2022 Outstanding Underground Project

Exchange Place Station – 9 Car Program West Corridor

By George Machikas

Fig. 1: Excavated tunnel

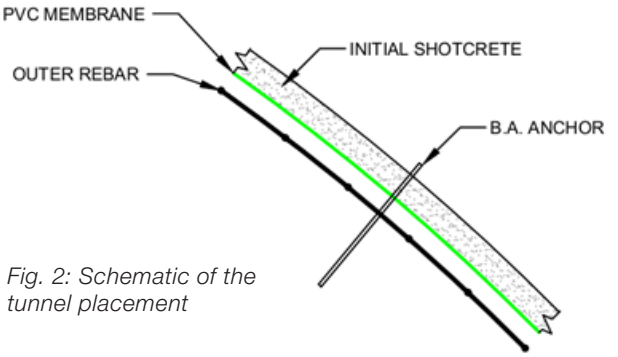


Fig. 2: Schematic of the tunnel placement

Fig. 3: Preconstruction mockup

Fig. 4: Concrete being pumped down from the street plus 100 ft to the work zone.

Exchange Place Station 9-Car Program is a vital part of the $1 billion PATH system improvement plan unveiled in 2019. The improvements to the 111-year-old system will allow for longer 9-car trains on the Newark/World Trade Center Line. The objective was to add capacity and reduce delays.

The work under this contract generally consisted of excavating a cross-corridor passage, including the installation of structural supports and architectural finishes for the PATH Exchange Place Station. Patriot Shotcrete's involvement was in constructing the lining for the cross-corridor, connecting the eastbound and westbound train platforms.

First, we had to prove to the NY Port Authority that shooting shotcrete in layers is effective and best practice for this project. This was done in the arch mockup, as this is how the project would be performed. A back mat of reinforcement was installed and shot, and then the second layer was installed and shot.

Eastern Materials, a US Concrete Company, provided the 5000 psi concrete mix. Patriot Shotcrete pumped the concrete from the street above. The placement line was routed through a drop tube to the corridor located 70 ft (21 m) below.

The corridor is 10 ft (3 m) tall and 16 ft (5 m) wide, extending 80 ft (24 m) between the station platforms with end beams and columns. Timing was of the essence as this is an active station. The corridor was tunneled through rock and

Fig. 5: Smoothening coat being applied

Fig. 6: Structural placement underway

then stabilized with an initial layer of shotcrete performed in 2 shifts. The final layer is 15 in. (380 mm) thick with a double mat of reinforcing, waterproofing, and grout tubes. The congested reinforcing of a double mat of #9 (#29M) and #6 (#19M) bars at 6 in. (150 mm) on center made it necessary to encase the outside mat prior to setting the inside mat.

The final finish was a flat and straight cut rod finish to be covered with tile. The final lining consisted of 2291 ft^2 (213 m^2) of finish area and 183 yd^3 (140 m^3). Shotcrete allowed us to meet the tight work windows available at this active station. Additional challenges included the limited access for forming, materials, and equipment; congested workspace; and a thick overhead placement. Working closely as one team with Walsh, the General Contractor, made this project very successful.

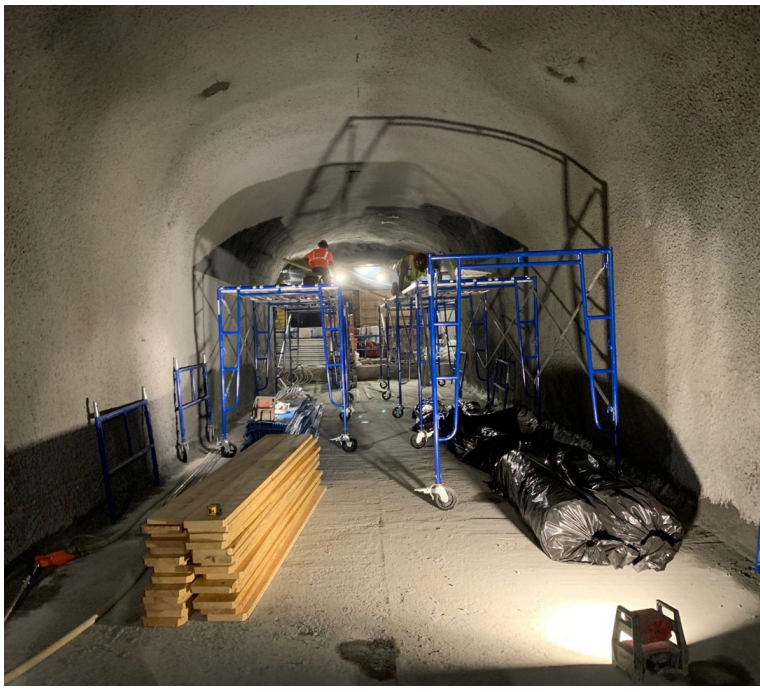
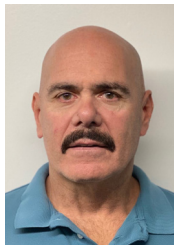


Fig. 7: Final tunnel



***George Machikas** is the Director of Operations for Patriot Shotcrete LLC, and has over 40 years of concrete construction experience. He has previous experience with Superior Gunite, Island Concrete, and C.M. Tec Inc. He has been with Patriot Shotcrete since its inception. George is experienced in poured concrete and shotcrete and graduated from Lehigh University in 1981.*

2022 OUTSTANDING UNDERGROUND PROJECT

Project Name
Exchange Place Station – 9 Car Program West Corridor

Location
Jersey City, NJ

Shotcrete Contractor
Patriot Shotcrete

General Contractor
Walsh Construction Company

Architect/Engineer
WSP USA Inc.

Material Supplier
Eastern Concrete Materials