

Sahar Road Crossover Cavern, Mumbai Metro

Project specifications

Project type: Subway tunnels
Application: Permanent sprayed concrete linings

Partners:

Owner: Mumbai Metro Rail Corporation
Contractor: J Kumar - CRTG (JV)
General consultant: MAPLE
Subcontractor - Endacom and Normet
Consultant - Bedi Consulting Ltd



Background

The Sahar Road Crossover Cavern (SRCC) is a tunnel with 6 symmetrical cross sections on Mumbai's Metro Line 3. The SRCC's original design called for a conventionally reinforced, cast-in-situ secondary lining. However, due to its complexity, Mumbai Metro Rail Corporation explored the use of sprayed waterproofing membranes (PSCL) and a drained regulating layer.

These methods are a first for any Indian metro project. The drained regulating layer even is an international first. Success on the SRCC is expected to revolutionize India's tunneling industry.

The challenge

The Mumbai Metro tunnels are designed to last 120 years, so developing a high-quality, durable concrete mix was a key challenge, especially because the locally available sand and aggregates in Mumbai used in the concrete are variable and of poor quality.

Also, the original design included rebars, but due to the cavern's different cross sections and complexity, it was difficult to place them.

The solution

For the permanent sprayed concrete lining the contractor used C32/40 concrete reinforced with 38 kg /m³ Dramix® 4D 65/35 BG steel fibers.

Choosing a steel fiber reinforced design eliminated the need for traditional reinforcement. This way, the contractor significantly reduced complexity and material cost. It was the first time for the company to use steel fiber reinforcement for this application, rather than a traditional concrete reinforcement method.