Customer case study

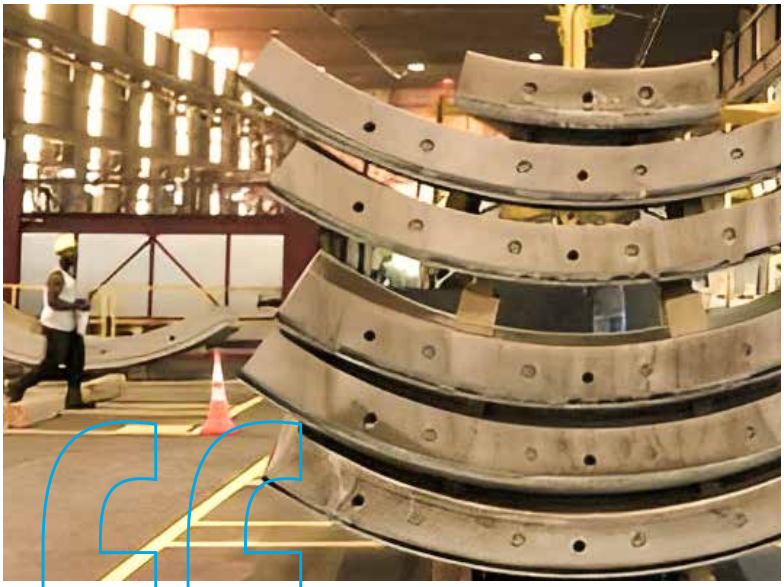
South Hartford CSO Tunnel

Project specifications

Project type: Sewer Tunnel
Application: Precast segments

Partners

- Owner: SouthH artford- MDC
- Designer: AECOM- NY,NY
- Contractor: Kenny/ O bayashi-J V
- Precast plant: CSI Tunnel Systems- New Hampshire



The South Hartford Conveyance and Storage Tunnel (SHCST) is a 20 ft-diameter, 21,800 ft-long bored tunnel that was excavated in shale, siltstone and basalt through several fault zones with high groundwater pressures up to 9.6 bars. For the first time in North America, Dramix® 4D 80/60BG fibers were designed as the optimal reinforcement for the precast segments.

The challenge

The tunnel is designed to meet the following performance criteria: A service life of at least 100 years; Self-cleaning ability to prevent solid depositions, blockage, odor, and corrosion; A finished diameterof 18 feet; An allowable infiltration rate of 100 gallons per day per inch diameter per mile of tunnel; Resistance to corrosion and chemical attack in CSO environment; Sufficient strength to withstand ground loads, external hydrostatic pressure, internal operating pressure, forces due to temperature variation, seismic ground motion; and limited deformation of underground opening and ground surface settlement.

The solution

The geotechnical and structural analyses indicated that precast concrete segments reinforced with steel bars or short steel fibers would provide sufficient strength and serviceability requirements for the one-pass TBM-bored tunnel lining. Dramix® 4D 80/60BG steel fibers were the optimum solution for the reinforcement of the segments on this project. The 4D fiber satisfies the serviceability requirements by limiting time-dependent effects of creep on crack opening and more significantly guarantees ductility requirements in conventional fiber dosage rates by providing an ultimate bending moment higher than the cracking bending moment. The below figure shows bending tests results using standard notched beams reinforced with 67 lb/yd^3 of Dramix® 4D 80/60BG fibers exhibiting this type performance. This deflection hardening performance is especially important for the loads applied on segments during production, storage, handling and transportation when segment is subject to pure bending loads.