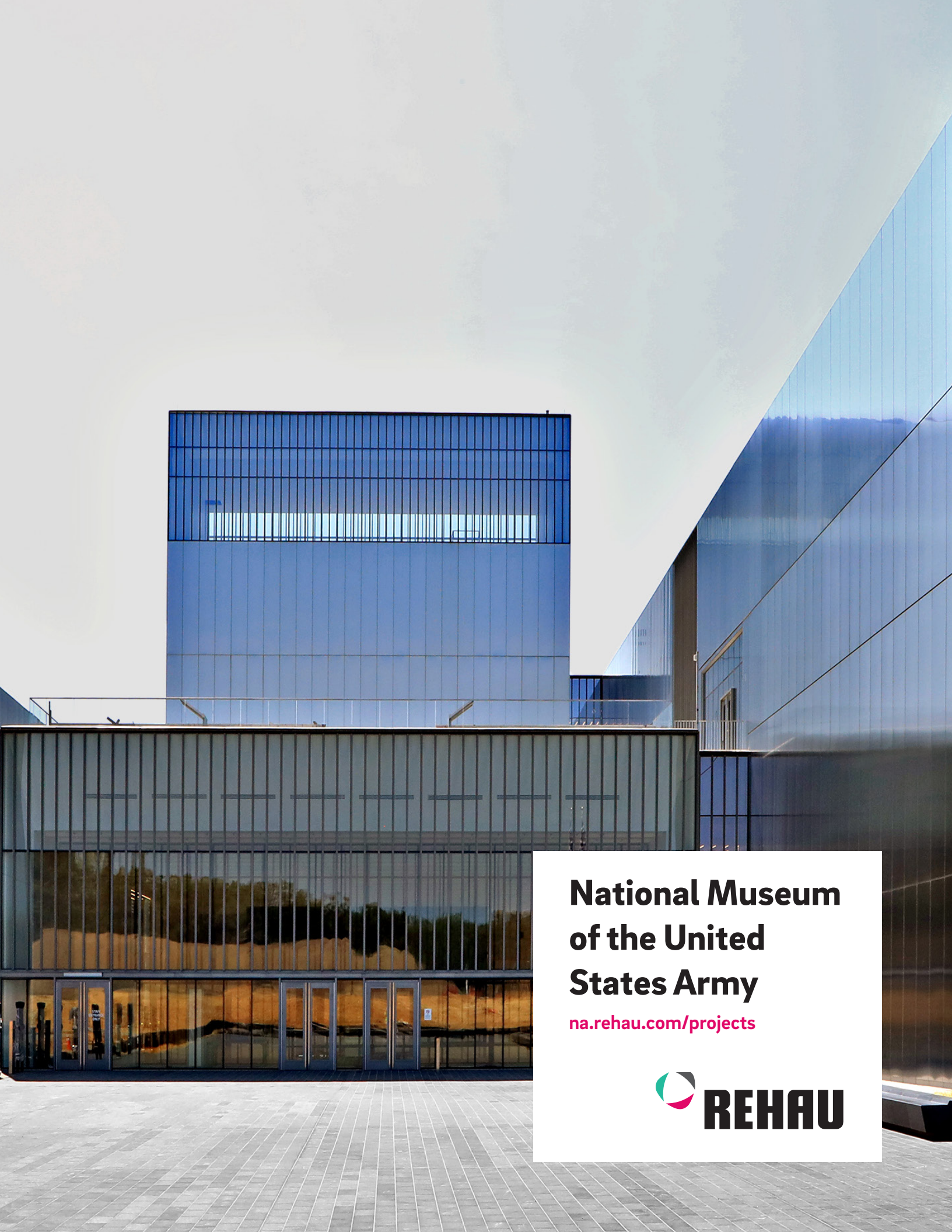

National Museum of the United States Army

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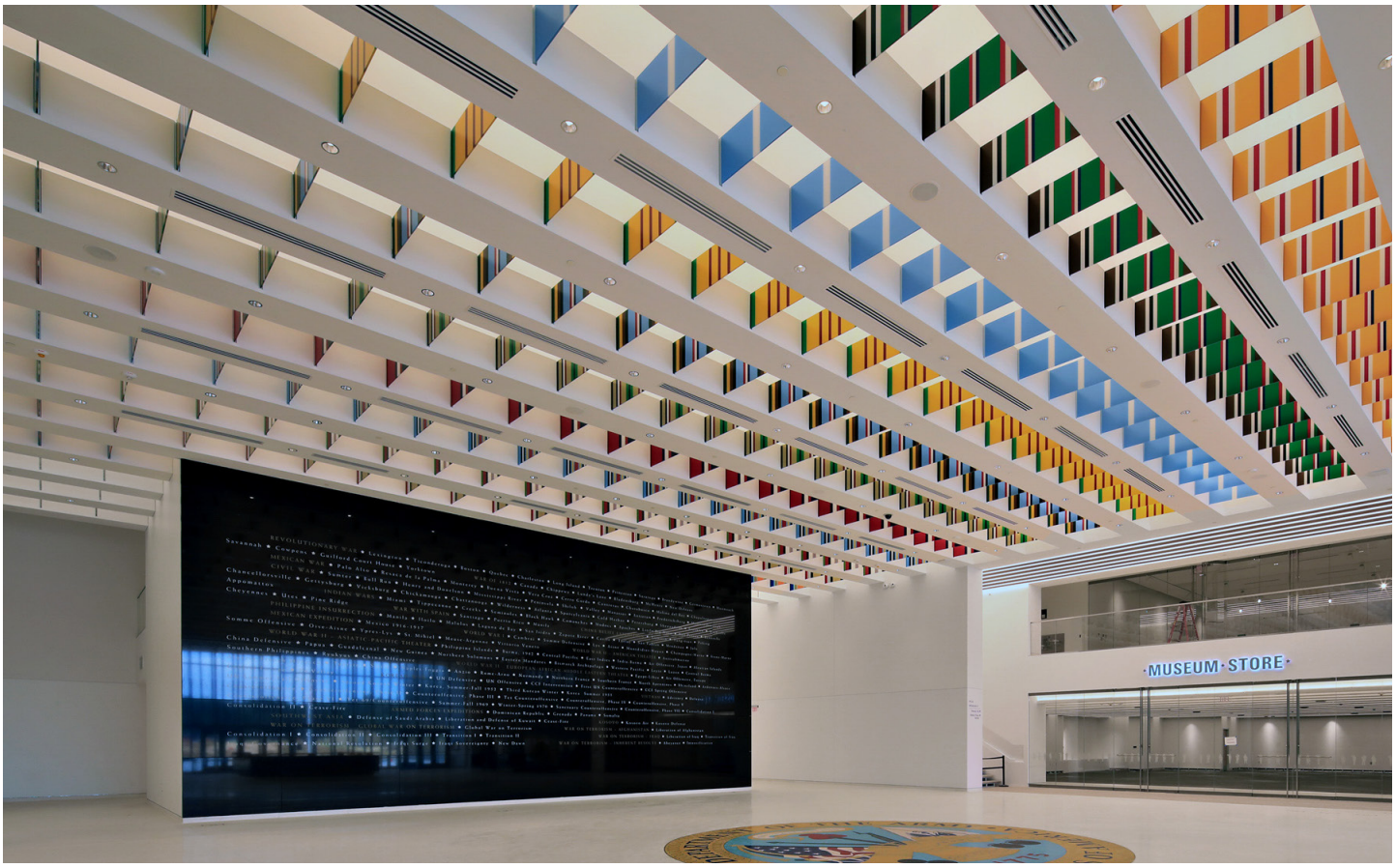
REHAU

Army museum enlists REHAU radiant system for climate control

After more than 240 years of honorably serving the country, the U.S. Army is getting its own museum. Sited on a hilltop at Fort Belvoir in northern Virginia, the museum will occupy more than 80 acres of grounds and feature 185,000 ft² (17,187 m²) of exhibition and support space.

Museum visitors will enter through a spacious lobby with a 35-ft (10.7-m) ceiling that features representations of the Army's history. An engraved Honor Wall at the southern end of the lobby commemorates each of the battles fought in the Army's history. The lobby leads to a vast, open exhibit hall – "Essentially, an airport hangar," said Jason Calcagno, project manager during the museum's construction for Southland Industries, the design-build company that served as the mechanical engineer for the project.



