Mass Timber, 3D Printing May be Future of Military Construction for Army, Navy

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Army and Navy barracks may one day be 3D printed or built using mass timber construction that involves large wooden structural beams manufactured from smaller lumber.

Today on Capitol Hill, Dave Morrow, director of military programs for Army Corps of Engineers, and Keith Hamilton, chief engineer for Naval Facilities Engineering Systems Command, met with lawmakers from the House appropriations committee, subcommittee on defense, to discuss the current and potential future uses of innovative construction techniques and technologies by the armed forces.

Additive construction – 3D printing buildings – high performance cement and concrete mixes, geosynthetics, mass timber, composite materials, industrialized construction, tension fabric structures, and carbon fiber reinforced polymers were all part of the discussion with lawmakers about how the Army and Navy can develop the most cost efficient and resilient military construction projects.

“In an increasingly complex global security environment, our commitment to innovation in military construction is not just about building structures, it’s about building the resilience and readiness our forces need to prevail,” Morrow said. “By working with industry to leverage these advancements, we can deliver more durable, sustainable and cost-effective infrastructure for our military, ensuring taxpayer dollars are used efficiently, while equipping our troops with the best facilities in the world.”

The Army Corps of Engineers, Morrow said, has already piloted 3D printed construction at Tyndall Air Force Base, Florida, and Fort Bliss, Texas. At Fort Bliss, three new projects, involving barracks, were constructed using 3D printing technology.

Morrow said this technology can be used in garrison or in expeditionary environments.

“Additive construction has [the] potential to reduce costs, manpower, logistics and time, while opening the door for improved and new applications, such as unconventional countermeasures,” he told lawmakers.

The USACE’s Engineer Research and Development Center, has played a part in the development of unified facilities criteria, to allow additive construction in 80% of the United States, Morrow said. The criteria, developed jointly, sets basic technical requirements that must be followed to deliver code-compliant, complete and usable military facilities.

In Hampton Roads, Virginia, the Navy is now piloting the use of mass timber, also called cross-laminated timber for construction of a child development center, Hamilton said.

In testimony submitted to the committee, Hamilton said the new facility will use a hybrid mass timber exterior envelope consisting of cross-laminated walls and diaphragms.

“DOD has expressly acknowledged the applicability of CLT with the creation of a guide specification,” Hamilton said. “As the CLT construction industry matures, CLT may prove more competitive and could be utilized more broadly in DOD construction.”

The USACE is also working with mass timber projects, Morrow said.

“We recently designed the Army’s first barracks made primarily

with mass timber structural elements and are soliciting interest in construction of a project at Mountain Home Air Force Base, calling for the incorporations of mass timber design," he said, adding that mass timber construction in those projects may reduce construction timelines.

Hamilton told lawmakers, at Marine Corps Air Station Cherry Point, North Carolina, NAVFAC was involved in piloting the use of high-performance concrete to build a new F-35 Lighting II hanger.

Advancements within HPC include durability, strength, and resistance to extreme environmental conditions, as well as improved thermal and acoustic properties.

"HPC has been used extensively for our piers, runways and other critical infrastructure; and we are broadening its application," Hamilton wrote in submitted testimony.

Like USACE, Hamilton said, NAVFAC is looking to newer technologies to provide better facilities and better capabilities to warfighters.

"NAVFAC is actively testing and employing innovative technologies, materials and methods for design and construction today, and we are leaning forward to increase collaboration with industry, academia and other government partners to identify and leverage future opportunities," Hamilton said.

Within the Navy, he told lawmakers, new guidance requires NAVFAC planners and engineers to evaluate if new military construction projects can use alternative construction methods to meet warfighting requirements, lower costs and accelerate project delivery.