# ENGINEER

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2024 Annual Issue

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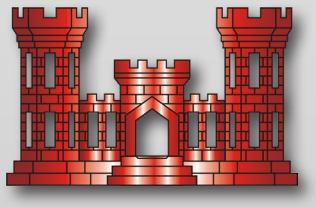

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The Engineer Doctrine Update is now available online at: <https://home.army.mil/wood/application/files/5717/0713/9620/EN_Doctrine_Update.pdf>.

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# Clear the Way

*COLONEL JOSEPH C. "CLETE" GOETZ II*
*100th Commandant, U.S. Army Engineer School*

We are contextual creatures. New opportunities, challenges, or circumstances immediately compel us to search our accumulated wisdom for a situation analogous to what we are facing. The past becomes our point of departure for the present, and it is up to us to critically think and to compare the context of the past with the present so that we can appropriately leverage our experience. I say this because, amidst the sea of changes taking place in order for the U.S. Army to adapt to the demands of war in 2030 and 2040, it is helpful to draw upon our past experiences to become oriented for the future and to clarify our priorities.

Allow me to provide some context for you. We're currently in an interwar period akin to the 23-year span between the conclusion of World War I and the U.S. entrance into World War II. During that historical period, industrialization and mechanization drove technological advancements that changed the character of war beyond what contemporary leaders could envision. World War I cost millions of lives and altered maps, regimes, and the international order. Following the war, military leaders examined what happened and began developing concepts and conducting experiments to adapt to the changes brought about by technology and to restore mobility. In 20 short years, the nature of war changed completely. We are now in a similar era in which technology is rapidly changing the way we will fight future wars, and we are in a contest—both within the Army and with our adversaries—to innovate and adapt.

For me, that historical grounding provides a compelling impetus to drive change. In *this* interwar period, our mission at the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, goes beyond initial military training; professional military education; and doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) integration. Our mission is to *drive and synchronize* change for the future Army in these domains while preserving the essential character of the Regiment as combat arms leaders vital to the success of combined arms operations. Based on this mission, I would like to introduce our priorities for 2024, which are nested with the Chief of Engineers Regimental Campaign Plan and the U.S. Army Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri, Campaign Plan. The lines of effort (LOEs) are—

- **LOE 1: Care for, grow, and manage talent across the Engineer Regiment.** This LOE reflects the continuous need to acquire, employ, and retain diverse talent for the Regiment, with an eye on generating leaders with the knowledge, skills, and behaviors (KSBs) needed for the Army of 2030 and 2040. We will guide and shape the behaviors of our force through our ability to designate key and developmental positions for officers and noncommissioned officers who will build the KSBs of our future leaders—much as we are doing now in preparation for the impacts of the Engineer 2030 Force Design Update.
- **LOE 2: Build technically and tactically proficient engineers.** We are obviously the engineer experts on the combined arms team, but the emphasis has been—and must remain on—combined arms operations. Even more so than in the recent past, we must build leaders with the ability to communicate capabilities, integrate into supported organizations, and advise maneuver commanders without having to reach back to the broader USAES, the U.S. Army Corps of Engineers (USACE) enterprise. In short, we must reflexively know more than we've been accustomed to.
- **LOE 3: Inspire and develop leaders for the Army of 2030 and beyond.** I am pleased with the progress that we have made in modernizing our programs of instruction to reflect the realities of large-scale ground combat operations, but future fights will continue to be inherently joint. There is no longer much duplication across the engineering joint capability area. We will build off that through this LOE. If greater expertise is required at lower levels (for example, a second lieutenant engineer platoon leader advising an infantry task force commander), then we must continuously expose young leaders to more complex engineering problem sets earlier in their training. In this regard, our Joint Engineering Operations Course, managed by USAES, will continue to provide a venue for young engineers to understand the breadth of the capabilities in the joint force and sooner prepare them to operate in an environment that will be inherently joint.

- **LOE 4: Modernize the Regiment for 2030 and 2040.** We are behind in modernization, in large part as a result of the decision to prioritize our ability to fight now at the expense of research and development on systems that will be used to win the future fight. LOE 4 reflects the urgent need, acknowledged by Army senior leaders, to develop engineer systems in terrain shaping, bridging, breaching, and support equipment for the force beyond 2030. For quite some time, both in terms of attention and budgeting, we have failed to account for the modernization needs of our small detachments, including quarry, utility, dive, and firefighting detachments. In 2024, we will conduct a deep assessment of the health and needs of these detachments, which are likely to make an asymmetric impact on future battlefields. I've asked the Regimental Command Sergeant Major to visit and talk with our Soldiers in these units about where they perceive gaps across the DOTMLPF-P spectrum so we can begin the process of modernizing these critical niche areas. I am hopeful, even confident, that our campaign of consistent messaging across the Regiment is beginning to bear fruit.
- **LOE 5: Engage and energize partnerships.** This LOE confirms that our vitally important ability to deliver the capabilities needed by the joint force is a function of the strength of our relationships with industry, academia, the science and technology community, joint Service engineers, and our allies and partners. Our role here goes beyond recognizing the importance of these relationships and extends to "connecting the dots" that deliver capability across the engineer enterprise.

I am excited for what 2024 will bring to our Regiment. By embracing the change taking place in the Army, I am more confident than ever that the Engineer Regiment will continue to be an indispensable part of the joint force.

Thanks for all that you do for our Regiment, the Army, and the Nation. *Essayons!*


# INAUGURAL PROTECTION AND MANEUVER SUPPORT SENIOR LEADER FORUM SET FOR JULY 2024

Major General Christopher G. Beck and Command Sergeant Major Jorge Arzabala Jr. are pleased to announce that the first-ever Protection and Maneuver Support Senior Leader Forum is slated to occur at Fort Leonard Wood, Missouri, in July 2024. The purpose of the forum is to bring senior leaders together to discuss and address the question of how the Army will synchronize capabilities to operationalize the Army of 2030 while setting conditions for success in 2040. The multiday event will provide opportunities for Army senior leaders to address the students, cadre, and staff at Fort Leonard Wood; discuss Protection and regimental capabilities gaps; focus on the importance of operational Protection, leveraging protecting a wet-gap crossing operation as a backdrop; and hold panels with corps, division, and center of excellence commanders to better understand the array of equities and requirements that must be developed and integrated in support of the Protection warfighting function. Invitations will go out in the spring time frame.

# Lead the Way

*Command Sergeant Major Zachary R. Plummer*
*Regimental Command Sergeant Major*

This past year has been a remarkable one for the U.S. Army Engineer Regiment. We continue to push to be the regiment of technically and tactically competent engineer warriors and leaders of character, serving our Nation and remaining committed to overcoming any challenge to the success of our mission.

April 2024 is fast approaching, and it will be an excellent month for our Regiment. During Regimental Week, we will host the Best Mapper Competition, the Geospatial Engineer Working Group, the 17th annual Lieutenant General Robert B. Flowers Best Sapper Competition, the Field Force Engineering Workshop, and the Engineer Total Army Planning Exercise. These events will bring together Soldiers of all components, members of the U.S. Army Corps of Engineers, our Families, and civilian professionals to highlight the best of our Regiment. Teams for the Best Sapper Competition will report to Fort Leonard Wood, Missouri, on 16 April 2024. Last year, for the first time, we kicked off the competition with the nonstandard physical fitness test in Roubidoux Park, Waynesville, Missouri. We received tremendous support from the Waynesville and St. Robert communities. I cannot adequately express my gratitude for all those who had a hand in the success of last year's event. This year's event will be even better, and I look forward to seeing you in April.

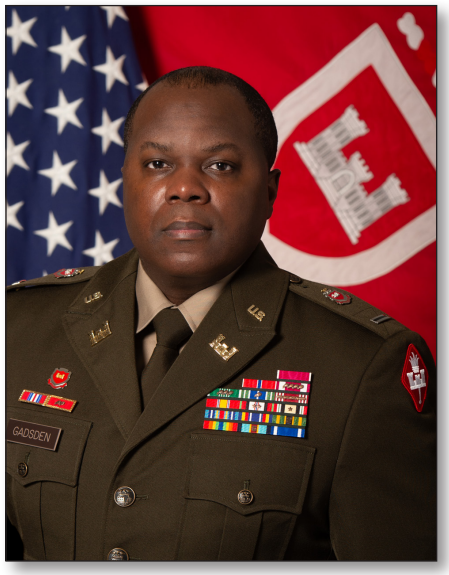
In October 2023, the Regiment added Military Occupational Specialty (MOS) 12P1O—Prime Power Production Specialist to the accession process. This represents the most significant change to our prime power capability in several years. Future Soldiers can now join the Army as prime power production specialists, working to install, operate, and maintain electrical power plants comprised of prime power generator sets of 500 kilowatts and higher, along with associated auxiliary systems and equipment, anywhere the Army needs power. As the Army's only medium-voltage specialists, MOS 12P1Os perform electrical assessments, facilities maintenance, and quality assurance/quality control operations and serve as liaison officers and technical advisors to military commanders, the Federal Emergency Management Agency, and other federal organizations.

With the assistance of Sergent First Class Seth D. Childers, the Regiment's Credentialing, Education, Certification, and Licensing (CECL) Program continues to expand. The CECL Program allows engineer Soldiers to obtain applicable, high-quality credentials by validating their individual Soldier training, skills, and work experiences. Sergent First Class Childers has diligently worked with the U.S. Military Apprenticeship Program to establish an apprenticeship program for our Regiment. A registered apprenticeship is a formal, structured training program in which enlisted Service members record valuable on-the-job work experience while completing everyday tasks within their MOS. Earning an industry-recognized credential improves military-technical competence and Army readiness and can enhance a Soldier's ability to secure meaningful employment upon transitioning from military Service to the civilian workforce. Please visit the CECL milBook website at <https://www.milsuite.mil/book/groups/engineer-credentialing-forum> for more information about how to establish an apprenticeship program within your units; you may also reach out to the Regiment by e-mail at <usarmy.leonardwood.engineer-schl.mbx.hqrfi@army.mil> for more information about the CECL Program.

In closing, thanks to all of you for your continued dedication to the Engineer Regiment! *Essayons!!!*

# Show the Way

*Chief Warrant Officer Five Willie Gadsden Jr.*
*Regimental Chief Warrant Officer*




Greetings, regimental team! I am honored to share with you the remarkable accomplishments of the U.S. Army Engineer Regiment over the past year—a period marked by dedication, innovation, and a steadfast commitment to excellence. As I reflect on our collective achievements, I do so with sincere appreciation and respect for the unwavering efforts of our remarkable team.

One significant event of this transformative year was the 19 July 2023 change of responsibility ceremony in which Chief Warrant Officer Five Dean A. Registe handed the reins of the Engineer Regimental Chief Warrant Officer over to me. The ceremony showcased the strong regimental dedication to tradition and marked the commencement of a new chapter under my capable leadership. This transition signaled a clear commitment to embracing change and advancing toward the future.

Moreover, the transfer of authority reinforced the Commandant's role as a steadfast supporter of all engineer warrant officer initiatives. This tangible commitment highlights the importance of championing and fostering initiatives that enhance the growth and success of the warrant officers within the Engineer Regiment. It serves as a testament to the dedication that our leadership has for the well-being and advancement of our personnel.

As the sixth Regimental Chief Warrant Officer, I bring a forward-thinking approach to modernizing the Engineer Regiment. My vision encompasses keeping pace with the ever-evolving landscape of engineering challenges and ensuring that the Regiment remains at the forefront of technological advancements and strategic innovations. This commitment to modernization is in seamless alignment with our core values, ensuring that we are ready to face the challenges of the future head-on.

In the continuous pursuit of excellence, the Engineer Regiment has implemented several strategic measures to improve our accession process, focusing on selecting and developing leaders. A standout success with regard to this effort has been the introduction of the Direct-Commissioning Program.[1] This innovative initiative, which has played a pivotal role in updating and modernizing our accession requirements, has been a game changer for the Regiment. It has allowed us to rapidly evaluate the competitiveness of applicants, streamline the entire accession process, and significantly enhance our overall strength by fostering diversity, bolstering our capabilities, and ensuring that we remain at the forefront of excellence in our mission and operational effectiveness. Through the strategic use of this program, we have successfully attracted a diverse group of talented individuals with specialized skills, effectively broadening the scope of our talent pool and ensuring that we have individuals with unique and valuable skills that align with the evolving needs of the Engineer Regiment. These individuals contribute to the success of the Regiment and the Army and play a crucial role in enhancing our adaptability to the ever-changing demands of multidomain environments. The Regiment has selected 10 noncommissioned officers who will serve as a "litmus test"; within a year, I will compile administrative analytics to demonstrate how this initiative has positively impacted the force structure of the Regiment.

As we progress, I remain dedicated to embracing change and pushing the boundaries of excellence, while still staying true to the values that define the Engineer Regiment. The accomplishments of this past year are a testament to the incredible resilience, adaptability, and relentless commitment of our team.

In closing, I extend my deepest gratitude to all members of the Engineer Regiment for your tireless efforts and your dedication to excellence. Together, we look forward to the challenges ahead, confident in our ability to overcome them with the same spirit of innovation and camaraderie that has defined us over the past year. *Essayons* . . . We will succeed!

**Endnote:**

[1]Miltary Personnel (MILPER) Message Number 23-113, *Implementation Guidance for Direct Appointment and Direct Commission of Certain Warrant Officers*, 24 March 2023, <https://recruiting.army.mil/Portals/15/MILPER23-113_DirectAppt_Comm.pdf>, accessed on 18 January 2024.

# ENGINEERS, PARTNERSHIPS, AND RECRUITMENT

*By Captain William J. Johnson*

The 1st Battalion, 395th (1-395) Brigade Engineer Battalion (BEB), Fort Cavazos, Texas, trains and validates Army National Guard and U. S. Army Reserve units during postmobilization operations to achieve readiness in support of combatant command requirements. Operating from the North Fort Cavazos trainer site, the goal of 1-395 BEB is to provide first-class observer coach/trainer support for mobilized Guard and Reserve units as part of the total Army force.

In addition to its primary mission, 1-395 BEB is at the forefront of supporting the III Corps and Fort Cavazos Adopt-a-School Partnership Program, which was initiated to introduce Fort Cavazos Soldiers into the surrounding communities. Units are matched with local communities/schools, and they contribute military resources to nurturing the intellectual, emotional, and social growth of children in the greater Fort Cavazos area. 1-395 BEB was partnered with the city of Gatesville (the "Spur Capitol of Texas") and the Gatesville High School. The partnership began with a welcome from Gatesville community leaders and the Gatesville District School Board in the fall of 2022. Once a month, 1-395 representatives attend the Gatesville Community Council meeting, where information, ideas, and support are shared. The battalion also sets up static displays for community events, provides a color guard for football and softball games, and assists with cross-country meets.