Temperature control for the exhibit hall and the lobby is provided, in part, by a REHAU radiant heating and cooling system. Calcagno explains that this technology is ideal for this application, because the environment is controlled near the ground for visitor comfort, while energy is conserved by reducing the heating and cooling requirement in the air space higher up.

A dedicated outdoor air system (DOAS) provides ventilation and humidity control. Combining radiant and DOAS for space conditioning significantly reduces the amount of HVAC energy, which in REHAU's experience has been as much as 35 percent when compared to a standard forced-air system. The DOAS/radiant system should lower operating costs for the Foundation.

The REHAU hydronic radiant system incorporates 108,000 ft (32,918 m) of 5/8 in. RAUPEX O_2 barrier pipe spaced 6-in. on center. The 288 circuits of pipe are connected to 24 PRO-BALANCE manifolds that regulate flow and slab temperature.

Original designs called for sending temperature-controlled water from the mechanical room to the conditioned space through copper or steel piping installed overhead. Calcagno said the decision to switch to REHAU INSULPEX pre-insulated PEXa piping, buried below the concrete slab, ultimately made more sense for several reasons. For starters, the exhibit hall will feature valuable artifacts, artwork, documents and images. Any leak from a pressurized pipe running overhead poses a risk for damaging the exhibits. The INSULPEX installation keeps energy distribution piping safely beneath the exhibits.

Installing the hydronic distribution piping system below the floor saves a significant amount of money in labor costs, a conclusion reached by other Southland offices who had already used INSULPEX. The primary contributor to labor savings is the continuous coil lengths that require fewer fittings. In addition, Calcagno pointed out, it also poses less safety and schedule risk for the installers as they do not have to work 35 feet in the air over such an expansive space.

"We were able to excavate 3 feet down to install INSULPEX, which comes with supply and return wrapped into one insulated pipe, before the building was erected, thus avoiding conflicts with other trades," notes Calcagno.

One challenge the Southland Industries crew encountered was how to design the radiant floor most appropriately to accommodate the museum's heavy displays. A 25-ton M3 Bradley Cavalry fighting vehicle used to transport soldiers in 2003, the first year of the Iraq War, was the first artifact to be installed in the museum, followed by a Sherman tank. Canons and other heavy artillery are also displayed. The weight of these exhibits not only requires extra-heavy concrete slabs, but each is tethered to the concrete, which risked puncturing or otherwise damaging the RAUPEX O_2 piping below the flooring.

The REHAU design department worked to accommodate the various exhibits by placing the pipe deeper than usual into the slab, at 5 3/4-in. rather than 2-in., but ultimately, project engineers were more comfortable running the radiant circuits around the heaviest exhibits.

"The system is efficient enough that we could take it out [from under the heaviest exhibits] and still meet the load necessary to heat and cool the space," said Michael Morder, design engineer, Southland Industries.

Support from Sales Manager Mike Norris before and during construction made the decision to use the REHAU radiant heating and cooling systems even easier, said Calcagno. "They understand the system's capabilities and flexibility best. It has been a real plus to talk through challenges and use their ideas when adjustments needed to be made."

With the museum finally open to the public, the climate control system will be hard at work keeping guests comfortable and protecting the heavy artillery and precious artifacts that will be seen for the first time by the American people.

About the National Museum of the U.S. Army: *The museum is a joint project of the U. S. Army and the Army Historical Foundation (AHF), a nonprofit that is raising the private funds for construction. The U.S. Army will own and operate the museum while AHF will manage the museum store, café and catering services for special events. Individuals, businesses, foundations, and veterans and military service organizations can learn more about providing support to the National Museum of the U.S. Army at armyhistory.org.*

Project: National Museum of the United States Army
Construction type: Military museum
Project scope: 108,000 ft (32,918 m) of RAUPEX pipe, 2,000 ft (610 m) of INSULPEX pipe
Architect: Skidmore, Owings & Merrill LLP (SOM)
Mechanical engineer: Southland Industries
General contractor: Clark Construction Group, LLC
REHAU systems used: Radiant heating and cooling (RAUPEX® O_2 barrier pipe, PRO-BALANCE® manifolds), INSULPEX® pre-insulated PEXa piping

Photos provided courtesy of the National Museum of the United States Army