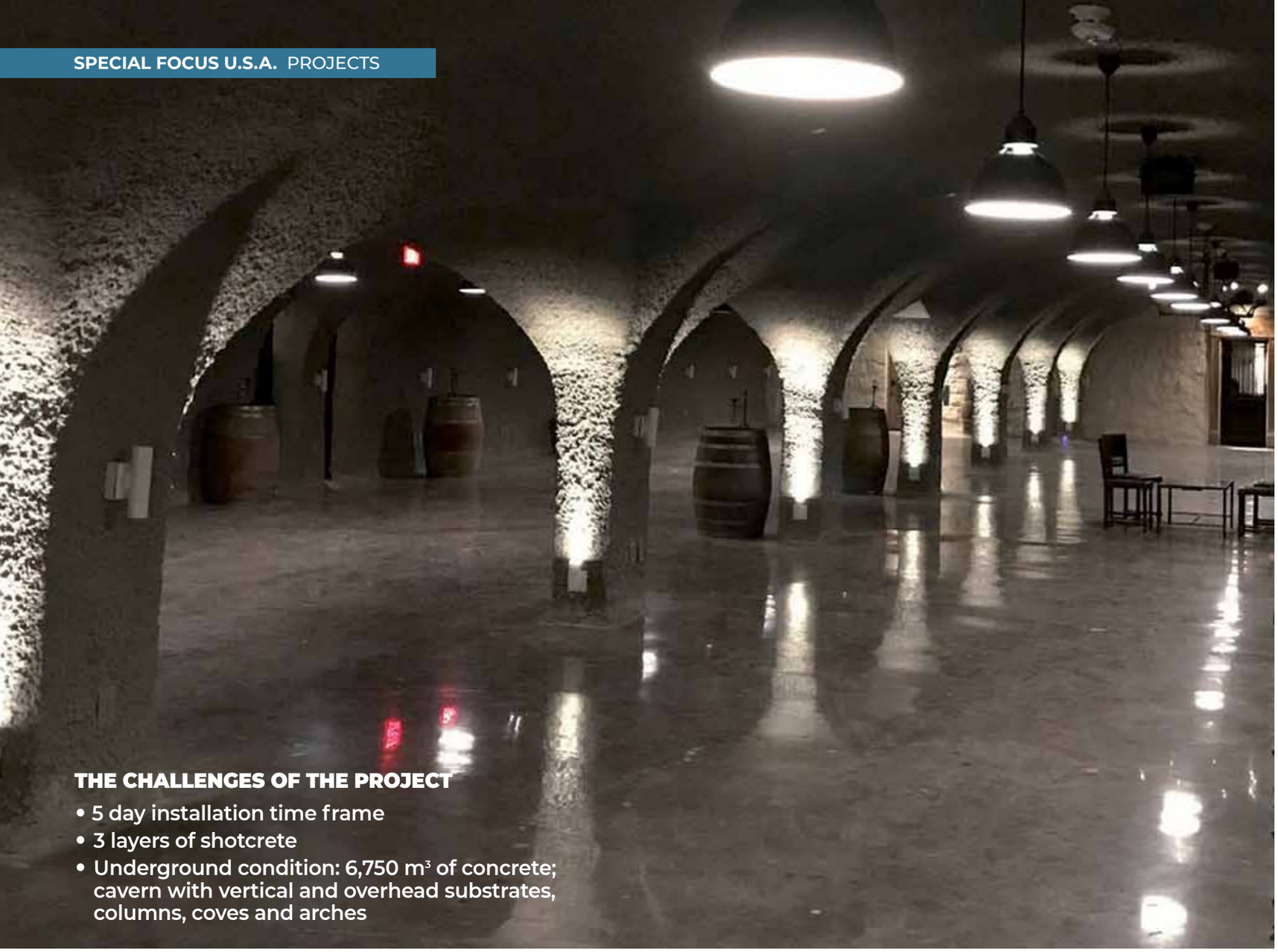


**THE CHALLENGES OF THE PROJECT**

- 5 day installation time frame
- 3 layers of shotcrete
- Underground condition: 6,750 m³ of concrete; cavern with vertical and overhead substrates, columns, coves and arches

**ABOVE.** A Cold War bunker was converted into a high-tech wine cave at Houston Oaks, Hockley, Texas.
**LEFT.** MAPEQUICK AFK 888 accelerator was used to prepare the shotcrete that was applied onto the wine cellar's walls and ceiling.

**Hockley (Texas)**

# HOUSTON OAKS WINE CELLAR

## MAPEQUICK AFK 888 WAS USED TO SPEED AND STRENGTHEN THE CONCRETE APPLICATION THAT TURNED A 1950S-ERA BUNKER INTO A LUXURIOUS WINE CAVERN

In the world of natural gas, Tenneco has a long history. Around World War II, the company – then known as Tenneco Oil and Gas Co. – controlled the pipelines that deliver oil and gas along the Eastern Seaboard of the United States. By the 1950s, a series of acquisitions transformed Tenneco into an international force.

