service providers. We would like to recognize the following vendors who assisted us with this endeavor >>

- American Engineering Testing, Inc., Rochester, MN
  Geotechnical Services
- City Concrete Company, Austin, MN
  Concrete Services
- Cullinan Rigging & Erecting, Ramsey, MN
  Rigging
- Fox Electric Company, Austin, MN
  Electrical Services
- Harty Mechanical, Inc. Austin, MN
  Mechanical Services
- Husemoller Excavating, Austin, MN
  Earthwork
- Jones, Haugh & Smith, Albert Lea, MN
  Foundation Design and Surveying
- Morris Midwest, Waukesha, WI
  Installation
- The Concrete Cutter, LLC, Le Sueur, MN & Regional Concrete Cutting, Inc., Rochester, MN
  Concrete Cutting

Visit us at these 2019-2020 Tradeshows & Conferences:

October 21-22, 2019
TAC 2019 Fall Workshop
Winnipeg, MB
Delta Hotel
Presenter

October 23-24, 2019
Trenchless Elevated 2019
Sandy, UT
Mountain America Exposition Center

October 28-30, 2019
No-Dig North
Booth #200
Calgary, AB
Telus Convention Centre
Presenter

October 31, 2019
2020 Akkerman Calendar Photo Submission Deadline

2020

January 28-30, 2020
UCT 2020
Booth #728
Fort Worth, TX
Fort Worth Convention Center
Presenter & Gold Sponsor

February 3-6, 2020
27th Annual Pilot Tube Seminar/ Microtunneling Short Course
7th Annual Networking Reception
Host
Boulder, CO
University of Colorado Boulder
Main Event Sponsor & Presenter

April 5-9, 2020
NASTT No-Dig 2020
Booth #407
Denver, CO
Hyatt Regency Denver
Presenter & Gold Sponsor

May 20-21, 2020
2020 Trenchless Technology Road Show
Niagara Fall, ON
Scotiabank Convention Center
Presenter

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