As the end of Fiscal Year 2022 approached, the Army had yet to reach its recruiting goal. 1-395 BEB viewed the Gatesville partnership as a way to assist in the Army recruiting effort. The battalion partnered with the local recruiting office in Copperas Cove, Texas, and the recruiting office managed to build on the foundation of mutual trust, respect, and communication that 1-395 had already developed with the students at Gatesville High School. With the support of the Gatesville High School administration, engagements between Army recruiters and Gatesville students have increased by more than 60 percent and 1-395 BEB has helped generate more than 40 qualifying leads for potential recruits, resulting in six Gatesville High School graduates enlisting in the Army.

In October 2023, the Gatesville police chief requested that 1-395 BEB provide a static display for Gatesville Night Out (a celebration in honor of the Gatesville police and fire departments and emergency medical services). Hundreds of people from the Gatesville community attended the event to support and extend their thanks to the men and women of the armed Services and the first responders in the Gatesville community. That same month, 1-395 BEB partnered with the 120th Infantry Brigade, Fort Cavazos, to provide 10 Soldiers and two high-mobility, multipurpose, wheeled vehicles in support of the Gatesville community "BOOzaar," a Halloween celebration held around the Coryell County Courthouse in Gatesville, making for a memorable event for the Gatesville community.

Of course, the partnership is not one-sided; Gatesville also hosts events celebrating military Service. Gatesville Community Council members have coordinated with 1-395 BEB to hold military appreciation events such as a Military Heroes Concert, a 4th of July Celebration, and a Military Appreciation Night Rodeo. 1-395 BEB has transported more than 500 mobilized guardsmen and reservists from North Fort Cavazos to attend these types of community events. Through such events, the Gatesville community expresses its thanks to Soldiers for their service to the country and their presence in the Gatesville community. And the events offer mobilized Soldiers the opportunity to enjoy a break from training and to be honored by the community they serve.

Gatesville Community Council leader Ms. Diane Fincher and the mayor of Gatesville, Mr. Gary Chumley, have been overwhelmed by the support from 1-395 BEB. Since 2022, the battalion has contributed more than 400 hours of volunteer work and averaged 10 volunteer Soldiers per event. In the spring of 2023, 1-395 BEB received three partnership awards from the III Corps and Fort Cavazos Adopt-a-School Partnership Program—the Comeback Partnership of the Year Award, the Partnership of the Year Award for the 120th Infantry Brigade, and the Partnership of the Year Award for Gatesville High School.

As 1-395 BEB continues to demonstrate selfless service and provide a pillar of strength in the Gatesville community, it is always looking for additional opportunities to support the Gatesville community and the Gatesville High School and to strengthen the Army's recruiting efforts.

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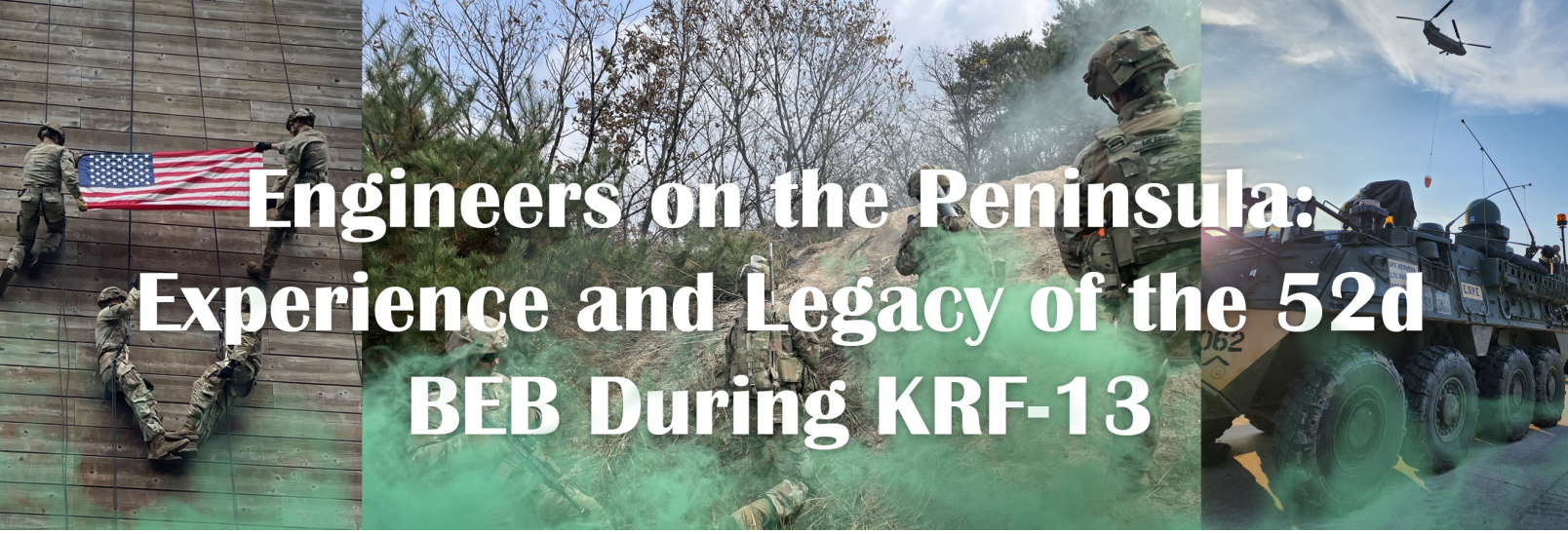
*Captain Johnson is an Army Reserve officer currently mobilized as an observer/coach trainer with 1-395 BEB. He holds a bachelor's degree in biology from Tuskegee University, Tuskegee Institute, Alabama.*



# Engineers on the Peninsula: Experience and Legacy of the 52d BEB During KRF-13

*By Major Jared R. Stefani and Captain Scott C. Blackstock*

The Korean Peninsula has long been a focal point of geopolitical tensions; as a result, U.S. forces have maintained a presence there for the past 70 years. The primary objective of these regional forces is to deter aggression from North Korea while safeguarding U.S. interests in the Indo-Pacific Command (INDO-PACOM) area of responsibility. Establishing a credible military deterrence requires the presence of highly skilled and adaptable military forces. Combat engineers notably stand out as a vital component for enabling maneuver and fires brigades to accomplish their missions. Furthermore, recent developments in modern military operations, exemplified by events in Ukraine and combat operations in Gaza, underscore the enduring significance of engineers. Now more than ever, highly trained and prepared engineers are crucial in enabling maneuver forces to fight and win on diverse and complex battlefields.

As part of a cost savings model, brigade combat teams (BCTs) are rotated to Korea, rather than being permanently stationed there. Based on capabilities established and dynamic training plans executed during the deployments, the Korean Rotational Force (KRF) should be renamed the Korean *Response* Force. The 52d Brigade Engineer Battalion (BEB) (Five Deuce), Fort Carson, Colorado, is currently assigned to KRF-13, Camps Casey/Hovey, Republic of Korea (ROK). KRF-13 represents the 13th rotation of a BCT to Korea on a 9-month deployment; however, it is only the second iteration in which a Stryker brigade combat team (SBCT) has been sent to the Korean Peninsula. Building on the successes of the first SBCT rotation to Korea, the 52d BEB and the 2d SBCT, 4th Infantry Division (ID), have provided new capabilities and training strategies to increase overall unit and Republic of Korea Army (ROKA) training readiness. While a brigade permanently assigned to Korea would provide operational continuity and uninterrupted ROKA integration, the *response* brigade concept allows the flexibility to rotate units in and out based on operational needs and enables opportunities for rotating units to train in different environments and scenarios. Because the current model is expected to remain in place for the foreseeable future, incoming rotational units should capitalize on the successes of Five Deuce and benefit from its hard-earned lessons.

**Soldiers breach a mechanical door.**

Rotational brigades fall under the 2d ID, a combined division made up of U.S. Army and ROKA service members integrated at all levels, from squad to division. Beyond enhancing the lethality of the Korean service members training alongside U.S. forces, this integration facilitates cultural understanding and fosters positive interactions with external ROKA units and community members. ROKA staff officers and Korean Augmentation to the U.S. Army (KATUSA)

personnel assigned to the Five Deuce help plan and execute training events with partnered ROKA units across the peninsula. These combined training events significantly boost interoperability—a crucial element for operational and strategic success since the U.S. Army almost always operates within a multinational operations framework. Five Deuce has successfully executed numerous combined training events and cultural exchanges, fortifying the asymmetric advantage of the United States over its adversaries and reinforcing ROKA partnerships by maintaining a robust network of partners and allies. A collaborative approach at these levels underscores the importance of international cooperation for success on the peninsula.

**Sapper conducting EQT V**

The 52d BEB is the principal enabler integrator for the 2d SBCT, 4th ID. It provides the 2d SBCT with a spectrum of capabilities ranging from engineering operations to chemical, biological, radiological, and nuclear reconnaissance; signal support; dynamic collection and targeting; and sustainment operations. Operationalizing training is a formidable challenge, given its command of 17 platoons with 14 distinct and unique mission sets. Compounding this complexity, the 52d BEB was required to navigate new and foreign bureaucratic hurdles to establish a clear pathway for its training progression in alignment with its mission-essential task list (METL) in Korea. In addition to its METL, the 52d BEB embraced another new mission during KRF-13, noncombatant evacuation operations (NEO). NEO involve evacuating civilians, including embassy personnel and military dependents, from a foreign country in crisis or conflict. Five Deuce carefully balanced its METL requirements with the development of new skills to meet the NEO mission. Never one to "fake the funk," Five Deuce expanded its collaboration with external agencies like the U.S. Department of State and ROKA units, fully operationalizing and executing its NEO mission during the 8th Army annual crisis management training exercise, Courageous Channel 23.

Prior to the transition to SBCTs, armored brigade combat teams (ABCTs) were the brigade of choice in Korea. However, as the Five Deuce is currently demonstrating, SBCTs are well-suited for the diverse and challenging terrain of the Korean Peninsula, which ranges from urban to mountainous areas. The versatility of the Stryker allows engineers to navigate the various environments to reach their objectives. And the rapid deployment and high mobility provided by the Stryker allows brigades to reach their objectives faster and with more tools and supplies than light units can, creating a more significant effect for maneuver forces; this also expands the fighting capability beyond the open terrain or roadways that are required by heavy units. In addition, the Stryker protects Soldiers against enemy small-arms fire and one of the deadliest adversaries in Korea—the weather. Moreover, ABCT maintenance can consume considerably more time on a unit training calendar. In short, the SBCT is a force multiplier that gives commanders more decision space at echelon. While participating in KRF-13, the 52d BEB continues to test new tactics, techniques, and procedures for Strykers, gaining a greater understanding of how Strykers may be used across INDO-PACOM.

Due to additional emphasis on dismounted operations across an SBCT, Five Deuce sapper squads train to conduct dismounted explosive breaches for Stryker-sized lanes. Training for this mission has been difficult in Korea due to the limited number of training areas that allow engineer qualification table (EQT) certifications encompassing Soldier and leader skills, mobility situational training exercise lanes, and live-fire in conjunction with an explosive breach.

Historically, engineers had only one location where they could conduct live demolitions in conjunction with live-fire exercises—the Digital Multipurpose Range Complex on Rodriguez Live-Fire Complex, ROK. All units use this training site for mounted machine gun gunnery, so it

**52d BEB constructs survivability positions.**

**Sappers conduct a deployment exercise on Camp Hovey.**

is consistently reserved by units across the peninsula. Previous KRF and permanently stationed units found it necessary to administratively separate their EQT V requirements, designating a live-fire lane for fire control measures and an offset explosive breach at an alternate training area. However, this approach was not realistic or compatible with the lethal mindset of Five Deuce. Given the limitation of one U.S. range in Korea capable of accommodating EQT V, the 52d BEB sought to expand the number of ranges capable of fulfilling the training objective.

Through a comprehensive education process in which the 52d detailed the minimal risks of demolition effects simulators and the profound benefits of realistic EQT training they provide, Camp Casey range control authorized the use of demolition effects simulator charges in its training areas. This authorization significantly enhanced the opportunity for sappers to train on Camp Casey and increased the potential for the future training of engineers, infantry, and scouts there. This was the first of many victories for the Five Deuce in Korea. Ultimately, two ranges were authorized for EQT V certifications. As the BEB continued to push, it was able to certify its engineers' ability to conduct fire control measures with a complete explosive breach and lane marking—a first in several years in Korea. This effort enabled engineers to be fully integrated into the 2d SBCT, 2d ID, culminating event—a combined arms live-fire exercise in 2024.

Five Deuce engineer capabilities extend beyond sappers, encompassing two engineer support platoons (ESPs) designed to deliver horizontal-construction engineer support to the 2d SBCT and the 210th Field Artillery (FA) Brigade, Camp Casey. Since artillery remains the "King of Battle" in Korea—just as on any battlefield—the Five Deuce ESPs trained extensively with 210th FA Brigade and ROKA engineers on providing survivability positions to protect valuable assets. The creation and execution of ESP EQTs that were aligned with 52d BEB KRF requirements ensured that BEB Military Occupational Specialty (MOS) 12Ns—Horizontal Construction Engineers were certified in their assigned mission to meet the commander's intent. This enabled subordinate units to have a specified training progression that mirrored the structure of sapper EQTs. The training plan for the ESPs culminated in a platoon survivability exercise that seamlessly integrated the 210th FA Brigade and ROKA counterparts.

Units in Korea must be "Ready to fight tonight—and win." To be "ready" implies a constant preparedness to perform unit functions and missions, which is achieved by rapidly increasing the ability to muster and maintain a high state of alert. The BEB amplifies readiness and enables brigades to fight and win. While the division is now the decisive tactical unit for large-scale combat operations, division staffs are already too overburdened with assets that must be controlled and providing lower-echelon unit commanders with command and control of enablers ensures that their formations remain lethal. Brigades still need to be connected to enabler units such as the BEB. Until a decision is made about BEB divestiture, engineers and other enablers within the battalion must double down on their efforts to integrate and enable maneuver units to move, communicate, collect, and target enemy forces.