With the advent of the Cold War, Tenneco was concerned about security and wanted a location for its company headquarters that could be easily controlled. In 1956, Tenneco constructed a single facility from which the company could safely control its global gas lines. The site chosen for their new headquarters was in Hockley (Texas) – a suburb 60 km northwest of the facility's previous location in Houston. At that site, Tenneco also constructed the Tennwood Golf Club, which served as a nearly 405-hectare resort for employees and their families.

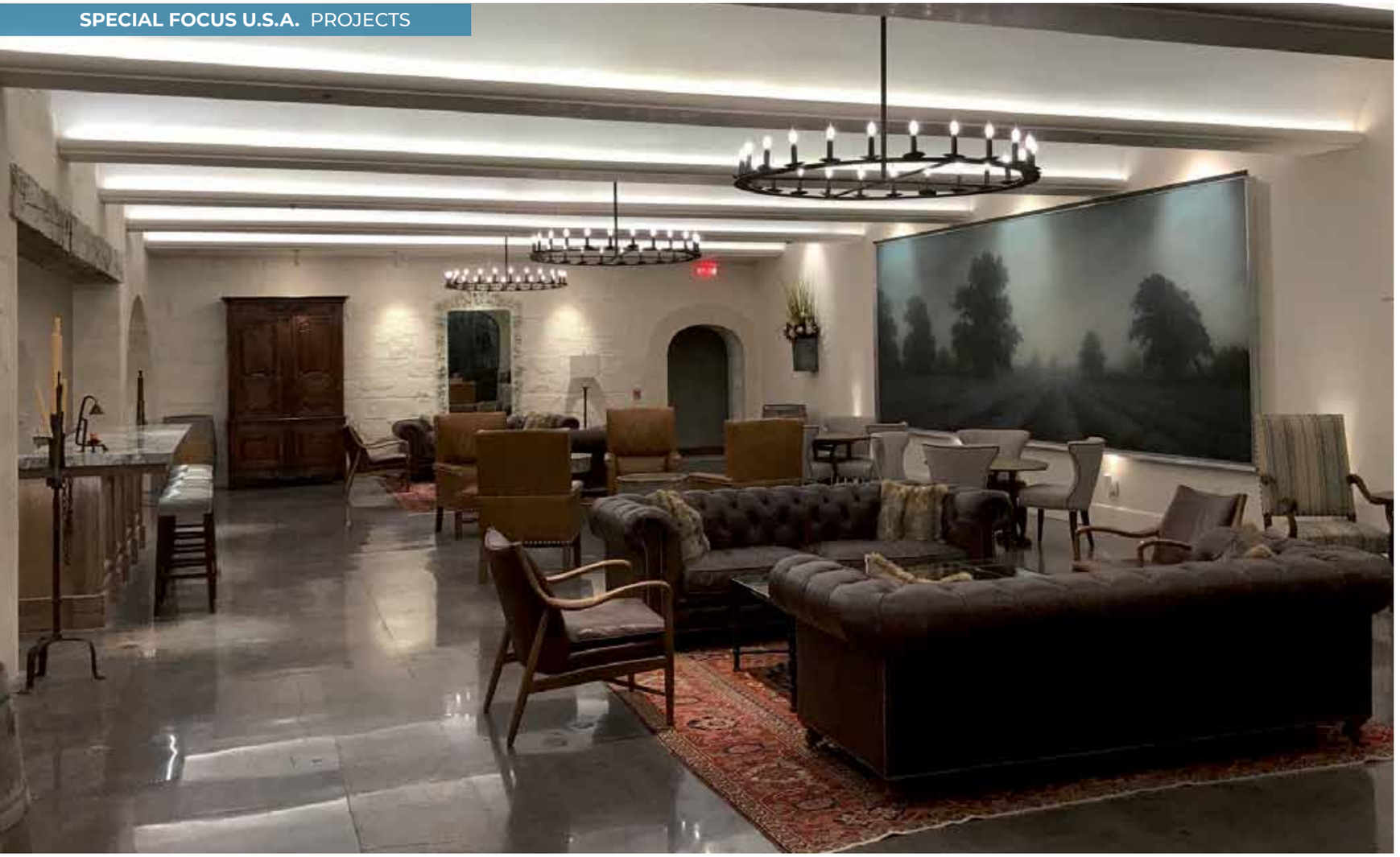
After the Cuban Missile Crisis in 1962, the Cold War became an international concern. In an effort to protect its global headquarters and employees from a nuclear blast, Tenneco built a 1 198-m² underground nuclear bunker facility with concrete walls measuring 0.91 m in thickness.

The end of the Cold War and the rise of technology brought many changes to the U.S. oil and gas industry. A series of mergers resulted in the oil and gas giant becoming a major auto parts company that is now headquartered in Lake Forest, Illinois.

