

## Trans Hudson Express Tunnels New York Penn Station Expansion (NYPSE) New Jersey Transit Authority

**Location:** New York, New York

**Date:** 2006 – 2010

**Structure:** Dyer Avenue Cavern, Ancillary Caverns and Station Cavern (NYPSE Caverns); Three Escalator Tunnels, Six Utility Tunnels and Three Shafts

**Length:** Main Station Cavern: 2,239 feet (682 meters)

**Cross-Section:** Largest Cavern has height: 97 feet (30 meters), width: 96 feet (29 meters)

**Geology:** Schist, Granite, Pegmatite, Amphibolite, and Migmatite

**Cost:** Estimated \$8.7 Billion

**Client:** THE Partnership (Parsons Brinckerhoff STV / DMJM, Joint Venture)

**Owner:** New Jersey Transit Authority (NJT)



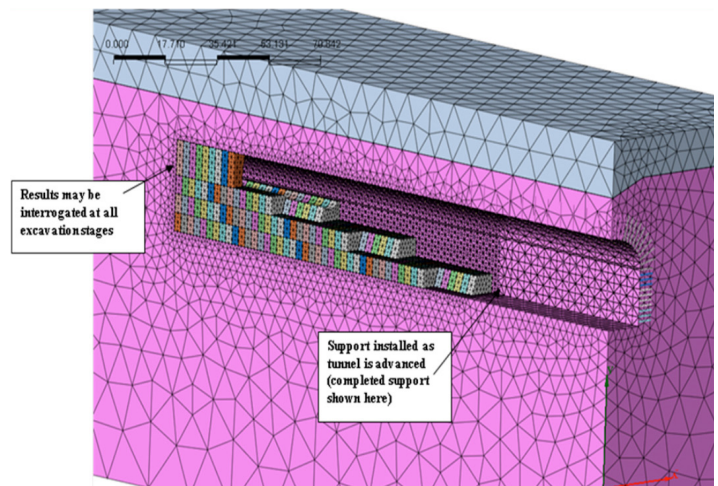
**Figure 1.** Trans Hudson Express (THE) station cavern New York Penn station Expansion (NYPSE) cross-section.

### Design Services for Manhattan Structures – Caverns, and Shafts:

The Access to the Region’s Core (ARC) Project’s main goal was to provide increased commuter rail capacity from northern New Jersey to Manhattan. The project included new railway terminals and caverns under 34th Street in Manhattan between 6th and 8th Avenues, shafts at Dyer Avenue, 33rd Street and 35th Street, utility tunnels to connect the shafts and caverns, and escalator tunnels to provide access from the surface to the station platforms.

Gall Zeidler Consultants (GZ) provided lead engineering and design services for the main station cavern, tunnel segments and underground structures to be constructed using drill and blast methods with rock reinforced and shotcrete for initial ground support. The services included construction sequence for all structures, excavation and support drawings, and three-dimensional (3D) numerical modeling of the station cavern. These segments included temporary access adits from both of the 33rd and 35th Street shafts, access and ventilation shafts, utility and escalator tunnels and the New York Penn Station Expansion (NYPSE) cavern. All structures, except the escalator tunnels, are designed with a PVC waterproofing membrane and a full drainage system followed by final lining.

To quantitatively assess the ground support of the station cavern, a detailed 3D numerical analysis was undertaken (see Figure 2) to appropriately simulate the excavation and support sequencing.



**Figure 2.** Trans Hudson Express (THE) station cavern (NYPSE) ground support model.