The 52d BEB KRF-13 deployment has been enabled by leaders who have focused on and demanded realistic, complex training that has further increased the lethality of the BEB, its supported maneuver battalions, and its ROKA partners. Five Deuce partnerships have improved the effectiveness of ROKA engineers and fostered strong diplomatic ties that have strengthened regional stability. The 52d BEB breached bureaucratic obstacles and established a lane for future rotational units to continue the fight to deter North Korean aggression while increasing the lethality of ROKA partners. Deployments to Korea will remain critical as a testing ground for determining how the BEB and SBCT will fight and win in the INDO-PACOM area of responsibility. As the 52d BEB prepares to redeploy to Fort Carson, the legacy of its training excellence will endure, providing valuable lessons for future units assigned to KRF to meet the demanding training environment of the Korean Peninsula. Five Deuce! Led by love of country! *Essayons!*

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# CONDITION CHECKS: WET-GAP CROSSINGS

*By Major Bruce T. Leuthold Jr.*

Last fall, the 1st Cavalry Division, Fort Cavazos, Texas, demonstrated proficiency in executing a wet-gap crossing exercise as part of Operation Remagen Ready—a deliberately designed large-scale combat operations (LSCO) scenario exercise. Wet-gap crossings, acknowledged as one of the most challenging tasks for armored forces, demand collaborative efforts. Success was dependent on leveraging assets external to the division, such as augmented engineers, military police, air defense artillery, and supporting main command post operational detachment partnerships. Operation Remagen Ready underscored the—

- Benefits of trigger-based action methodology.
- Balancing of risks to pursue transition opportunities through agile decision making.
- Synchronization of cross-functional capabilities.

A pivotal insight gleaned from this exercise involved the integration of condition checks into the evolving employment needs for bridging capabilities. These checks ensure appropriate sequencing and provide a checklist of essential actions before transition to the next phase. For example, a practical condition check might involve refraining from initiating rafting operations until the assault force eliminates enemy direct fires from the far side objective. These condition checks proved to be indispensable tools in advising the division commander through decision points, facilitating timely transitions, and maintaining offensive momentum during the wet-gap crossing. Field Manual (FM) 3-0, *Operations*, discusses the criticality for planning transitions, which are "typically points of friction or opportunities," specifically highlighting wet-gap crossings.[1] Among the many decisions that facilitate transitions through wet-gap crossings, critical events influenced by engineers include—

- Initiating the assault crossing.
- Beginning rafting operations.
- Transitioning to full-enclosure bridging.
- Establishing two-way traffic.
- Employing a line of communications bridge (LOC-B).

## Trigger-Based Condition Checks

Key products that enable gap crossings incorporate movement tables, crossing synchronization matrices, and execution checklists. However, the linchpin for successful execution lies in tailorable condition checks for each templated transition. For the gap-crossing exercise, these checks, which were developed by division staff sections and organized into warfighting functional categories, empowered brigade commanders with comprehensive checklists to influence critical path task completion. Checks were largely rooted in the operational situation that linked bridging employment dependencies based on relevant transition constraints. Traditional H-hour timings[2] can pose challenges when certain conditions are not met; triggers play a key role in setting the stage for subsequent events. An example of challenges to traditional H-hour adherence might involve mistakenly beginning rafting operations prior to obscuration becoming effective. In this case, strictly following timelines can prevent appropriate task sequencing from taking place; suitable triggers prevent similar problems from occurring.

**Obscuration billows as rafts begin to ferry combat power.**

The agility that was afforded to the division commander through condition checks was particularly noteworthy. Maneuver, artillery, engineer, and aviation brigade commanders reported individual condition check statuses to the division commander, providing situational understanding of the operational environment and enabling flexible, risk-informed decision making. In addition to previously established reporting requirements, statuses were primarily communicated via virtual conferences.

FM 6-0, *Commander and Staff Organization and Operations*, conveys the importance of continued assessment, tracking the "progress toward transitioning to the next phase of operations, achieving objectives, or obtaining end state conditions."[3] The inherently dynamic nature of LSCO necessitates this adaptability, and condition checks offer a mechanism by which to objectively measure progress.

## Agile Decision Making

Engineers, who are accustomed to adhering to timelines dictated by H-hour sequences, can benefit from the agility that condition checks offer during combat operations. Expected bridge construction durations and projected vehicle movement speeds throughout wet-gap crossing transitions are valid for planning purposes only. Friction points arise when identified long-lead tasks are met with emergent challenges, such as extended durations for LOC-B emplacement or the effects of reductions in crossing site trafficability. Conversely, opportunities arise when it is discovered that certain tasks have high float and can be delayed while other tasks, such as holding and staging area development, are pursued. Engineers are accustomed to waterfall tasks dominating construction project Gantt charts that do not harmonize well with military bridging during LSCO.

**Rafting an Abrams tank**

Due to changing situational factors during combat, engineers must remain agile. During stability construction operations, the focus is often on time and money (resources). (Are we behind schedule? Are we over budget?) In combat, the focus shifts to assets in time and space. Time is the usual default anchor, but it doesn't need to be. Planning efforts should not be limited to exercise capabilities under such expected conditions. Trigger-based action methodology via condition checks is often best suited for engineer operations—including bridge construction—under combat conditions.

According to FM 6-0, "Mission command helps commanders employ subordinates to achieve the commander's intent

**Joint light tactical vehicles crossing a ribbon bridge**

in changing conditions," implying that, as conditions (risks and opportunities) evolve, agile decision making from subordinate leadership is essential for executing the commander's intent.[4] We should expect wet-gap crossing conditions to transform with the battle. During combat conditions, crossing feasibility parameters are subject to change based on battlefield developments and environmental factors. The enemy will aim to impede progress and bridge employment, which is highly dependent on weather effects; these factors will impact the templated crossing site conditions with respect to equipment capabilities. However, condition checks don't always force a decrease in tempo; sometimes, they allow the tempo to increase. For example, favorable terrain conditions at one crossing site can allow for faster emplacement of full-enclosure bridging there than at another crossing site. Seizing opportunities faster than what would be possible under the designated H-hour sequence creates an advantage that will likely lead to accelerated combat power throughput on the far side.

Condition checks that provide input for commander's decisions and drive bridging employment transitions are only useful when planning takes place up front and includes all interdependent considerations from the warfighting functions. Commanders can adapt to changes on the battlefield and take advantage of opportunities presented to them when astute staff officers build agility into their plans.

## Combined Arms Synchronization

FM 3-90, *Tactics*, states that a "deliberate river crossing is an operation conducted as part of an offensive operation"; crossing the obstacle is an element of the overall scheme of maneuver.[5] Gap crossings help meet the desired end state; the main effort typically consists of maneuver elements successively transitioning from assault to bridgehead to breakout forces. While gap crossings are often perceived primarily as engineer missions, Operation Remagen Ready highlighted the collective effort required from all warfighting functions for a successful deliberate crossing. Engineers execute a crucial role, facilitating assured mobility by reducing natural water obstacles and maintaining trafficability

throughout crossing areas; however, synchronization is critical in enabling the division to sustain successful offensive actions while also maintaining the tempo throughout the operation. Engineers have an excellent opportunity to bring cross-functional capabilities together to enable success at such an inflection point in the scheme of maneuver, which propels the offense forward.

Bridging employment triggers are often associated with combat power buildup on the far side. While this is crucial, it is just one factor among many that the commander must consider in making transition decisions. Lists of interconnected triggers make up the tailorable mission-dependent condition checks that guide leaders through bridging employment transitions. Suppression and obscuration from fires must be fully initiated and effective prior to beginning the critical first step of initiating the assault crossing. Electromagnetic suppression and an allowance of time for the obscuration to effectively billow are also required. Additionally, the assault crossing cannot take place until the near side objective is secured. Crossing area reconnaissance is fundamental for proper site selection as well as for determining trafficable routes that can facilitate sizable movement control nodes and offer cover and concealment.

Before initiating rafting, the assault force must eliminate enemy direct and indirect fires on the far side objective. It is imperative that air defense artillery be emplaced and provide coverage for multi-role bridge companies (MRBCs) at crossing sites and engineer equipment parks. Additionally, traffic control must be established along designated routes throughout the crossing areas. Aviation capabilities can be used to expedite the operation by inserting assault forces and sling-loading bays, ramps, and boats. This can potentially serve to bolster branch plans by decreasing bridge emplacement timelines, crashing the schedule when needed. The availability of front-loading recovery and digging assets in the order of march is imperative in order to quickly move damaged vehicles off the bridge and improve slip trafficability. The need for obstacle reduction on the far side must be anticipated, with plans addressing collection methods and the use of applicable breaching assets.

The transition to full-enclosure bridging is of paramount importance in order to quickly mass forces on the far side. However, this presents a sizeable risk to forces due to the static nature of bridge emplacement and the time required to connect the rafts together to build the bridge. This takes time away from massing forces on the far side at an often-expected tipping point in the crossing. The timely balancing of risk in this transition decision is critical to achieve accelerated throughput benefits.

Two-way traffic is needed in order to increase the capacity of sustainment to enable offensive tempo via fuel, ammunition, maintenance, and medical support. Two-way traffic can only be enabled when the threat of enemy counterattack has been assessed as low and an additional engineer regulating/check point and a call-forward area have been successfully emplaced on the far side objective. Military police-administered traffic control must be established and able to execute the complexities of controlling two-way traffic.

Effective communication capabilities are required across numerous echelons throughout these transitions. The transition to LOC-B should take place only when the bridgehead force has completely crossed onto the far side and the corps engineer work line has moved past the gap. To facilitate LOC-B construction and traffic control, the most appropriate alternative to activating the division reserve MRBC may be further augmentation from the corps reserve engineer brigade. LOC-B emplacement (preferably consisting of overbridges at designated locations with existing damaged bridges that have solid abutments) will facilitate forward movement of the MRBC so that it can continue to provide assured mobility for the next templated crossing. Construction duration, crew proficiency, and material-handling equipment considerations must be closely managed.

## Conclusion

Wet-gap crossings should transcend arbitrary time-based execution standards. The clock should serve as a guide—not as an anchor; conditions should be the primary driver for transition. While not every condition needs to be met in order to trigger an intended transition, condition checks illustrate the value of risk-based decisions that the commander makes to ultimately facilitate successful transitions while also maintaining tempo. The deliberate involvement of all warfighting functions in the creation and evaluation of condition checks is paramount. It embodies the collective effort and adaptability that are essential for success in complex combat scenarios. Operation Remagen Ready reinforced these principles and served as an opportunity for the 1st Cavalry Division to demonstrate its commitment to excellence in preparing for future LSCO.

**Endnotes:**

[1]FM 3-0, *Operations*, 1 October 2022, p. 3-16

[2]An H-hour timing is a timeline sequence for execution based on an agreed-upon start time (or action) for an operation.

[3]FM 6-0, *Commander and Staff Organization and Operations*, 16 May 2022, p. 4-21.

[4]Ibid, p. 1-3.

[5]FM 3-90, *Tactics*, 1 May 2023, p. 18-14.

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# Operation Turning Point

*By Captain Matias K. Sejersen*

The 92d Engineer Battalion, Fort Stewart, Georgia, participated in the first of a series of battalion level exercises as part of Operation Turning Point. The exercise focused on improving port damage repair (PDR) capabilities and offered valuable lessons in the planning and execution of this type of mission.

Each battalion within the 20th Engineer Brigade, Fort Liberty, North Carolina, is responsible for a distinct general engineering capability; the 92d Engineer Battalion develops the XVIII Airborne Corps PDR capability. Although PDR is a defined mission-essential task for the engineer dive detachments (EDDs) assigned to the 92d Engineer Battalion, there is an institutional knowledge and experience gap with regard to PDR.

## Planning and Coordination

Three primary goals of the exercise were to—

- Exercise the ability of the battalion to conduct expeditionary deployment operations of heavy construction and diving assets.
- Test and continue to improve the ability of the engineer construction company (ECC) to conduct pile-driving operations in a marine environment.
- Refine EDD and ECC tactics, techniques, and procedures for conducting carpentry repair work of waterfront facilities in concert with one another.

These goals led to the requirement for a training location that was geographically separated from the EDD/ECC home station, included waterfront facilities in need of repair, and fell under the control of an organization receptive to hosting the exercise.

## Training Area Selection

Pier F, Naval Station Norfolk, Virginia, was identified as an ideal training location for the exercise. The timber pier was in need of extensive carpentry repair work for a return to full operational capacity, and it is located adjacent to a suitable staging area. Because the owning organization, Naval Facility Systems Engineering Command (NAVFAC), Washington Navy Yard, Washington, D.C., was interested in having the pier repaired, there were no construction material costs to the battalion. Planners from the 92d Engineer Battalion took advantage of the opportunity to conduct joint PDR skill set training alongside Naval Mobile Construction Battalion Eleven (NMCB 11), Gulfport, Mississippi, which regularly conducts PDR training near Gulfport. Following the training, Pier F and adjacent piers of differing construction types remain suitable training areas for future battalion PDR exercises, as considerable carpentry and pile work must yet be done to return the piers to their full operational capacity.


**Soldiers perform carpentry work on a timber chalk.**

## Funding

Because the line haul of heavy construction equipment from Fort Stewart to Naval Station Norfolk would be prohibitively expensive, the 92d Engineer Battalion requested that the 7th Transportation Brigade (Expeditionary), Fort Eustis, Virginia, provide assistance in the form of a sealift from Blount Island, Florida, directly to Naval Station Norfolk; the 7th Transportation Brigade was able to fulfill this request at no cost to the 92d, as that voyage was classified as a training sail. Coordination of this movement—particularly for the use of the Blount Island facility as an upload point—was cumbersome and dependent on the good faith of several officers and civilians external to the 20th Engineer Brigade. However, the movement provided 92d Engineer Battalion leaders and equipment operators with valuable experience in maritime roll-on/roll-off transportation operations. And although the movement was ultimately successful, the assignment of a dedicated mobility warrant officer to the 20th Engineer Brigade would support battalion representatives coordinating with organizations outside the chain of command for movement support and provide the knowledge and expertise necessary for movements other than convoys and line hauls. The 7th Transportation Brigade frequently executes training voyages that may align with future iterations of 92d Engineer Battalion PDR exercises and has expressed a willingness to provide support in the future; therefore, the 92d will continue to maintain a close working relationship with the 7th Transportation Brigade in order to draw upon that watercraft support.