The company's former global headquarters in Hockley is now The Clubs at Houston Oaks, one of the most exclusive family resorts in an area known for exclusive resorts.

Sitting on the 405-hectare footprint of the Tenneco property, Houston Oaks features luxury homes and lodging, tennis courts, an equestrian center, a shooting range, a clubhouse, a chapel and a championship golf course. Even the underground bunker remains, but it has been transformed into a state-of-the-art, Napa Valley-style wine cellar known as Bunker 55°.

The wine cellar serves as a complement to the resort's working farm and ranch, a greenhouse (which features an aquaponics farm) and a farm-to-table restaurant. The cellar is always kept at 13°C with an ideal humidity of 70%. In the cellar, Houston Oaks' wine club members have the option of reserving storage bunks that have space for 450 to 5,000 bottles of wine each. This massive wine cave also features a private dining room, a bar and event meeting spaces.



The new wine cave also features a private dining room, a bar and event meeting spaces

## Problems and solutions

The transformation of Tenneco's Bunker 55 into Houston Oaks' high-tech wine cellar required applying shotcrete to the walls and ceiling of the cellar. Given that the installation had such a tight time frame, the contractor knew that the shotcrete had to rapidly set and cure, and that they could count on Mapei's technology to make this happen. MAPEQUICK AFK 888, an alkali-free, inorganic salt-based liquid accelerator that is often used in tunneling projects, was added to the shotcrete to accelerate the curing process. It contains ingredients that activate the silicates contained in the concrete, causing a rapid curing reaction.

**How MAPEQUICK AFK 888 saved the cave**

Byer Builders, Inc. was charged with sourcing a team of professionals, plus the most suitable products, to transform Tenneco's Bunker 55 into Houston Oaks' high-tech Bunker 55°. At five days from start to finish, the project's time frame was tight. With no time to waste, Byer Builders reached out to Bill Allen, Business Development Manager for Tunneling for Underground Technology Team (UTT) at Mapei Corp. (the U.S. subsidiary of the Group), to assist with the shotcrete chemistry and ensure that the project was completed to the highest standards. Allen was asked to perform quality control at the concrete truck to ensure that the proper concrete slump was maintained during shotcrete production; he also worked as a nozzleman during the installation.

For his part, Byer Builders' Dave Johnson was glad to have Allen's experience on his jobsite. "I am excited to work with Mapei UTT, and welcome the products and support they bring to our industry," Johnson said.

The shotcrete installation was hand-sprayed using Mapei's UTT product MAPEQUICK AFK 888, an alkali-free, liquid set accelerator for shotcrete. "Utilizing MAPEQUICK AFK 888 allows shotcrete to be sprayed in one pass, about 15 to 20 cm thick on the arches and overhead," Allen said. "This is amazing because you are basically hanging concrete upside down without a form and defying gravity." Concrete mixed with this admixture adheres better to surfaces and has higher mechanical strength than concrete without the accelerator.

This means no slumping or sagging of unrestrained concrete with high-early strength performance that satisfies tight construction schedules.

"The MAPEQUICK AFK 888 accelerator produces shotcrete that is characterized by rapid-setting times, yet allows easy trimming," said Dominic Petrella of Petrella Concrete.

The fact that MAPEQUICK AFK 888 is alkali-free means that the chance for alkali-based corrosion is reduced. By using this admixture, shotcrete bonds better to rocky and/or uneven surfaces when it is used in conjunction with MAPEQUICK AFK 888, resulting in less concrete rebound and cost. In addition, shotcrete mixed with this admixture is 95% more compact than a sample of surface-compacted reference concrete without an accelerating agent. Moreover, on a project with a tight schedule, ease of application and finishing is crucial because time is money.

The team of shotcrete applicators finished the project on time with superior performance, in part thanks to Mapei technology and expertise.

*This article was taken from Realtà Mapei North America no. 28, the magazine published by Mapei Corp. (USA), whom we would like to thank.*

### MAPEQUICK AFK 888

Alkali-free, inorganic salt-based liquid accelerator, with which it is possible to produce shotcrete characterised by rapid setting times and a very quick development of its strength after only a very short curing time.

**FIND OUT MORE**

**TECHNICAL DATA**
**Houston Oaks wine cellar – The Clubs at Houston Oaks,** Hockley, Texas (USA)
**Period of construction:** 1950s
**Period of the Mapei intervention:** 2018
**Intervention by Mapei:** supplying an admixture for the shotcrete that was applied onto the wine cellar's walls and ceiling
**Shotcrete installer:** Applied Shotcrete
**Trimmer and carving:** Dominic Petrella
**General contractor:** Byer Builders, Inc.
**Concrete pumping contractor:** Oscar Orduno, Inc.
**Ready-mix concrete supplier:** Lauren Concrete
**Mapei coordinator:** Bill Allen, UTT, Mapei Corp. (USA)

**MAPEI PRODUCTS**
Accelerator for shotcrete:
Mapequick AFK 888