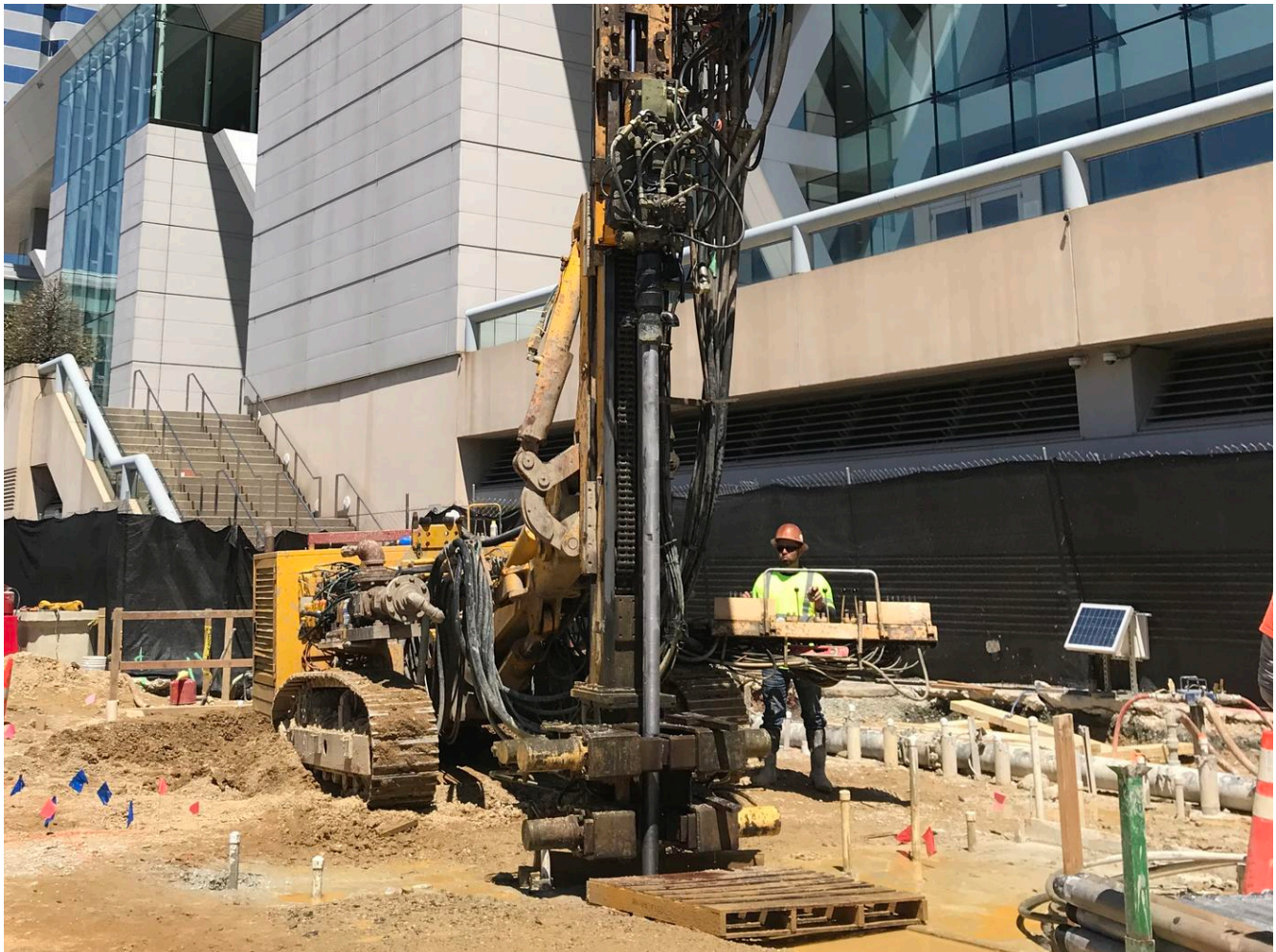




## CSX Camden Street

Baltimore, Maryland

In downtown Baltimore, increased flooding and impacted train operations led to a complete replacement of a storm drainage system, steps away from the Oriole's Park at Camden Yards and the Baltimore Convention Center. Keller provided a design-build grouting program for a water-tight excavation.



## The project

Initially built in 1891, a 48-inch in diameter drainage pipeline crossed under the CSX railroad tracks that entered the Howard Street Tunnel. In the 90s, the pipeline was lowered to accommodate the rail track being lowered for vertical clearance. Over time, the storm drain demonstrated inadequate capacity, resulting in frequent flooding and impacted train operations. A complete replacement of the system was required.

## The challenge

The project required the construction of two hand-mined tunnels under the operational rail tracks and jacking a micro tunnel boring machine over 150 ft. The required excavation extended more than 25ft below the groundwater table. Due to the urban environment, the area was heavily traveled with foot and vehicle traffic. In addition, the CSX freight rail and adjacent MTA light rail needed to remain operational during construction.

## The solution

In the early stages, Keller worked with the project team to provide a cut-off solution to minimize the risk of flooding around the shafts. Chemical grouting was chosen as the optimum solution due to the ability to install within tight space conditions and without disrupting operations. Keller performed grouting around the entire perimeter of the 26 ft in diameter West Shaft and for the rectangular East shaft. Break-in and -out blocks were created with an additional row of grouting. Grouting was also performed as a crown cover for the tunnel alignment between the two shafts. The grouting program successfully prevented track movement and groundwater entry, keeping the excavation in the dry.

## Project facts

### Owner(s)

CSX Transportation

### Keller business unit(s)

Keller

### Main contractor(s)

Clark Construction Group, LLC

### Engineer(s)

Keller

### Solutions

Support of excavation

### Markets

Infrastructure

Water, sewage and waste disposal

### Techniques

Permeation (chemical) grouting

### Email address

[info@keller-na.com](mailto:info@keller-na.com)

### Phone number

1 (800) 456-6548