## Contracting

Due to the off-post location of the exercise and the cost of movement, the 92d Engineer Battalion decided to pursue contracting solutions for the crane support required for the placement of timber piles before the piles could be driven with the ECC hydraulic excavator (HYEX). The U.S. Army Mission and Installation Contracting Command (MICC) at Fort Stewart initially directed the battalion to the U.S. General Services Administration for equipment rental. However, unit research indicated that there were no General Services Administration rentals available so the unit again consulted with MICC. Following the consultation, the battalion performed market research and submitted initial requirements to MICC—but this was within 90 days of execution. Due to the shortened timeline, MICC was unable to execute completed contracts prior to the start of the exercise. A final effort to contract for a crane was made through the supporting NAVFAC office—but that effort was also unsuccessful, as it was undertaken too late in the planning process. In the end, the exercise provided an opportunity to prove that a single HYEX can be used to place and drive piles; however, the operation is imprecise and slow. Additionally, in real-world contingency operations, ECC personnel will likely be moved many days ahead of their heavy equipment. For future exercises, the battalion will continue to refine the process of placing and driving timber piles with one HYEX, using divers, formwork, or a combination of the two to improve precision. Additionally, the staff will engage a supporting contracting officer to determine the feasibility of developing a generic contract for heavy equipment (crane and excavator) support, which the battalion may tailor and execute for future exercises or contingency operations where ECC personnel find themselves deployed ahead of their equipment.

**Soldiers assigned to the 554th ECC perform work on a floating platform, illustrating the difficulties caused by rising and falling tides.**

## Pile Driving

Due to the lack of contracted crane support for placing piles and the unavailability of material-handling equipment suitable for loading the ECC HYEX onto the NAVFAC-provided floating platforms, piles could not be driven directly adjacent to Pier F (to replace the fendering system, which protects the structure from impacts), as had originally been planned. Instead, ECC personnel drove a single test pile from the wharf, with the primary goal of determining if the HYEX—equipped with a custom-fabricated pile-driving attachment—could be used to place and drive piles. Absent any diver support or formwork, the operation was cumbersome and imprecise. It also required modification of the pile driver; a pin was needed to fix the end of the pile to the driving attachment—an arrangement that is likely to destroy the driving attachment over time. The driving attachment performed well, as a pointed timber pile was driven to a target embedment depth of 10 feet. Future exercises will involve experimentation with the use of square rather than pointed piles and with various ways to precisely place timber

piles before they are driven by the HYEX with driver attachment, which should be accompanied by a second piece of equipment—preferably a crane, due to the extended reach, but possibly a second HYEX. A dedicated maneuverable floating platform must be available for the HYEX with pile-driving equipment so that it is capable of accessing the entire worksite. In addition, unless the pile-placing equipment consists of a very large, long-reach crane located on the wharf end of the pier, it must also be placed on a floating platform. Experimentation will also be conducted on the use of divers and formwork to ensure that the pile is correctly placed before it is driven. An even better solution would be the acquisition of a crane- or excavator-mounted vibratory pile driver that is compatible with battalion organic equipment; this would allow a single piece of equipment to efficiently place and drive the pile, entirely removing the need for the second piece of equipment. Under this configuration, piles would be fixed to the vibratory driver by a single-point chain sling and hoisted into position, where divers or pierside personnel would guide them to their precise locations. The vibratory driver could then be used to "pull" the pile through the first several inches of embedment via the single-point sling to fix the pile in place before support personnel released the sling and allowed the driver to be placed on top of the pile to drive it to the desired embedment depth. Any of the techniques discussed will require that a unit conducting PDR maintain a population of proficient crane operators, load riggers, and supervisors to safely place and drive timber piles. Engineer units might consider that, as part of Advanced Individual Training for Military Occupational Specialty (MOS) 88Hs–Cargo Specialists, the 58th Transportation Battalion, Joint Base Langley-Eustis (JBLE), Virginia, conducts training on the operation of large cranes in maritime environments. Those instructors may be able to provide valuable knowledge beyond the scope of the Crane Operator's Course offered by the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, to engineer units seeking to train operators to rig and lift unusually shaped loads in a marine environment.

**A Soldier uses a HYEX to drive a timber pile at Naval Station Norfolk.**

## Operations

Personnel from the 511th EDD, JBLE, and 526th ECC, Fort Stewart, assisted NMCB 11 personnel with the construction of an earth-filled sheet pile pier during a Gulfport, Mississippi, iteration of Operation Turning Point. This experience familiarized 92d Engineer Battalion and subordinate personnel with Navy tactics, techniques, and procedures for waterfront construction, which will, in turn, improve the battalion's own capability. The most notable technique learned was that for the employment of long-reach hydraulic excavators. This equipment is nearly identical to the Army ECC HYEX—except that the boom has been replaced with either a long (or extended)-reach version, allowing greater flexibility in placing the equipment to perform work. In the context of waterfront construction, such a substitution would allow a floating HYEX to access a larger work area from a stationary platform, thereby reducing the time spent repositioning and anchoring the platform. It would also allow a HYEX to drive piles to a greater depth of embedment than is possible with a standard-reach boom, as the driving attachment could be hoisted to a greater initial height. This would be especially useful in driving structural piles (as opposed to fender piles), where a specific depth of embedment must be reached in order to attain the required bearing capacity. NMCB 11 personnel also made use of a standard vibratory pile-driving attachment optimized for driving sheet piles. This equipment offers the capability of building waterfront facilities of an entirely different construction type—earth-filled sheet pile piers or wharves. These structures are simple to construct (due to a lack of horizontal and diagonal cross bracing), have highly customizable geometry, and—if a sufficient supply of sheet piles is available—can be constructed using local materials for backfill. This construction method is further simplified by the fact that airfield damage repair tactics, techniques, and procedures already established by the 20th Engineer Brigade could easily be applied to designing and constructing the backfill components of the structures. The 92d Engineer Battalion will continue to focus on improving timber pile construction capabilities but should consider sheet pile construction as a goal for future development. Specific consideration should be given to pile-driving attachments that can drive both cylindrical and sheet piles.

## Replacement of Timber Components

ECC and EDD personnel worked next to and beneath the pier to replace timber diagonal cross bracing and pile-bracing members. To access their respective work areas, the units used reconfigurable floating docks, which can be formed into narrow sections capable of accessing the underside of the pier between the pile bents. These floating docks performed very well and provided a stable and maneuverable work platform. Leaders developed an efficient and scalable task organization for this type of work comprised of dedicated demolition and installation teams for each work area, dedicated preparation teams that prepared new timber members for the work areas, a single extraction team

*(Continued on page 19)*

# EAB Engineer Battalion Training at JRTC


*By Major Joseph F. O'Donnell*

The 46th Engineer Battalion ("Steel Spike"), Fort Johnson, Louisiana, recently completed Rotation 23-09 as the divisional engineer battalion for the 21st Airborne Division (the high-command element of the Joint Readiness Training Center [JRTC], Fort Johnson) in support of the 3d Brigade, 10th Mountain Division, Fort Johnson. This article highlights the experiences of the 46th Engineer Battalion and presents its process for building relationships and participating in a combat training center (CTC) rotation as an echelon-above-brigade (EAB) formation for any EAB engineer battalion that would like to tackle the challenge—and benefit from the training value—of participating in a JRTC rotation.

The process of joining the JRTC rotation involved a year of planning and the convergence of a few factors. EAB engineer battalions that wish to follow suit should—

- Carefully chose their rotation and partner units.
- Ensure that they understand the U.S. Army Forces Command process of the troop exemption list memorandum, initial planning conference, and final planning conference.
- Communicate the importance of the training value to their higher headquarters.
- Confirm coordination with the commander and staff of the supported formation as the battalion integrates into the team.

## Background

The commander of the 20th Engineer Brigade, Fort Liberty, North Carolina, posed the following question to the 46th Engineer Battalion: How can we apply the Regionally Aligned Readiness and Modernization Model or Operational Readiness Cycle Framework to EAB engineer companies and battalions for Headquarters, Department of the Army-directed response force capability missions? Ideally, these units would be afforded a year-long collective training phase that would culminate with a validation exercise (in the form of a CTC rotation) in the fourth quarter.

Parallel to that planning effort, the 46th Engineer Battalion will field a multi-role bridge company (MRBC)—the 553d MRBC—in fiscal year (FY) 2025. In planning a training cycle for the 553d MRBC to participate in large-scale exercises such as Defender–Europe and Remagen Ready, Fort Cavazos, Texas, the 46th took a look at a series of 10th Mountain Division JRTC rotations, with the idea of participating in increasing increments during each rotation from FY 23 to FY 25. 10th Mountain Division rotations were chosen for two reasons: 1) The 20th Engineer Brigade had directed that the 46th Engineer Battalion have a habitual supporting relationship with the 10th and 2) The 46th Engineer Battalion has a subordinate engineer support company collocated with the 10th at Fort Drum, New York. The battalion headquarters would stay in the divisional support area and manage the flow of assets forward (to actual or simulated brigades), as the scenario and the 21st Airborne Division dictated.

## First Steps

In August 2022, the 46th Engineer Battalion contacted the 10th Mountain Division planning office in an attempt to initiate support for JRTC Rotation 23-04 in February 2023. Unfortunately, the initial planning conference for Rotation 23-04 was already underway and additions could not be made to the troop exemption list memorandum. The initial planning conference, which brings all of the Forces Command scheduled enablers together to coordinate priorities and training objectives, is scheduled to take place 180 to 150 days prior to the start of a rotation. The troop exemption list memorandum is a document, signed by the division commander, authorizing any additional Soldiers or equipment for the rotation; it is often used to add extra aviation assets or white-cell or opposing-force requirements. The troop exemption list memorandum is typically finalized prior to commencement of the initial planning conference so that all rotation participants are present. Getting in ahead of the initial planning conference and getting approval to be added to the troop exemption list memorandum are the two most important steps in gaining access to a CTC rotation.

With the planning for Rotation 23-04 too far along for the 46th Engineer Battalion to be included, the battalion began coordinating with the 10th Mountain Division planning team and the 3d Brigade, 10th Mountain Division, with a revised goal of participating in Rotation 23-09 with the 3d Brigade. Starting in November 2022, the battalion also began coordinating with Task Force Zulu of the JRTC Operations Group. Task Force Zulu was interested in pulling some of the traditional brigade combat team (BCT) enablers back to the divisional support area to better replicate a divisional fight.

In January 2023, the 46th Engineer Battalion attended the initial planning conference for JRTC Rotation 23-09. The conference was arranged by warfighting function, and the 46th participated in the protection cell working group. At that time, JRTC had not yet determined the command support relationship for the 46th, the combat support enablers, or the configuration of the higher headquarters. While meeting with adjacent units was useful, much of the integration and planning for one of the U.S. Army Reserve companies was conducted with leaders who did not actually participate in the rotation, which created a disconnect between the expectations of the 46th Engineer Battalion and the company command team when they arrived for the rotation. In retrospect, all company commanders and first sergeants of the enabler units should have been present for the initial planning conference. The planning conference marked a transition for the involvement of Task Force Zulu; the task force unit went from high-level conceptual planning to detailed planning for the rotation.

## Traction

In March 2023, the 46th Engineer Battalion attended the Leader's Training Program (LTP) for Rotation 23-09 at the Fort Johnson Mission Training Complex. In conjunction with leaders from the 3d Brigade, the 46th began planning missions for the EAB engineer enablers. The first issue encountered during the LTP was a divisional order that included tasks for a fictional 21st Maneuver Enhancement Brigade (MEB) but no dedicated MEB team or coach. The 46th spent the first day and a half of the LTP conducting a military decision-making process session to produce outputs for the 21st MEB to pass down to subordinate battalions. The 317th Brigade Engineer Battalion, Fort Johnson, coach agreed to act as the coach for the EAB engineer battalion.

After the exercise, commander's intent, key tasks, end state, and tasks to subordinate units had been developed, the 46th Engineer Battalion transitioned to planning its own mission. The LTP mission set was extremely challenging for the staff of the 46th, as the battalion was to be supporting the 21st Airborne Division, which had units spread from north to south along a 187-mile-wide front between two interstate corridors and was moving east to west—with a river requiring a wet-gap crossing.

Attendance at the LTP provided the 46th Engineer Battalion with valuable planning experience. It helped the battalion identify friction points, including the clearing of fires in the rear area, management of division Class IV supplies, and specification of command support relationships when companies are pushed into other BCT areas of operations. The LTP also highlighted the need for a liaison officer (LNO) for each brigade. Finally, as an EAB engineer battalion, the 46th does not organically have tactical Internet; although this requirement was supported by the 35th Signal Brigade, Fort Liberty, the LTP provided a forum in which the 46th could warn that it had never trained with the 35th and question whether the 35th would be mobile enough and capable enough to jump with the 46th.

Between March and May of 2023, the 20th Engineer Brigade commander and deputy commander were extremely involved in communicating the excitement of the 46th Engineer Battion to be a full on-site JRTC participant under canvas with the XVIII Airborne Corps and the 10th Mountain Division. This was important because, while units cannot be admitted to JRTC without inclusion on the troop exemption list memorandum prior to the initial planning conference, they can be cut for budget or other reasons all the way up to the end of the final planning conference. For a few months, the involvement of the 46th seemed precariously close to the cut line, despite the support of the 3d Brigade and the JRTC Operations Group. In the end, it was the championing of the 46th by the higher headquarters that secured participation in the rotation.

## Final Details and Preparation

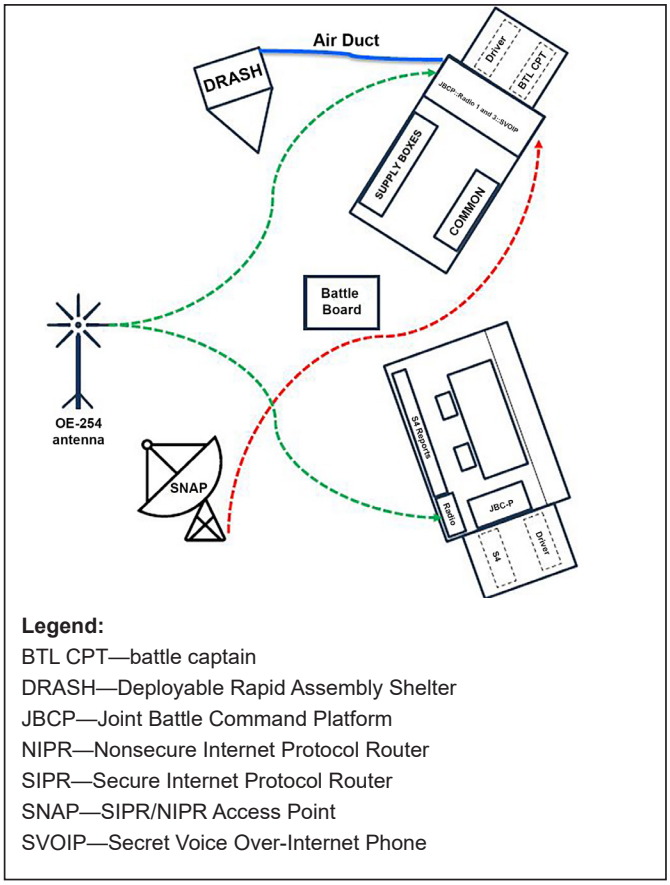
With participation in JRTC secured, the next critical steps for the 46th Engineer Battalion came in May 2023. The new battalion commander participated in planning conferences with Task Force 5 and Task Force Zulu to clarify the role and command support relationships of the 46th in Rotation 23-09. Task Force 5, the brigade engineer battalion task force, wanted one engineer battalion headquarters concerned with providing mobility and countermobility support to the tactical brigade in the close fight and another engineer battalion headquarters providing protection and combat support in the divisional rear area. Task Force Zulu was seeking unit input on whether the JRTC Operations Group should stand up Task Force 6.

