



East Link Light Rail, Bellevue tunnel

Bellevue, Washington, USA



Project Information

Project category:
Infrastructure/Transportation

Years of construction:
2017-2020

Years of MAPEI involvement:
2019-2020

MAPEI coordinators:
Bill Allen (in memoriam), Monica Rourke
and Enrico Pavese

Project owner:
Sound Transit

General contractor:
Guy Atkinson Construction

Installer company:
F.D. Thomas, Inc.

Project manager:
Bill Packs

Photographers:
Monica Rourke and Stuart Isett

Project size:
1,985 linear ft. (605 m) of tunnel construction



Project Overview

Three years ago, work began on constructing an underground light-rail tunnel in downtown Bellevue, Washington. This project represented the first time that MAPEI's **Mapelastic® TU System NA** synthetic membrane was used for major tunnel construction in the United States. MAPEI was successfully chosen over the competition, even though it had not worked on previous projects of its type in America. This project is also special as it was the last one that MAPEI's Bill Allen worked on before his untimely passing.



Products Used

Mapelastic TU System NA
Maapeproof™ AL NA



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MAPEI UTT helps complete Seattle's Bellevue tunnel

The downtown Bellevue tunnel (E330) is a soft-ground, 1,985-foot (605-m), sequential-excavation-method (SEM) tunnel located in Bellevue, Washington. The E330 is part of Sound Transit's larger East Link program that provides 14 miles of light rail connecting the southern part of Seattle to Redmond, Washington.

Sound Transit awarded Guy Atkinson Construction a \$121 million contract to construct an underground light-rail tunnel (the E330) in downtown Bellevue. The E330 contract is one of multiple projects that will complete the East Link light-rail extension, which will run from downtown Seattle to Redmond.

The downtown Bellevue tunnel begins at the south portal near 112th Avenue SE and Main Street, runs under 110 Avenue NE for about one-half of a mile and then turns east near NE 6th Street towards the north portal — immediately adjacent to Bellevue City Hall and the Bellevue Transit Center.

The E330 tunneling operation included about 1,985 linear feet (605 m) of SEM tunnel construction, as well as tunnel pre-support, groundwater control, waterproofing, final lining, tunnel walkways, a center dividing wall, embeds and conduits, and a mid-tunnel access shaft and adit.

MAPEI's Underground Technology Team (UTT), which is recognized for its world-wide expertise, its customized products, and its dedicated and

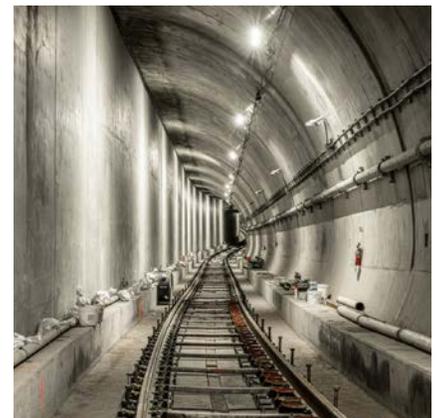
professional staff, was awarded the design, bid and build contract for the tunnel.

MAPEI on the job

The project's MAPEI coordinator was the late Bill Allen, who served as Business Development Manager for Tunneling for MAPEI UTT North America. He was not only a valued member of the UTT team and an expert in shotcrete, but he was also an American Concrete Institute examiner for nozzleman certification. Allen's skills came in handy due to the tunnel specifications calling for the application of shotcrete over three layers of *Mapelastic TU System NA* synthetic membrane — the first time that this product was used as a commercial application in the United States.

From the very beginning, the job presented challenges. The substrate was not smooth and, although that was not a major issue, the water infiltration that plagued the site was. According to Allen's report from November of 2018, "It has been a struggle to deal with water ingress, water seepage and damp areas. We have learned that the substrate must be dry to successfully install *Mapelastic TU*."

The general contractor, Guy Atkinson Construction, ran a crew of six to 10 per shift. MAPEI UTT would be on site for the 2 p.m.-to-midnight shift, as that was when the patching operations were finished and the application work would begin.



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According to Monica Rourke, MAPEI UTT's North America Chemical Grout Injection Manager – Waterproofing, who was Allen's colleague on the team and the one who took over after his passing, the application process followed roughly the same schedule for the entire project. The general contractor would first patch the very rough, and many times wet, surface. Then, *Mapelastic TU* was sprayed in three coats — the first coat was white, the second coat was blue/green and the third coat was again colored white. Lastly, when *Mapelastic TU* had cured, the shotcrete was sprayed using a special two-component pump.

"The crew learned how to spot critical areas in the application – the water would darken the substrate – and used the colors to distinguish leaks coming through the sprayed surface," Rourke explained. These areas were then marked and patched, and the process would begin again.

At one point in the installation, "The general contractor damaged the *Mapelastic TU* when pulling off the forms at the joint," Rourke said. But, MAPEI had a solution. "The *Mapelastic TU* was patched using **Mapeproof AL NA** and also by patching over with a layer of *Mapelastic TU*," she continued.

With MAPEI products waterproofing the invert and walls, the tunnel opened in the late summer of 2020. "This is not only the first use of *Mapelastic TU* in the U.S., but it is also such a lasting tribute to the hard work and dedication of our team member, Bill Allen," Rourke said.



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