RECORD VERSION

STATEMENT BY

MR. DAVID B. MORROW
DIRECTOR OF MILITARY PROGRAMS
UNITED STATES ARMY CORPS OF ENGINEERS

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INNOVATIVE TECHNOLOGIES AND TECHNIQUES IN MILITARY CONSTRUCTION

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Introduction

Chair Carter, Ranking Member Wasserman Schultz, and distinguished members of the subcommittee, thank you for this opportunity to discuss the U.S. Army Corps of Engineers' (USACE) efforts to research and utilize innovative technologies, techniques, and materials in military construction projects.

From the appointment of the first uniformed Army engineers by the Continental Congress on June 16, 1775, over the last 250 years U.S. Army Engineers have evolved to encompass the twin pillars of modern engineer operations, providing engineering expertise to the Army, and responding to the nation's toughest engineering challenges. The USACE mission includes Civil Works, Military Programs, Research and Development, and Disaster Response.

For this hearing, I want to focus on our Military Programs and Research and Development missions. USACE performs major construction and construction-related services for the Army, Air Force, other assigned U.S. Government agencies and foreign governments. We support our Combatant Commanders in 110 countries around the globe through a very robust military mission and Interagency and International Services program. These facilities service 3 million active-duty military, plus veterans, civilians, & their families.

USACE relies heavily on private industry to deliver innovative technologies and techniques in military construction. The Unified Facilities Criteria (UFC) are developed through tri-service coordination and sets the basic technical requirements that must be followed to deliver a code-compliant, complete and usable military facility. The UFC are also regularly updated to incorporate the latest codes, national standards, statutory, executive, and departmental requirements. Any innovative design solution that meets the UFC and mission requirements is acceptable and USACE encourages design and construction solutions from our industry partners that meet these requirements.

USACE also takes an active role in developing innovative mission-focused technologies and techniques. Our Research and Development mission, vested in our Engineer Research and Development Center (ERDC), is to discover, develop and deliver trusted engineering and scientific solutions for the warfighter and the Nation. ERDC is

comprised of seven laboratories in four states and has eight field offices from Alaska to England. It supports the USACE mission in military construction, installation support and support to Warfighter operations overseas and in the battlespace to ensure that facilities, infrastructure and installation services are resilient, ready and efficient. ERDC also maintains civil and military engineering technology leadership necessary for force protection, force projection and sustainment, and civil works missions.

Innovation is critical to achieve mission requirements, in maintainable, life-cycle cost effective, high-quality, and safe facilities. Through leveraging industry standards, industry partners, and military-focused R&D, we create conditions for responsible use of innovative technologies and techniques in military construction.

Organization

The USACE organizational structure supports delivery *and* innovation. USACE is organized geographically into 44 Districts that execute construction projects for the local region. Each District recruits and develops professionals, supporting training, professional licensure, and generates local expertise that enhances our successful construction project delivery.

These Districts execute work for Civil Works projects, Army, Air Force, Defense, Interagency and International partners. USACE has regular engagements with the other military services which fosters innovation through information sharing and common training opportunities. This activity with other services allows USACE to benefit from the experience of diverse project execution and leverage those lessons in military construction.

Innovations

Additive Construction: One innovative technology that can be used for expeditionary, CONUS, or MILCON applications is Additive Construction (construction 3D printing). Additive Construction has potential to modernize expeditionary, CONUS, and MILCON construction to reduce costs, manpower, hard labor, logistics, time, while opening the door for improved and new applications (e.g., unconventional countermeasures). While each scenario and equipment solution differs, the primary

benefits come from the potential ways that Additive Construction can increase efficiency of construction of structures from bridges to buildings to barriers (manpower, logistics, freedom in geometry, and& more). USACE ERDC has taken a leading role in alignment of the field and acceleration of technology transition with private sector. This includes development of the unified facilities criteria language with the Tri-Service Structural Discipline Working Group to allow additive construction in 80% of the US and in regions where seismic activity is not an issue.

This is still a developing technology with a lack of historical structural performance data compared to traditional construction. Through pilot projects at locations, such as Fort Bliss, Camp McGregor, and Tyndall AFB, the knowledge and lessons learned from proceeding efforts have led to increased confidence in Additive Construction in military structures. In order to expand this technology to be appropriate for higher risk areas, a consolidated testing effort to characterize the field needs to be completed. Additionally, the current UFC language is being updated with the intent to write less stringent requirements based on new data field wide.

Novel Cement and Concrete Mixes: The ERDC is currently conducting research and fielding demonstration projects on other innovative materials and techniques as well. This includes innovative cement solutions utilizing non-traditional chemistries. Advantages of these products can include rapid set and hardening times, supply chain advantages, and activated chemical solutions for protection against specific threats. For example, these innovative products tailor chemistries to increase performance and longevity in situations such as protection against Petroleum, Oils, and Lubricants (POLS) and providing more effective surfaces for Vertical Take-Off and Landing (VTOL).

High performance and advanced strength concrete materials, and an improved design methodology for implementing them, are being incorporated into tri-service criteria for hardened structures across the globe. They are expected to enhance resilience of MILCON hardened structures.

Geosynthetics: Synthetic polymer materials called geosynthetics are being designed and manufactured to solve civil engineering problems including separation, filtration,

drainage, reinforcement, and containment. These materials help separate dissimilar materials and protect quality engineering materials from contamination with unwanted materials. For example, geonets and geocomposites can provide a drainage layer that is easily placed and reduces construction costs and time. Geogrid materials are routinely used to reinforce soil and aggregate, which allows project engineers to utilize local materials and reduce costs. Geomembranes are frequently use in containment basins and landfills to contain harmful effluents, retaining them to the localized designated area, and not allowing contamination of surrounding areas.

Mass Timber: USACE has also supported testing and evaluation of mass timber materials for contingency application and is working to clarify business practices to ensure industry understands where there are opportunities to incorporate these materials into MILCON applications. USACE recently designed the Army's first barracks made primarily with mass timber structural elements. The ERDC team's efforts working with the District design team, allowed them to make adjustments that will enable incorporation of mass timber products with greater confidence. USACE is currently working through potential siting conditions and looks forward to advertising opportunities to potential build partners on this barracks project. USACE is also currently soliciting interest in construction of project at Mountain Home Air Force Base, calling for incorporations of mass timber design. Utilizing mass timber in these projects may reduce construction timelines and the resource demand, if taken into account early with a risk-informed approach.

Composites: Fiber-reinforced polymer composites are under investigation to meet military interest in corrosion-resistant, low maintenance critical infrastructure. USACE aims to leverage a newly developed design standard to reduce maintenance requirements of exposed framing supporting critical infrastructure. This technology is especially applicable to highly corrosive environments, including sea spray that is common in coastal regions, and provides an electrically insulating, radio-transparent structure for improved signal range or reduced risk of electrical shock. Where composite framing is not feasible due to logistics or engineering challenges, the coatings systems will continue to offer solutions.

Conclusion

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. The innovations highlighted today represent not only progress in military construction technology but also a smart investment in the future of our armed forces. 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. Thank you for your time today and we look forward to your questions.