The question of whether JRTC should stand up Task Force 6 for a unit is one that is critical for units to answer up front. Standing up Task Force 6 involves a JRTC request for battalion command team observer coach/trainers (OC/Ts) from the 1st Army Brigade. It also involves a more robust

**Hide site preparation**

**Hide site occupation**

guest OC/T requirement from the battalion or its higher headquarters. In general, it is recommended that Task Force 6 be stood up if the majority of the battalion combat power is part of the rotation. If the headquarters element is small, it is recommended that the costs and the requirements for guest OC/Ts be kept down by not standing up Task Force 6.




**Legend:**
BTL CPT—battle captain
DRASH—Deployable Rapid Assembly Shelter
JBCP—Joint Battle Command Platform
NIPR—Nonsecure Internet Protocol Router
SIPR—Secure Internet Protocol Router
SNAP—SIPR/NIPR Access Point
SVOIP—Secret Voice Over-Internet Phone

**Mobile tactical operations center diagram**

During the final planning conferences for JRTC Rotation 23-9—and approximately 45 days before the exercise began—Task Force Zulu determined that Task Force 6 would be stood up for the 46th Engineer Battalion. This development resulted in a short-notice tasking for the 20th Engineer Brigade to provide approximately 20 guest OC/Ts for Task Forces 5 and 6. Task Force 5 managed the splitting of permanent OC/Ts between the two task forces and used the guests from the 20th Engineer Brigade to augment the JRTC trainers. However, as an added benefit, the 46th received a full-time senior trainer from 1st Army to manage Task Force 6.

The reward for all of this effort was a JRTC rotation that greatly advanced the tactical and technical organizational competence of the 46th Engineer Battalion. The battalion tested the capabilities and limitations of its new mobile command post, which had been developed over the previous year. It learned the value of carefully prepared vehicle-hiding positions and deliberate patrol base occupation plans to disperse the formation and conceal its footprint. It learned the limitations of its communications equipment in the dense JRTC jungle and swamps. It received excellent training on moving and operating at night using night vision devices. And it witnessed the challenges that distance poses in supporting a BCT from a divisional rear area 15–25 miles away. The 46th Engineer Battalion was able to capture lessons that might have otherwise taken years and several staff generations to acquire and incorporate them into its command post standard operating procedure and tactical standard operating procedures.

## Considerations

EAB units interested in participating in a JRTC rotation should consider the following:

- **Enabler integration.** Prior to the JRTC rotation and throughout the first week of operations in the rear unit bivouac area, there was a gap between the 46th Engineer Battalion expectations of enabler readiness and preparedness of the enablers to execute. As the battalion fought through a condensed reception, staging, onward movement, and integration timeline, the "unknown-unknowns" caused friction points between the battalion headquarters and U.S. Army Reserve and Army National Guard enablers. The battalion must provide copies of the command post standard operating procedure and tactical standard operating procedures to the enablers early in the planning process to allow them the to better understand the way the battalion fights. The battalion must also coordinate to obtain the enablers' unit identification codes and Department of Defense Activity Access Codes ahead of their arrival at the CTC. This data allows for improved support of enabler maintenance and dispatch issues. If Department of Defense Activity Access Code alignment under the supported battalion is not possible, enablers must bring their signature cards, formatted for the JRTC supply service activity; assumption-of-command orders; combat slants; JRTC Orange 3s (vehicle reconstitution reports); personnel reconstitution packets; trip tickets;

and repair parts signature cards, which should all be created at home station. These products should require only minor updates after receiving pre-position operations equipment.

- **Upper tactical Internet.** The 21st MEB and the 21st Airborne Division worked exclusively from secure voice-over-internet-protocol telephones. As these telephones are not EAB engineer battalion organic assets, the 46th Engineer Battalion had little familiarity with their limitations in the field. JRTC foliage and terrain elevation and the amount of time required to disassemble, package, and reset the commercial, off-the-shelf communications dish severely limited battalion access to the tactical Internet and secure voice-over-internet-protocol telephones. As a result, the 46th missed half of the battle rhythm meetings.
- **LNOs**. Due to manning constraints, the 46th Engineer Battalion could support sending only two LNOs to higher and adjacent headquarters. The LNO sent to the 3d Brigade worked out perfectly. The other LNO, who was placed in the 21st Airborne Division—two levels up in higher headquarters—did not have the requisite rank or dedicated communications platforms necessary to be effective. The 46th should have provided each of the two LNOs with a dedicated Joint Battle Command Platform so that they could communicate effectively, per the battalion primary, alternate, contingency, and an emergency plan. Many of the issues encountered throughout the rotation were related to logistics; consequentially, in retrospect, it may have been better to place an LNO with the combat sustainment support battalion to alleviate friction with logistical support in the rear area. A total of three LNOs would have been ideal.

## Conclusion

It requires a year of planning and a carefully chosen partner unit for an EAB engineer battalion to gain access to JRTC. The importance of the brigade and division commanders getting the battalion added to the troop exemption list memorandum cannot be overstated. Because the exercise scenario is designed by JRTC Task Force Zulu, battalions should have clearly defined training objectives, know whether or not they want JRTC to stand up Task Force 6, and understand the requirement for support details. For those units that successfully lay the groundwork to attend a JRTC rotation, the reward is an unparalleled training experience in supporting large-scale combat operations. JRTC develops the most challenging training scenarios in order to stress the rigors of combat in austere environments while operating from mobile command posts. With engineer battalions soon to be pulled from BCTs, the only way that engineers can maintain a battalion level presence at CTCs is by EAB engineer battalions leaning into CTC rotations.

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*("Operation Turning Point," continued from page 15)*

that removed old timber from both work areas, and—in this case—two separate command and control nodes. While performing the shore-side carpentry work of preparing timber elements for installation, gasoline-driven and electric tools performed very well; however, leaders should take adequate precautions when utilizing these tools on platforms floating over water, where hydraulic or pneumatic tools are generally considered safer. To maximize efficiency, each team performing work on a timber pier (cross bracing, fendering, decking/curbs) requires at least two hydraulic power units—one for demolition work and one for installation work. Sharing two hydraulic power units between the ECC and EDD installation teams led to bottlenecking at several times. Between the hydraulic power units organic to the ECC and EDD and the auxiliary hand tool hydraulic ports on some pieces of heavy equipment, sufficient equipment exists to perform meaningful carpentry repair work without any augmentation. These assets will be integrated into future battalion PDR exercises to increase the scope of work performed.

## Command and Control

Due to the lack of work that required efforts both above and below the waterline, there was little direct collaboration between ECC and EDD personnel on-site. Each unit worked according to plans developed and managed by their own command team. On a large project or one requiring the efforts of topside and diving construction personnel in concert (such as the precise driving of timber piles), a higher-level command and control node would be appropriate. In future exercises, the battalion command and control element will deploy to the construction site so that the construction operation cell can control the construction activities of multiple companies.

## Conclusion

The staff of the 92d Engineer Battalion coordinated with external organizations for support during a PDR exercise of Operation Turning Point. NAVFAC, the owner of Pier F at Naval Station Norfolk, was the primary external stakeholder for the project. That agency, in turn, also acted as a liaison with other entities on Naval Station Norfolk, assisting the 92d with procuring local support and services necessary for successful execution of the exercise. Future iterations of this exercise are expected to lead to increased skill and efficiency of equipment operators, construction supervisors, supporting staffs, and unit commanders in their execution of the PDR mission.

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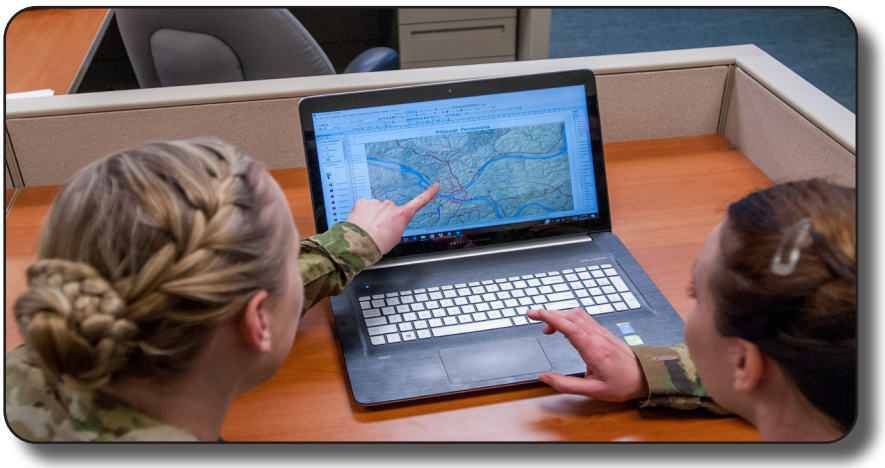
# Should Company Commanders Have Dedicated GIS Assets?

*By Captain Ryan M. Kossover*

Over the past few decades, it has become clear that geospatial information system (GIS) technologies and databases can enhance U.S. Army organizational performance. A GIS provides the ability to perform advanced terrain analysis and create maps and common operating pictures—and commanders at any level can benefit from GIS products. However, while GIS assets are regularly employed at higher echelons for strategic and operational levels of planning, it is evident that company commanders need greater access to these tools to create their own on-demand products. Why do company commanders need geospatial capability? Because their Soldiers' lives depend on accurate intelligence.

GIS availability at the company level is sparse. However, commanders can receive assistance and products from technical experts at the U.S. Army Corps of Engineers Reachback Operations Center, U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. In addition, various agencies and websites allow leaders to gather intelligence and analyze the battlefield via GIS products and aerial imagery from satellites. Military tools provided by an online GIS platform enable product creation based on different mission sets and a streamlined intelligence workflow. A designated person from an organization can create an organizational account that enables other personnel from that organization to use the tools. The organizational account may cost money, but use of the account by the additional personnel should not incur any further expense.



**Soldiers identify a location on a map produced by geospatial engineers.**

The primary intelligence source for company commanders is the operations section (S-2) at the battalion and brigade levels. The higher echelons provide products conducive to creating the common operating picture, which enables streamlined planning and vertical and lateral communication within and across chains of command. However, issues arise because only sometimes do company commanders receive products that contain the details needed for their respective operations. Commanders need information about current conditions on the ground (for example, information about the distance that the vegetation or terrain affords for direct-fire engagements, what the enemy sees from its perspective, or locations of potentially fordable water crossings). While aerial imagery can provide current information, outdated topographic maps cannot. Although topographic maps remain the basis for all planning, unless they are georeferenced with current aerial imagery, they are likely outdated and will fail to account for changes in the terrain and environment due to human intervention. Therefore, the only way to account for the potential changes without GIS capability is to make assumptions in the plan; this is an educated gamble. Commanders can make informed decisions only when questions are answered and assumptions are turned into facts.

So, how would the U.S. Army give company commanders GIS capability? There are some cheap, practical ways to approach this problem. One potential solution would be to create a more robust introduction to the technologies and software available. Students in Army leadership courses such as the Engineer Senior Leader Course, Engineer

*(Continued on page 23)*


# Engineer Lessons Learned From the War in Ukraine

*By Lieutenant Colonel Matthew S. Holbrook*

The unprovoked Russian attack on Ukraine has recently highlighted the need for engineers to shift focus. Such a shift in focus—from the Global War on Terrorism to large-scale combat operations (LSCO)—is mentioned in the *National Security Strategy of the United States of America*[1] and demonstrated by the 2021 withdrawal of troops from Afghanistan. Before the outbreak of war in Ukraine, the idea of LSCO as a brand of warfare had generally faded into the shadowy area between obsolete and inconceivable. It had been relegated to "hip pocket" training in the already jam-packed schedules of an Army struggling with retention and burnout—if it were even considered at all. Acknowledging this training gap isn't an indictment on leaders; it's simply a recognition of the factor of time and our mandate to prepare our Soldiers for the missions that they were most likely to face over the last 2 decades. Now, as the largest land combat operation in nearly a century rages in Europe and an emerging power menacingly sits in Asia, it is incumbent on today's leaders to glean lessons from a real-time conflict in order to prepare for the unwanted possibility of a large-scale outbreak of hostilities.

Institutionally and organizationally, we must train and equip our formations and individual Soldiers for the potential eventuality of facing a peer or near-peer adversary that can challenge us in ways for which we are currently underprepared. Failure to learn from the real-time example in Eastern Ukraine with regard to emerging threats to engineer formations, demonstrated Russian obstacle efforts, and bridging challenges at this scale could result in needless loss of blood and treasure in the event that the United States is pulled into a future LSCO environment. We can glean three important engineer-related points from a study of the Russo-Ukrainian War:

- The importance of dispersal and overhead cover.
- A possible need to improve the required Army force to contend with obstacles.
- A possible massive shortfall of bridging resources in the inventory.

The conflict in Ukraine is far from a revolutionary military affair. Russian Federation forces are utilizing a strategy that has seemingly remained unchanged for more than 100 years. The Russians have developed a complicated and intricately designed defense in depth, using a variety of artillery-covered traditional obstacles that are best defeated by carefully choreographed combined arms actions and traditional suppress, obscure, secure, reduce, and assault techniques. These operational skill sets have severely atrophied in the 2 decades that we have spent focused on defeating improvised explosive devices. The need to decentralize mission command in the face of evolving threats to the electromagnetic footprint of our large command posts and the unmanned aerial systems (UAS) that are ever-present over the modern battlefield further complicate this revisited way of war. The new aerial threat forces engineers and breaching elements to focus on the sky and ground in ways that the U.S. Army has never before needed to.

Perhaps the U.S. Army must realize just how saturated with UAS the air over Ukraine is. A recent Royal United Services Institute (RUSI) report partially conveys the scale of the saturation, stating that there is "a Ukrainian loss rate in unmanned aerial vehicles of approximately 10,000 per month."[2] That statement refers only to *losses* (not total utilization)—and to only one side of the conflict. According to the upcoming book *Lessons From Ukraine for the Future Force*, "The UAS threat could be described as the improvised explosive device of the current conflict, and perhaps the next as well. The proliferation of technology has enabled both state and nonstate actors to develop small, inexpensive, and increasingly lethal UAS."[3] This means that engineers preparing to breach complicated obstacles or conduct river-crossing operations must assume that they are under constant surveillance. As in previous wars, engineer assets are likely to be considered high-value targets in the next conflict. For example, a Mine-Clearing Line Charge (MICLIC) would be a juicy target for what amounts to a cheap and steerable artillery round; the devastation that UAS could reap on a towed or hauled MICLIC charge would far outweigh the cost of the system. This may be a particularly devastating situation where a MICLIC is concerned, but the concept also holds true for logistical convoys that are well in the rear.

