



**C 20202** - Above: View looking into east tunnel heading approximately 70 feet from east shaft portal face.

**C20203 - Upper Left:** 63<sup>rd</sup> Street slurry wall being constructed as part of the connection of Manhattan to Queens.

**Lower Far Left:** The excavation support system designed with a view of the elevated track above that was underpinned.

**Lower Near Left:** The underpinning system designed to support the elevated track and adjacent subway.

## 63rd Street Subway Connector to Queens Midtown Tunnel, Queens, NY

This project consists of four contracts to connect the New York City Transit Authority (NYCTA) 63rd Street subway (Q Line) to the Queens Boulevard bound subway (Lines E & F) which runs under Northern Boulevard. MRCE provided extensive geotechnical and structural engineering services for two of these contracts, described below.

### C-20203

MRCE designed the slurry wall for the box connector construction and associated excavation for an adjacent tunnel ventilation complex, as well as a siphon sewer tunnel below Northern Boulevard and a box sewer culvert. Two square shafts (20ft. x 20ft.) were constructed on either side of the boulevard and elevated tracks for the sewer siphon under Northern Boulevard. Slurry diaphragm wall construction was used and the panels keyed into the bedrock. Then a 16 square foot shaft was mined into the relatively sound bedrock and the rock faces were reinforced with rock bolts down to the new sewer siphon level. Instead of having the 16 ft. diameter siphon 20 ft. below the Q Line subway box as originally planned, the Contractor proposed a modification of the design to take it 40 ft. deeper into the bedrock and relocate the shafts to the northeast. Excavating the siphon in the bedrock was seen as much safer and lower cost than jet grout drilling and advancing the siphon tunnel through organic silt and sand. Also, groundwater levels would be maintained without potentially draining these soils. Drilling through the sands and compressible soils below the E, F and Q subway boxes would have caused groundwater lowering which could have caused ground subsidence. Relocating the shafts eliminated the underpinning of two elevated subway columns and avoided interference with the existing siphon.

### C-20202

MRCE designed a slurry wall water cut-off, a temporary earth retention system and underpinning of the existing operating subway tunnel during construction of the new two-track tunnel. The underpinning must also support an elevated two-track rapid transit system which is supported on the existing four-track tunnel.