

Personnel from the City of Akron, the construction management team and the contractor (Kenny/Obayashi JV) wait for TBM Rosie to breakthrough after her 10-month journey below the city of Akron. Part of Akron Waterways Renewed!, the Ohio Canal Interceptor Tunnel project broke ground on Nov. 6, 2015.

PHOTO: BRUCE S. FORD PHOTOGRAPHY

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## Underground Today I

# Below-Surface Solutions

Engineered systems add safety and efficiency to multiple projects

By Karin Tetlow

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## Multiple Shoring Systems Secure Storm Sewer Project

A large contractor was awarded a storm sewer project in a major Illinois city. It required three bore pits with excavation dimensions of 42 ft long, 16 ft wide and 30 ft deep for the installation of 42-in. and 62-in. storm sewer pipe and a precast manhole. A receiving pit would also be required measuring 24 ft long, 12 ft wide and 24 ft deep. The contractor's competent person onsite classified the medium to stiff clay as Type B.

The site was a few feet from a busy interchange, and the underground cuts for the bore and receiving pits were located adjacent to active highway ramps, two feeder roads and an overpass. The contractor needed four supporting systems that could provide an open-span area in a tight environment while providing property safety protection for the workers. The protective devices also needed to provide proactive soil support

to prevent potential soil raveling given the proximity to the existing highway infrastructure. Additionally, there was an Illinois Dept. of Transportation request to allow a maximum deflection of 1.5 ft due to poor soil conditions. Moreover, the underground phase had to be completed before other contractors could begin installation of new flyover ramps.

National Trench Safety (NTS) met with the contractor to discuss potential protective system options. It became apparent that a site-specific plan would be the safest and most cost-effective method of providing excavation support. NTS's in-house engineering team developed a plan with the contractor that met the site-specific challenges. The plan would use a large hydraulic excavation brace system for the three bore pits and a slide rail system with a sheeting guided frame for the receiving



National Trench Safety provides a contractor with a hydraulic bracing system.

pit. The hydraulic bracing system was composed of steel sheet pile, walers and hydraulic braces. A progressive installation on both protective systems would allow for minimal soil disturbance. The contractor was impressed with the protection and versatility of both systems and pleased with the service provided by NTS. ♦

PHOTO: COURTESY OF NATIONAL TRENCH SAFETY

## Clean Water Access Shaft

With the significant population growth in the San Francisco Bay area, the Silicon Valley Clean Water (SVCW)'s wastewater conveyance authority that serves more than 200,000 customers sought replacements for its aging and increasingly unreliable system. One part of SVCW's Regional Environmental Sewer Conveyance Upgrade (RESCU) is the gravity pipeline project that includes the design and construction of 3.3 miles of a 16-ft-dia

TBM-bored tunnel. In a progressive design-build agreement with contractor Barnard Bessac JV and design engineer Arup, the staged project will have a 100-year design life and a 10-year design life warranty.

Malcolm is responsible for the support of excavation for the 85-ft-deep, 60-ft-dia TBM access shaft named the Airport Access Shaft because of its location less than half a mile north of San Carlos Airport. The reinforced concrete slurry

wall consists of slurry wall panels, each excavated under bentonite slurry and connected to the next panel with watertight construction joints. Excavation of individual panels is performed under bentonite slurry. Once excavation is completed, the slurry is cleaned using desanding and desilting techniques, rebar cages are installed and tremie concrete is poured through gravity tremie pipes.

One major challenge is the actual site logistics that led to complex task scheduling. While the site in general is large, the location of the shaft is constrained by power lines to the west that limited the usage of the site to east of the power line. Moreover, FAA regulations allowed limited headroom for construction equipment. Malcolm Director of Slurry Wall Operation Ihab Allam says, "That required us to use shortened crane booms and splice the rebar cages three times over the open excavation." ♦



Malcolm is installing slurry wall panels for the Airport Access Shaft.

PHOTO: COURTESY OF MALCOLM DRILLING





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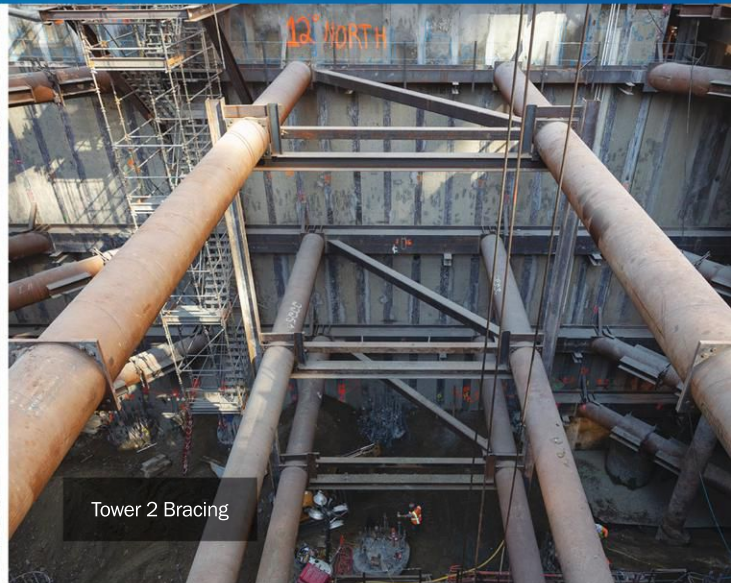
## Look to the Blue

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Tower 2 Bracing



Top of 332-foot-deep shafts