The bottom line is that Lesson 1 consists of an equation:

**dispersal + overhead cover = increased survivability**

In other words, cover should not be broken until necessary and the maintenance of proper standoff between equipment and ammunition dumps is critical.

As engineers and combined arms elements shift focus to LSCO, we must study the subject matter in real time. The counteroffensive in Ukraine has met stiff resistance along a carefully prepared defensive belt that engineers—one of the stronger-performing elements of the Russian military—have had months to construct. Returning to the RUSI report, "Russian force protection engineering has largely followed

its doctrine, with little methodological change since the Cold War. Russian defensive positions generally comprise two to three lines."[4] The initial point of contact usually consists of hasty infantry fighting positions. As the position progresses in depth, the second line is more deliberately prepared—and dangerous. The obstacle belts in that line consist of 6-meter-wide tank ditches, followed by other vehicular obstacles such as wire and concrete dragon's teeth in front of well-prepared trench systems reinforced by concrete fighting positions if time allows. The obstacle belts are often reinforced with unmarked minefields comprised of both antipersonnel and antitank mines with seemingly no pattern. They are often covered by a company of Russian infantry.[5] Despite numerous logistical challenges, mines seem to be plentiful in the Russian stockpile and Russian engineers quickly react to Ukrainian tactics. Ukrainian front-line commanders report that their forces had initially placed rollers on the fronts of tanks that were rated for four direct mine strikes but that Russian engineers then began double-stacking antitank mines to more quickly degrade the equipment; Ukrainians also often encountered obstacle belts with four-plus rows of mines, which required significant engineering efforts to overcome.[6] Some Russian trenches have also been demonstrated to have been constructed solely to trap and destroy approaching infantry. "Mine trenches" (as they are referred to by the Ukrainian forces attempting to clear them) are deliberately empty of troops; still, they are filled with remotely detonated mines that are destroyed by the Russians when Ukrainian forces charge into them.[7] These stout defenses are organized in four zones that are generally aligned with the annexed oblasts of Ukraine. They cover most of the eastern portion of the country with obstacle belts.[8] Although the most common obstacle belts range up to 1,000 meters in depth, some outlying belts are much deeper and are interlaced with mines rigged with antitampering devices, trip wires, and seismic sensors.[9] These obstacles are generally tied into terrain and are almost always covered with artillery fire. In line with the Russian way of war, artillery rounds are another of the supply items that seem to be inexhaustible in the war with Ukraine.

While these obstacles are formidable and capable of causing severe challenges for Ukrainian forces, they could potentially be exploited. The RUSI report and a report by an American think tank, the Center for Strategic and International Studies (CSIS), postulate that the front is simply too long for Russian forces to defend. It is estimated that there are approximately 70 Russian brigades in Ukraine to cover 1,000 kilometers of frontage, likely requiring some form of mobile defense.[10] Surprisingly, some obstacles are not tied into terrain but "appear more like 'elaborate roadblocks' that don't stray too far from the roads or into the fields."[11] Another shortfall in Russian defenses results from the contractors used to build them. In contrast to the effective minefields that are laid by competent Russian engineers, tank ditches and trenches have been constructed by poorly trained and often mistreated workers.[12]

Lesson 2 is twofold:

- Mass could be critical, and it may not currently exist in the engineer personnel or equipment inventory.
- It is paramount that engineer reconnaissance elements find gaps and bypasses to avoid direct assault on heavy defensive works.

A final engineering-related aspect of the Russo-Ukrainian war with which the United States could struggle in a similar scenario is the sheer scale of devastation to road and bridge networks. Within the first 6 weeks of the war in Ukraine, 23,000 kilometers of roadway and 273 bridges and overpasses were destroyed—amounting to 13 percent of Ukraine's total road and bridge network.[13] By September 2022, the number of bridges destroyed had risen to 320.[14] While not all of these bridges are critical to mobility, the scale of destruction could be a significant detriment to allied maneuver and resupply in a similar situation or in an Indo-Pacific situation in which tactical bridges may be in short supply. The limited existing Army inventory of tactical bridging and bridging engineers could be an overlooked shortfall when the focus of the military-industrial base is trending toward ammunition and artillery rounds. However, attention must also be paid to protecting these assets from the previously mentioned UAS threat overhead. Bridging operations necessarily occur in an exposed space; there is no overhead cover on a river. The Army should take the time now to determine if there are enough bridging assets in the inventory, if those assets are rapidly deployable, and how permissive a potential wartime environment must be in order to get those assets where they need to go.

Lesson 3 is: Rapid deployability and the availability of a severely limited asset could be critical to supporting a war effort.

The war in Ukraine should serve as a prime opportunity for the United States and its allies to realign focus from the Global War on Terrorism to LSCO. Any war with a great power such as Russia or China would likely play out differently than the war in Ukraine. For example, total national mobilization would make a huge difference. Nevertheless, the Russo-Ukrainian war does present us with a prime opportunity to study and address any shortfalls and regain any skills that may have atrophied since the end of the Cold War. Now is the time to check inventories and develop training scenarios to enable our warfighters to fight and win the next great power conflict.

**Endnotes:**

[1]*National Security Strategy of the United States of America*, White House, Washington, D.C., 12 October 2022, <https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf>, accessed on 25 November 2023, pp. 2–3.

[2]Jack Watling and Nick Reynolds, "Meatgrinder: Russian Tactics in the Second Year of Its Invasion of Ukraine," RUSI, May 2023, <https://static.rusi.org/403-SR-Russian-Tactics-web-final.pdf>, accessed on 25 November 2023.

[3]Matthew S. Holbrook, Chapter 13: "Protection: Electronic, Air, Civilian, and Infrastructure," *Lessons From Ukraine for the Future Force,* U.S. Army War College Press (publication pending).

[4]Watling and Reynolds.

[5]Ibid.

[6]Jonathan Bale, "Western Tanks Get [Pummeled] on Ukraine Front Line," British Broadcasting Corporation, July 2023, <https://www.msn.com/en-us/news/world/western-tanks-get-pummelled-on-ukraine-front-line>, accessed on 25 November 2023.

[7]Ryan Pickrell, "Russia Built Fake Trenches Along the Front Lines To Lure Ukrainian Soldiers Into Deadly Explosive Traps, Researchers Found," *Business Insider*, July 2023, <https://www.msn.com/en-us/news/world/russia-built-fake-trenches-along-the-front-lines-to-lure-ukrainian-soldiers-into-deadly-explosive-traps-researchers-found>, accessed on 25 November 2023.

[8]Seth Jones et al., "Ukraine's Offensive Operations: Shifting the Offense-Defense Balance," Center for Strategic and International Studies, June 2023, <https://www.csis.org/analysis/ukraines-offensive-operations-shifing-offense-defense-balance>, accessed on 25 November 2023.

[9]Michael Peck, "Russian Troops Still Build Battlefield Defenses Like They Did in World War II, and It's One of Their Rare Successes in Ukraine, Experts Say," *Business Insider*, June 2023, <https://www.msn.com/en-us/news/world/russian-troops-still-build-battlefield-defenses-like-they-did-in-World-War-II-and-its-one-of-their-rare-successes-in-Ukraine-experts-say>, accessed on 25 November 2023.

[10]Jones et al.

[11]Jake Epstein, "Satellite Images Show Russia is Making a Big Gamble on How It Plans To Defend Territory Near Crimea From Ukraine," *Business Insider*, 1 December 2022, <https://www.businessinsider.com/satellite-images-show-russia-gambling-defense-territory-near-crimea-ukraine-2022-12>, accessed on 25 November 2023.

[12]Jones et al.

[13]Anhelina Sheremet, "Ukravtodor: 23,000 Kilometers of Roads in Ukraine Have Already Been Destroyed Due to the War," April 2022, <https://babel.ua/en/news/77516-ukravtodor-23-000-kilometers-of-roads-in-ukraine-have-already-been-destroyed-due-to-the-war>, accessed on 25 November 2023.

[14]Myroslava Gongadze, "Ukraine Replacing Destroyed Bridges," *Voice of America*, 19 September 2022, <https://www.voanews.com/a/ukraine-replacing-destroyed-bridges/6753387.html>, accessed on 25 November 2023.

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*("Should Company Commanders . . . ," continued from page 20)*

Advanced Leader Course, Engineer Captain's Career Course, and Engineer Basic Officer Leadership Course could be exposed to the free GIS resources that are readily available to them through the Department of Defense. They could create accounts to gain access to agencies and websites, gain knowledge and practical experience through the courses, and take that knowledge and experience to their units. Another potential solution would be to incorporate registration for GIS website accounts for certain ranks into company and battalion in-processing procedures so that those personnel would have access to GIS capabilities already at the disposal of the Army.

A more robust potential solution could include forming GIS planning cells and assigning Military Occupational Specialty (MOS) 12Ys—Geospatial Engineers to the battalion S-2 to assist in the production of GIS products. Taking this a step further, MOS 12Ys could be assigned to the operations section at the company level; they could specialize in coordinating GIS analysis efforts between the company and higher-level GIS cells. Having GIS specialists at the disposal of the company commander would greatly enhance tactical planning and would allow commanders to distribute tailored products to their platoons to carry out the mission. If, for whatever reason, this arrangement were not feasible, then the battalion could designate one of its personnel to hold an online GIS organizational account and one or two company personnel could be granted access to the organizational account to use the GIS platform. The issue of which organizational funds would be used to pay for the organizational account might arise; but compared to the wages of personnel, this expense would be relatively minor.

GISs contain fantastic sets of tools that can be used by any Army leader. It is an engineer officer's duty to provide the best engineer capabilities possible to the maneuver units that he or she supports. That requires an understanding of GISs and knowledge about how to employ them to help accomplish the mission and reduce the loss of life in the process. Making GIS assets more accessible to company commanders would streamline the flow of intelligence up and down the chain of command while giving the commanders the perspective of the battlespace their operations demand. The presence of dedicated GIS assets at the company level—either in the form of free software or MOS 12Ys—can only lead to a better outcome for the U.S. Army. A more informed commander makes better decisions.

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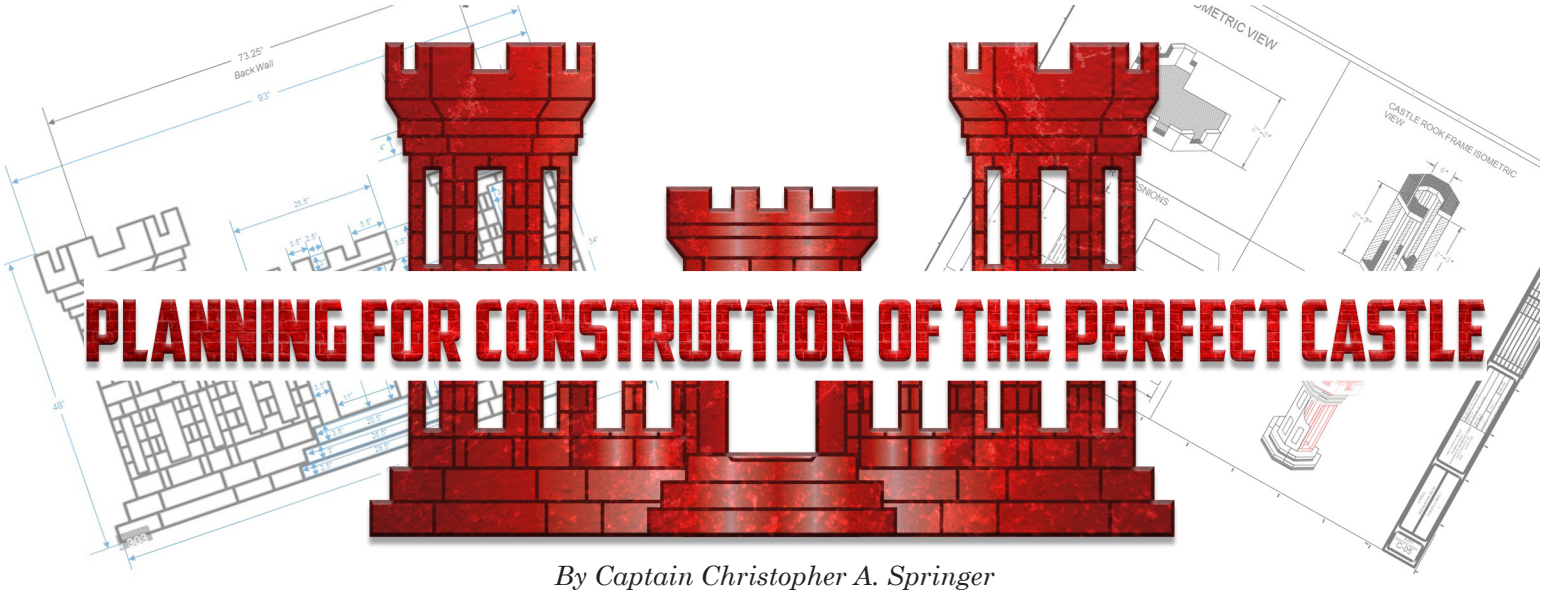

# PLANNING FOR CONSTRUCTION OF THE PERFECT CASTLE

*By Captain Christopher A. Springer*

## The Problem

In Fall 2021, I was a first lieutenant, serving as the construction officer for the 10th Brigade Engineer Battalion (BEB), Fort Stewart, Georgia, which was undertaking sustainment, renovation, and modernization efforts. One of our tasks during this time was to renovate and modernize the battalion museum area. The centerpiece of the museum was a plywood engineer castle. The castle was burnt orange instead of scarlet red, pieces were coming unglued and falling off, and the dimensions of the castle were not proportional.

## The Solution

Coming from a criminal justice degree background and having previously served as a mechanized sapper platoon leader, I lacked construction expertise; however, with virtually no resources, I initiated the project by measuring the existing wall and locating proportionally correct images of the U.S. Army engineer castle online through basic Google® searches. I then scaled the images in such a way that the constructed castle would fill the display wall, with the turrets wrapping around the sides.

