Statement of Mr. Brent Richardson, Principal Research Scientist, Center for Naval Analyses

Chairman Carter, Ranking Member Wasserman-Shultz, distinguished members of the Committee, thank you for the opportunity to testify on innovative military construction techniques.

CNA is a nonprofit, analytic organization of about 700 scientists, analysts and staff dedicated to the safety and security of the nation. Our analysts can be found on aircraft carriers and military bases, in squad rooms and crisis centers, working side by side with operators and decision-makers to ensure our national and homeland security.

CNA's Center for Naval Analyses provides our sailors, our marines, and the broader national security community with objective analytics to improve the lethality and effectiveness of the Joint Force. Our sole mission is to support the decision-making of military leadership. As a clearinghouse for Navy, Marine Corps, and Department of Defense (DOD) operational data, we base our analytics on decades of information we have collected and maintained on the lethality, readiness, cost, and performance of military platforms and systems.

As a Civil Engineer Corps officer in the Navy, I have spent my career gaining direct insight and understanding of the military construction (MILCON) program. Now, as an analyst at CNA, I lead work related to the MILCON program, for example, examining the impacts of Typhoon Mawar on critical DOD infrastructure for the INDOPACOM Commander.

The DOD currently faces specific challenges to incorporating innovative construction techniques into MILCON projects. As such, the FY23 National Defense Authorization Act (NDAA), Section 2851, required the Secretary of Defense to commission a study examining barriers to

incorporating innovative techniques. In response to the FY23 NDAA, the Deputy Assistant Secretary of Defense (DASD) for Infrastructure Modernization and Resilience (IMR) asked CNA's Center for Naval Analyses to conduct this analysis. I am honored to be here today to present the results of this project.

Innovative construction techniques can be described as products or techniques that depart from the traditional means of construction and further advance efficiency—reducing project costs and/or construction time. One example is additive manufacturing (AM) which may include the automated process of "printing" a three-dimensional solid object from a digital file using concrete as a medium instead of procuring the item. Another example is the use of mobile sensors on construction sites to capture and update construction progress in real time.

We have observed that the DOD is using innovative construction techniques for MILCON. The Department recently employed additive manufacturing technology to construct barracks at Fort Bliss, Texas, and has a planned project for constructing a barracks using a second innovation, mass timber technology, at Joint Base Lewis-McChord, Washington. Effective use of both technologies can reduce construction times and labor requirements, thus reducing the overall project costs compared to traditional construction means and methods. However, these technologies are not yet widely used by both the DOD and construction industry so incorporation into construction decision-making is hampered.

Our approach to examining barriers for the inclusion of innovative construction techniques for MILCON projects included an examination of criteria change requests related to innovative techniques, Unified Facility Criteria (UFC) documents, Federal Acquisition Regulations, and the MILCON planning process. We also held discussions with subject matter experts (SMEs) within

the DOD to include senior personnel at DOD and service component labs. Our approach and analysis revealed several barriers such as:

- Innovative techniques typically require evaluation, demonstration, and validation before industry accepts the technique as a best practice or standard. Therefore, industry may not be incentivized to use innovative techniques unless such techniques are proven, documented, and cost-effective. This can prohibit use of innovative techniques in MILCON as industry standards and best practices directly influence MILCON construction methods.
- Though DOD and service component labs have established selection criteria for selecting solicited study topic areas and projects and have researched innovative technologies, there is not a formalized process for identifying such study topic areas and projects specifically for MILCON.
- Discussions with UFC working groups and service component labs indicate that the manner in which innovative technologies are tested and evaluated by DOD labs do not always translate into the performance requirements necessary to update UFC documents. This directly impedes or stalls efforts for adopting the new technologies identified.
- Regional availability of innovative technologies and the workforce necessary to employ innovative technologies is variable and can be difficult to ascertain.

There are several options to bridge the gap between industry and DOD efforts to adopt innovative construction techniques. **First, a DOD technology roadmap for MILCON would provide necessary guidance for both DOD and service component labs to make informed and targeted investments towards innovation.** Such a roadmap would establish enduring capability needs and measured focused areas for identified MILCON outcomes.

This technology roadmap would also identify the priorities for military construction advancement research, identify options for construction process improvements, as well as identify some specific technologies feasible for adoption. For example, one specific use case is to leverage artificial intelligence technology to provide a scalable, faster, and reliable aid for design and construction management efforts.

A published MILCON technology roadmap, available to industry, would also provide a demand signal to industry to drive development of specific technologies, potentially leading to private sector investment. This would also foster the subsequent development of industry standards, thereby advancing innovation.

A second recommendation is to adhere to a collaborative front-loaded design process. This would entail the inclusion of construction contractors early in the design process for the purposes of leveraging additional innovative construction knowledge and experience that is newly emerging in the private sector. Industry experience shared by a construction contractor during the design phase of a project can provide valuable benefits to the government, including the identification of regionally available innovative technologies and supporting workforces. Additionally, construction contractors—with regionally specific expertise—can serve as an additional resource in the identification of potential construction challenges in the design phase. This allows the designer of record to minimize construction risks and facilitate the most efficient construction means and methods. NAVFAC has undergone such efforts and recently published a guide for early contractor involvement in the design phase of MILCON projects.

Lastly, while our analysis highlighted existing DOD efforts towards the inclusion of innovative technologies in MILCON (such as additive manufacturing and mass timber), without a technology roadmap in place and industry engaged at the design phase, DoD investment in such

technologies is not prioritized and private sector interest is not encouraged. Thank you for the opportunity to speak today. I look forward to your questions.