



Mixing Strength With Satisfaction

MAC LIGHT RAIL TRANSIT SHAFT, MINNEAPOLIS, MN

MS-D3 ACCELERATED SHOTCRETE

PROJECT:	MAC Light Rail Transit Shaft St Paul/Minneapolis Airport, MN
SPECIFIER:	CNA Consulting Engineers Minneapolis, MN
CONTRACTOR:	Brent Anderson Associates, Inc Fridley, MN
PRODUCT:	MS-D3 Accelerated Shotcrete
QUANTITY:	30 m ³ (1000 ft ³)
COMPLETION:	Winter 2001

In January 2000, the State of Minnesota began construction of their first Light Rail Transit line, an 18.6 km (11.6 miles) connection of downtown Minneapolis, the Minneapolis/St Paul International Airport (MSP) and the Mall of America. The project includes a 2.25 km (1.4 mile) twin tube tunnel located under the MSP airport runways and taxiways and one underground station (Transit Center). The Minneapolis-St Paul Metropolitan Airport Commission (MAC), the owner and operator of MSP, contracted the project to HNTB Corporation. The project was estimated to cost \$675 million.

The Transit Center, 36.5 m (120 ft) below the Lindbergh Terminal allows passengers access to the Light Rail system. While excavating the shaft leading to the Transit Center, Sheehy Construction Company (the project's successful bidder) began encountering an average of 250000 litres (66000 gallons) per day of contaminated ground water. An area approximately 24 m (80 ft) down into the shaft was found to contain a band of loose shale ranging from 1.5 to 2.75 m (5 to 9 ft) in height.

To aid in stopping the infiltration of water into the shaft, Sheehy approached one of Minnesota's leading Waterproofing Companies, Brent Anderson Associates (BAA). Understanding the cold temperature concerns (often as low as -7°C (20°F)) BAA recommended the use of MS-D3 Accelerated Shotcrete, which was being used successfully on Ford Field in Detroit, MI. The product was submitted to CNA (part of HNTB's design team) and they approved its use.

In order to heat the entire area, BAA constructed a temporary shelter. As expected, the flow of water increased dramatically after the shale began to thaw. BAA then constructed an elaborate PVC pipe bypass system inserting relief ports 40 to 60 cm (16 to 24 inches) into the rock. Once the water flow was controlled, lime deposits were removed from the face and shotcreting commenced to a depth of 7.5 to 12.5 cm (3 to 5 inches) over the rock face.

After 2 days of hydration, the pipes were injected with a cementitious grout and the area was continually heated for another 4 days. The entire process was successful in diverting the water around the shaft, allowing Sheehy Construction to continue with their concrete forming on the remainder of the shaft. Both BAA and CNA Consulting Engineers were pleased with the performance of MS-D3 Accelerated Shotcrete, especially considering the difficult site conditions.