Once my vision for the renovated castle was complete, it was time for the battalion to act. Sergent First Class Seth A. Taitague and Sergent Thomas J. Seymour were the driving forces behind the design of the project. Sergent First Class Taitague provided the construction expertise needed to improve the original vision and determine the equipment and materials required for construction, and Sergent Seymour took the initiative to use his personal computer and his drafting software to create a professional-grade design template. Together, they produced drawings for higher command and Department of Public Works review and approval. I continued to work on the budget and resourcing of equipment and material as well as the standard paperwork involved with a construction project, such as the scope of work, risk assessment, bill of materials, and funding requests.

## Lessons Learned

Resource and budget constraints imposed upon construction cells in BEBs may force construction officers to get creative with their projects. It helps to know about available resources in the area; for instance, the 92d Engineer Battalion, Fort Stewart, had the equipment that we needed for our construction project. Therefore, coordinating a troop construction tasking and signing for equipment from the 92d were plausible options. Knowing how Army funding works—including how government credit cards are used for the purchase of construction materials and how training funds are leveraged for construction projects—also plays a factor. There are other sources and channels of income for construction, but they vary based on the project. Getting to know fellow Soldiers, learning their talents and capabilities, and generating "buy-in" can help get a project off the ground; otherwise, it can wither and die.

## Conclusion

An Army engineer castle is an icon that any engineer unit should be proud to display as part of the engineer legacy. There are many approaches to planning new construction or renovating an existing castle, but the end goal should be to showcase our engineer expertise and ingenuity by creating "the perfect castle."

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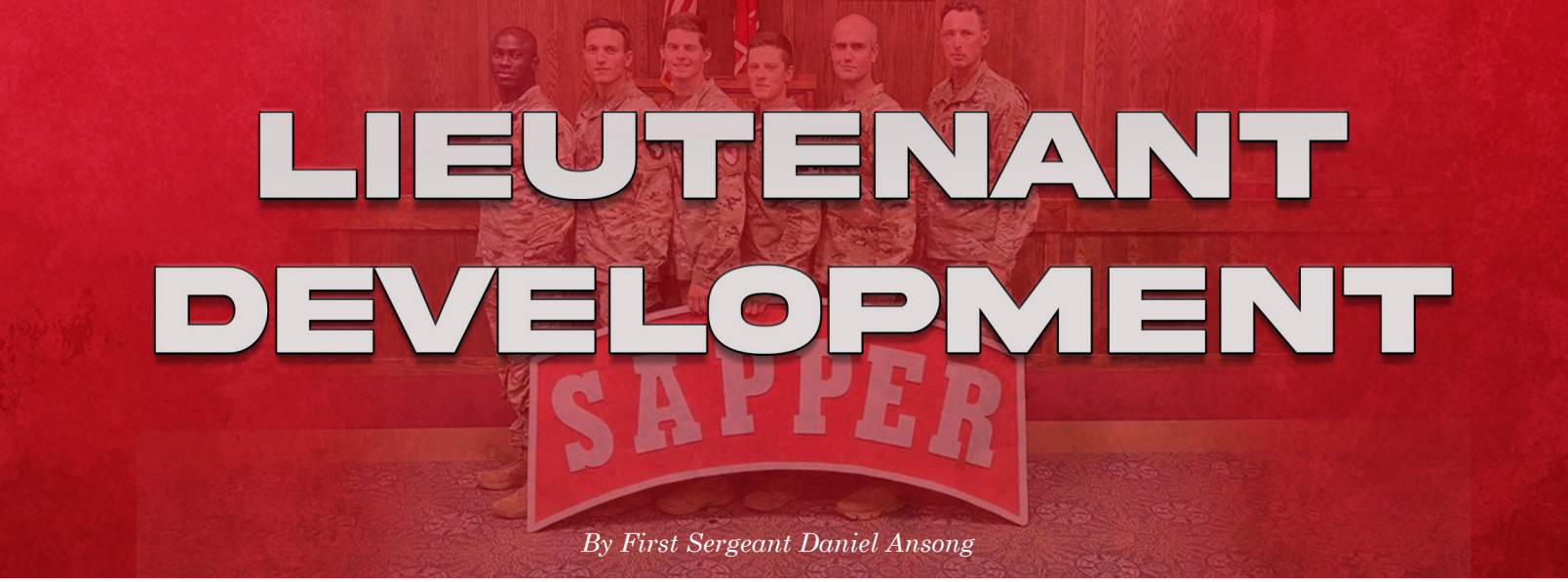


# LIEUTENANT DEVELOPMENT

*By First Sergeant Daniel Ansong*

Beginning with the first publication of leadership doctrine in 1948, the Army had always described leadership as a *process*; it was defined as "the process of influencing people by providing purpose, direction, and motivation to accomplish the mission and improve the organization."[1] This is important because a process can be learned, monitored, improved, and repeated. However, the latest version of Army Doctrine Publication (ADP) 6-22, *Army Leadership and the Profession*, published in July 2019, describes leadership as an *activity*; it states that leadership is "the activity of influencing people by providing purpose, direction, and motivation to accomplish the mission and improve the organization."[2] Why the change? To many, the two definitions may be tantamount—but are they?

According to the *Oxford Learners Dictionary*, an activity is something that is done for interest or pleasure or to achieve a particular goal, while a process is a series of steps completed to achieve a particular result.[3] An activity involves acting on something that is already known; it does not require guidance or deliberate supervision. Walking, running, and fishing are examples of various daily activities. But leading a group of highly trained individuals qualifies as something more than a mere activity. Leadership requires many skills and encompasses complex and dynamic relationships between leaders, subordinates, and seniors who depend on each other to attain a mutually desired goal. It takes time to develop good leadership.

How would a 10-year-old child who inherits a Fortune 500 company know what to do with the new asset? How could that child be empowered to manage the resulting wealth and prestige? A strategic process would be required. Unfortunately, the life of a young engineer officer is similar to the situation of the child beneficiary. Upon completion of the 19-week-long Engineer Basic Officer Leader Course, a young lieutenant may be assigned to a horizontal-construction platoon but deployed to conduct sapper tasks or appointed as a task force engineer to advise a maneuver commander on engineer capabilities for an incredibly challenging task. The engineer, who still needs to gain experience, may be placed in charge of personnel and equipment and simply directed to "figure it out." Who is going to assure the young engineer lieutenant that things will be okay when he or she has issues at home but must still show up to motivate subordinates every day?

While serving as an Engineer Basic Officer Leader Course platoon trainer, I was grading an operations order (one of the critical course events) when a very disciplined and intelligent student began his operations order briefing. A few seconds into the briefing, the student started repeating himself. He became acutely uneasy and apprehensive. I immediately realized that something was wrong. I excused myself and conferred with my officer counterpart, who was also grading an operations order in another bay. I quietly asked if he was aware of the student's situation, and I learned that the student had previously been on the phone all night long, talking to his Family and his lawyer about a custody battle with his former wife. With this troubling news, I returned to my bay and continued grading. During our after-action review, I expressed my sincere sympathy regarding the student's plight and encouraged him to be strong. I acknowledged how challenging it can be to be a leader in today's Army and reminded him of the need to separate his personal life from his professional life. Given their lack of experience and the complexity of what young officers are asked to do, the development of these lieutenants is in everyone's best interest.

Leader development constitutes stewardship of the profession, which is critical as we strive to achieve the Army mission and vision. Leaders at all levels must make developing and providing quality mentorship to their lieutenants their utmost priority. This can be accomplished through use of the Army Leadership Requirements Model, which is outlined in ADP 6-22. According to ADP 6-22, an Army leader is "anyone who, by virtue of assumed role or assigned responsibility, inspires and influences people by providing purpose, direction, and motivation to accomplish the mission and improve the organization."[4] Army leaders motivate people within and outside the chain of command to focus thinking, shape decisions, and pursue actions for the greater good of the organization. This is difficult and time-consuming; it cannot happen overnight.

The Army Leadership Requirements Model is grounded in historical experience and determinations about what

works best for the Army, and Army research supports the completeness and validity of the model. The model identifies core competencies and attributes applicable to all echelons and types of Army organizations and conveys expectations and establishes required capabilities of all Army leaders, regardless of rank, grade, or position. The Army Leadership Requirements Model significantly contributes to individual and unit readiness and effectiveness. The components of the model are centered on what a leader is and what a leader does, as shown in Figure 1. Leaders' core attributes of character, presence, and intellect enable them to apply core competencies to enhance their proficiency. Leaders who gain expertise through institutional learning, operational assignments, and self-development tend to be versatile enough to adapt to most situations and to grow toward greater responsibilities.

The difference in the competence and confidence of a platoon sergeant and a newly commissioned lieutenant is experience. Although mentorship is voluntary, new lieutenants need all the mentorship they can get and leaders should incorporate mentorship programs into the daily battle rhythm of their organizations. While assigned to the 20th Engineer Battalion, 36th Engineer Brigade, Fort Cavazos, Texas, we conducted various leader professional development activities, including a 5-day field exercise for organizational leaders (platoon leaders and their platoon sergeants). Training on leadership topics ranged from engagement area development to patrol base operations and the military decision-making process. The 20th Engineer Battalion has a great senior leader mentorship program.

From my experience, I estimate that the average age of lieutenants graduating from the Engineer Basic Officer Leader Course is about 24. But successful graduation does not mean that the young officers are ready to accomplish every mission. It takes years of mentorship, development, and experience to separate the chaos at home from the professional responsibilities of a leader. Organizational-level leaders fulfill the stewardship function of the Army profession by placing a high priority on investment in the development of future leaders at all levels, as competent leaders are a crucial source of combat power. With conditions set for a robust leader development system in which organizational members learn from their experiences and those of others, organizational leaders can take advantage of numerous avenues of approach for strengthening lifelong learning, such as—

- Virtual training and learning centers.
- Simulations.
- Assignment-oriented training.

## Conclusion

The leadership at echelon is responsible for the U.S. Army's asymmetric advantage in this volatile and complex world. Leaders are made, not born—and the development of good leaders requires a significant investment of time and energy. Leader development is a deliberate, progressive, continuous process that involves the career-long synthesis of training, education, and experiences acquired through opportunities in the institutional, operational, and self-development domains. Because leadership is rooted in Army values, Army leaders are competent, committed professionals of character. Senior leaders must continue to hold subordinate leaders accountable by establishing left and right limits while implementing the Army Leadership Requirements Model, which clearly articulates the need for leader competency.

The development of leaders is a crucial component of our profession of arms. Leadership is a process that can be completed through deliberate leader development and mentorship.

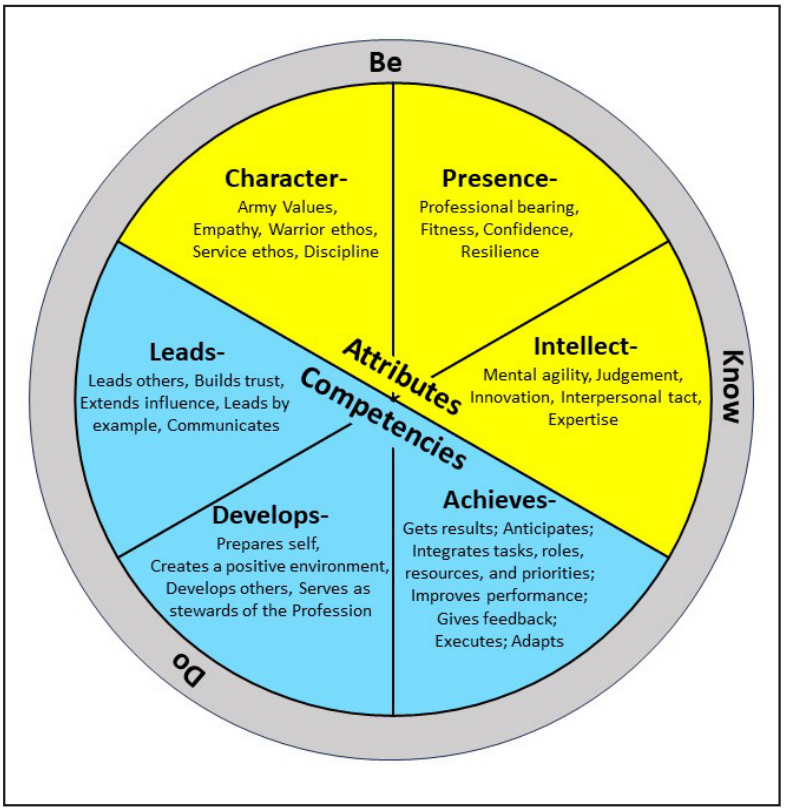


**Figure 1. Army Leadership Requirements Model core attributes and competencies**

**Endnotes:**

[1]ADP 6-22, *Army Leadership*, 1 August 2012 (now obsolete).

[2]ADP 6-22, *Army Leadership and the Profession*, 31 July 2019.

[3]*Oxford Learners Dictionary*, 2023, <https://www.oxfordlearnersdictionaries.com/us/definition/english/>, accessed on 7 December 2023.

[4]ADP 6-22

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# Reflections
## From a Deputy District Commander

*By Lieutenant Colonel Michael P. Carvelli*

Having had the honor of serving as a U.S. Army Corps of Engineers (USACE) deputy district commander (DDC) for several years, it is only appropriate that I reflect on and share my successes and failures. These shared reflections might help new DDCs before and during their tenures.

### Role of a DDC

The DDC is second in command of the assigned USACE district and serves as the district commander's principal military advisor. Each district also has a civilian deputy, the deputy for planning, programs, and project management (DPM). The DPM has programmatic responsibility and authority over all work in a district and is the senior civilian with authority second only to the district commander.[1] DPMs also serve as the chiefs of programs and project management divisions. In short, the DDC has military authority, whereas the DPM has programmatic responsibility.

A good model for understanding the difference between the DDC and DPM is a comparison of the relationship to relationships at an Army division headquarters. If the district commander were the division commanding general, then the DPM would have responsibilities similar to those of a deputy commanding general (DCG) for operations/maneuver and the DDC would have responsibilities like those of DCG–support. DPMs generally deliver the program on behalf of the commander, and DDCs support/sustain the delivery of the program.

The specific duties of each deputy vary depending on the size and function of the district; however, there are many commonalities across districts. Most DDCs can be expected to—

- Perform various duties focusing on specific issues, areas, or functions, as directed by the district commander and in coordination with subordinate technical divisions or general and administrative (GA) office chiefs. DDCs ensure that district headquarters and subordinate divisions/offices are integrated and that they effectively execute routine staff, management, administrative, and logistical activities. DDCs typically directly oversee (but might not supervise the chiefs of) the district programs for public affairs, readiness and contingency operations, safety and occupational health, and security and personnel protection. Although DDCs have differing supervisory responsibilities, most manage these programs on behalf of the commander in some fashion.
- Manage the district headquarters office staff to ensure that primary missions and programs are properly executed and serve as the district spokesperson in governance forums. Because these duties are shared with the DPM, it is best to gain shared understanding between the DDC and DPM about who owns what responsibility.
- Oversee staff operations and the planning of response and recovery missions during contingency operations. DDCs generally supervise the district emergency management technical division in fulfillment of these duties.
- Represent the district commander at ceremonies and events, as delegated. This can include participating in standard meetings, delivering remarks to civic groups (commonly with politically appointed officials present), and attending various functions.[2]

### "Commander" in Your Title

If you are assigned as a DDC after having recently served in a key and developmental position such as a battalion/brigade executive officer or operations officer or as a group/regiment staff engineer, it is critical to remember that you are now a DDC. You are no longer a staff officer; however, I will soon caveat that statement a few times.

Some USACE districts have chiefs of staff, others have executive assistants, and others have minimal or no executive office personnel. You will need to learn the nuances of your district in order to understand how GA offices execute routine staff work.

As a DDC, you will most likely act with more authority than you previously had as an executive officer or operations officer. You can create unwanted superfluous emergencies for your district simply by speaking or directing—just because you have the word "commander" in your title. Understand that districts do not have the same time horizons that you may have experienced in tactical units, and mete your direction.

Delegations of command authority to the DDC are common, as they help alleviate the commander of routine staff

work. Depending on your rank, you may serve as the appointing and approving authority for financial liability investigations for property loss, overtime requests, or myriad other items. Assume authority with a keen eye, as the responsibility can be overwhelming at times.

As a DDC, there will be times when you won't own your calendar or your day. You will be required to be in specific locations at certain times. However, you can block off time on your calendar for priorities. I recommend that you schedule your time at least 6 weeks out since chances are that your calendar will be empty except for battle rhythm events. Use your calendar as a weapon to arrange necessary meetings and protect time for priorities. Do this for your commander as well.

## Military Human Resources

USACE districts do not have military administrative offices; so, as a DDC, you will most likely serve as the district military administrative office. You should expect to manage all aspects of regular Army commissioned, warrant, and noncommissioned officers within your district. You will track all military human resources metrics, including evaluations, fitness tests, medical readiness, orders, deployments, and the mission-essential requirements cycle. Be sure to teach junior officers how mission-essential requirements work because they will most likely need to manage one in their next job. Some districts manage forward engineer support teams—alpha.

Learn how military officer positions are funded. Some receive regular Army funds, but many others are funded through district earnings. It may take a few interactions to understand the confusing process of paying military salaries through the Defense Finance and Accounting Service. The percentage of the district population that falls into this category is typically in the single digits, but the knowledge may be important when there are projects such as a change of command or safety investigation for company grade officers to execute.

## Budget

Perhaps the most daunting lesson that should be learned early on is how USACE fiscally operates. Authorizations, appropriations, apportionment, revolving funds, overhead, direct charging, regional rates, and carryover are a just few of the components of the massive learning curve ahead. USACE districts function similar to the way that nonprofit organizations function, but the general model doesn't account for all of the nuances. Ask questions, request more thorough explanations, and absorb the material. The learning curve can be intimidating, but you can learn the information if you engage your district leaders at a reasonable pace. Civilian employees do not expect you to show up understanding the entire process; they will be willing to teach you.

Critical budget personnel include the DPM, the chief of resource management, and the programs director in the programs and project management division. Additionally, each division and office could have access to different types of funds. For example, the chief of emergency management accesses funds that are not regularly used by any other technical division. It is worth reading the legislation contained in authorization and appropriation bills and researching relevant public laws such as Public Law 84-99, *Emergency Response to Natural Disasters*.[3]

The budget should be considered in every decision or change made within the USACE district. Making decisions without considering fiscal implications runs the risk of negatively impacting the district and the region. For example, you might be offered an additional commissioned officer through the Technical Engineer Competency Development Program—and you will probably be excited about having another officer in the district. However, you must determine how the addition of an officer will impact the district budget and, potentially, how it will affect the budget of a specific technical division. The month that an officer joins a district is the month that the district must begin funding that officer's salary.

## Employees

It is important for DDCs to understand how technical divisions generate income through projects in order to provide stakeholders the services they request. Most technical division employees charge their work to projects, thus generating USACE income. This project income pays for employee labor as well as district overhead, including rent, vehicle expenses, and fuel. This income also funds GA work, including the salaries of the employees who perform it. Timecards, leave, and the USACE Financial Management System can appear opaque if you haven't supervised civilian employees or been employed by USACE before. The good news is that all of that can be learned and USACE employees will be happy to educate you as you serve as their DDC.

Due to DDC supervision of emergency management in most USACE districts in the continental United States, you should understand how employees volunteer for duties or teams such as planning and response teams, forward engineer support teams–alpha, base development teams, crisis action teams, dive teams, Silver Jackets,[4] and others. Employees must disengage from their normal duties to serve in these positions and are sometimes deployed in or outside of the continental United States. The duties of everyone on these teams are important to the overall USACE mission. Apply your years of leadership experience to address issues and encourage employees to volunteer for these duties/teams.

## Supervisors

*Hiring managers* is a term often used to refer to supervisors. All supervisors are hiring managers because they are charged with the duty of backfilling positions of employees who depart. Due to existing organizational structures, USACE districts do not offer a full suite of human resources for supervisors—although some districts provide more services than others. Supervisors must perform whatever human resources responsibilities GA offices cannot or do not

provide. This is well understood by USACE supervisors but is something that you will most likely need to learn as a DDC.

When employees volunteer for emergency type duties or teams, USACE supervisors must redistribute the affected normal work. Sometimes, supervisors have a full workload and their teams suffer from the loss of an employee to a critical volunteer mission. DPMs own the workload-to-workforce projections and should have a good understanding of which supervisors are overloaded and whether there are viable solutions. As the DDC, you can assist the DPM in assuaging supervisors' concerns and reducing friction.

First-line USACE supervisors are required not only to carry out leadership duties but also to perform routine work. They still perform basic employee functions such as writing contracts, negotiating real estate agreements, or creating change orders. In conjunction with the DPM, you, as the DDC, will need to help educate supervisors about the tools available to address excellent/poor performance or conduct. You can also help them understand how to obtain assistance from GA offices, including the equal employment opportunity, public affairs, resource management, logistics, and communication offices and the civilian personnel advisory center. Supervisors should be engaged on a routine but not overwhelming basis.

Unfunded mandates for supervisors are common. Changes to supervisor training requirements, unexpected data calls, policy changes, and myriad other requirements place additional tension on these critical employees. No good organization survives with bad leaders. Find unique ways to relieve this added tension though education and personal engagement.

## Your Value

Although, you remain the DDC, you might also be appointed the project delivery team (PDT) leader for critical events or programs at times. A few salient examples of such circumstances include the Novel Coronavirus (COVID-19) response, talent acquisition, adjustments to the district battle rhythm, and the creation of a change management plan for the military table of distribution and allowances. When appropriate, you may need to become a PDT leader to allow USACE supervisors to focus on delivering the program.

Many districts have initiatives that should be implemented or changes that should be made; however, due to the way that USACE fiscally operates, not all districts can afford to institute them. If your district needs something advanced, you may need to act as the PDT leader, assemble a team, understand the problem, and institute an appropriate solution. Topics might include updating a district policy, creating a mentorship program, leading a supervisory professional development session, or adjusting a business process.

If you happen to find a short lull in your duties, don't be afraid to do the work of a PDT leader. The district needs that—but be wary of assembling PDTs too often, as you still have the word "commander" in your title. You don't want to distract the team from other, higher-priority efforts—or yourself from your commander's priorities. Remain focused on supporting delivery of the program, and always do what the commander needs to have done.

## Visits With Employees

Some USACE districts are geographically small and have few field sites; others span multiple states, with some locations hours away. Several districts have more than 1,000 employees; others have only a few hundred. Commanders are pulled in multiple directions, with requirements for time spent at enterprise/regional governance meetings or with congressional delegations, staff delegations, governors, tribal leaders, mayors, military leaders, or a panoply of other stakeholders. You are in the perfect position to visit your employees. Remember to take control of your calendar—and schedule routine visits with district employees.

Employees will see you differently than you see yourself. They will generally share more of their story with you than they are willing to share with the commander. Districts do not have chaplains or sergeants major, so use your position as DDC to speak with employees to gain shared understanding of sources of friction. Use your position to eliminate or reduce friction when district policies or norms stand in the way. Your employees will thank you for helping them solve what you might consider to be miniscule issues. Use your title only for good.

## A Grateful and Gracious Attitude

There are not enough engineer professionals to serve the growing needs of the government and private industry, yet all USACE employees are technical experts. You should become a technical expert at recognizing superior performance. This starts with a "Thank you." Thanking employees often and in public has a positive effect on retention. The many forms of appreciation that civilian employees can receive for great performance include monetary awards, commander's coins, service awards, de Fleury Medals, time-off awards, personal notes, e-mail messages of appreciation, and enterprise awards.

Most employees simply want their voices to be heard. Many don't have problems that you will be able to solve but will appreciate you listening to their issues. If you submit an employee's concern in an information paper, e-mail, or governance meeting, provide him or her with feedback when possible. The employee will appreciate knowing that you actively listened and followed through. He or she will also understand if you don't have the power to resolve the issue.

It can be difficult to understand that some civilian employees have spent more than 40 years in your district. You do not have the context that they do—and you never will. However, you have been appointed as the DDC because of your leadership abilities. You will be required to make difficult decisions and to recommend others to your commander. To the best of your ability, be gracious and understanding when you change a process that intimately affects an employee who has done it "that way" for the past 30 years. Explain yourself, and listen to the employee's perspective. It is okay

to disagree. And it is okay to choose a certain course of action because it is the way that the district should be operating. It is also critical to acknowledge employees' willingness to try something new for the betterment of the district.

## Conclusion

The position of DDC is an incredibly rewarding one. It is an honor to so directly serve the citizens of the United States. As a DDC, your employees protect lives and property, steward resources, enable the economy, and aid citizens in crisis. Cautiously wield your authority—but when you do wield it, be an expert marksman. You will never know enough; there are simply too many authorities, regulations, and nuances for a DDC to learn it all in 2 or 3 years. However, don't stop learning from your employees; they have thousands of years of combined USACE district service and are willing to shape you into the DDC that they need.

**Endnotes:**

[1]USACE Engineer Regulation (ER) 5-1-11, *Business Process*, 31 July 2018, p. 9, <https://www.publications.usace.army.mil/Portals/76/ER_5-1-11.pdf>, accessed on 18 January 2024.

[2]USACE ER 5-1-13, *U.S. Army Corps of Engineers Policy on Regional Business Centers*, 30 June 2017, pp. A-3–A-4, <https://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_5-1-13.pdf?ver=2017-07-12-142353-397>, accessed on 18 January 2024.

[3]Public Law 84-99, *Emergency Response to Natural Disasters*, 28 June 1955, <https://www.govtrack.us/congress/bills/84/hr3878/text>, accessed on 18 January 2024.

[4]Silver Jackets are interagency teams that facilitate collaborative solutions to state flood risk priorities.

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# THE FUTURE ROLE OF ENGINEER RECONNAISSANCE IN LARGE-SCALE COMBAT OPERATIONS

*By First Lieutenant Nicholas W. Hill and First Lieutenant Tabb D. Patrick*

From General George Washington's iconic crossing of the Delaware River to Colonel Joshua L. Chamberlain's heroic stand on Little Round Top and Major General James E. Rudder's fearless climb up Pointe du Hoc, history has favored the side that can see, understand, and use terrain to its advantage. Engineer reconnaissance is paramount to dominating the terrain of tomorrow's battlefield. Technical analysis of routes, rivers, bridges, and obstacles will feed the decisions that win our Nation's wars. As the character of war undergoes fundamental changes, dedicated engineer reconnaissance assets are needed at the division level to maintain a decisive advantage in future fights against near-peer threats.

Former Chairman of the Joint Chiefs of Staff, General Mark A. Milley, describes the changing character of war, writing, "The attributes of organizations will—by necessity—be small, widely dispersed, nearly autonomous and self-sustaining, capable of constant motion and able to periodically mass effects for decisive action."[1] Because forces will be required to remain mobile, the need for engineer reconnaissance will be enduring. As commanders constantly move to avoid detection, they will be looking for answers to questions like: Can my vehicles ford this river? Is my convoy too heavy for this bridge? What types of countermobility efforts are the enemy implementing, and what is the enemy hoping to achieve? This change in the character of war coincides with a shifting geopolitical landscape, pushing us closer and closer to a great power conflict.

Over the past 2 decades, the United States has dominated the air and space domains against technologically inferior opponents, allowing easy access to aerial and satellite reconnaissance assets. However, this advantage is not guaranteed to continue through our Nation's next war—and that will result in an increase in demand for ground reconnaissance forces. The current conflict in Ukraine serves as a shocking reminder of the destruction caused by war between two conventional forces. According to a 2023 study, although the Ukrainian government was unable to collect data on more than 6,000 of the estimated 28,000 bridges in the country, nearly 10 percent of the remaining bridges in Ukraine require repairs prior to reuse.[2] The study provides a glimpse into the damage, destruction, and uncertainty that could be expected to encompass most infrastructure in a great power conflict. To address the uncertainty related to bridges, engineers would need to perform technical inspections to verify structural integrity or conduct further reconnaissance to locate other feasible crossing points. Without an engineer reconnaissance asset within each division, we run the risk of losing valuable assets due to catastrophic infrastructure failure.

Under the current Army division task organization, the brigade engineer battalion has two engineer companies. Each of these engineer companies is tasked with conducting engineer reconnaissance as a part of its mission-essential task list—however, engineer reconnaissance is often neglected as commanders balance their precious time across other mission-essential tasks, such as providing engineer support for mobility, countermobility, and survivability operations. As a result, brigade combat teams often lack the level of expertise required to perform accurate engineer reconnaissance at the tempo desired by the maneuver commander. As the Army begins the process of restructuring divisions for large-scale combat operations, there is an opportunity to create a new reconnaissance force that blends the skills of engineers with cavalry scouts.

Like the brigade engineer battalion, the cavalry squadron is in a period of transition amid Army force modification. Often tasked with conducting reconnaissance missions similar to those of engineers, cavalry scouts lack the engineer expertise required to conduct technical reconnaissance and identify explosive hazard threats along routes. This is particularly evident in Ukraine, where Russia frequently uses antipersonnel and antitank mines to close off axes of advance during countermobility operations. Furthermore, cavalry squadrons lack the mine-clearing assets needed to remove these threats. This slows the tempo of reconnaissance operations as cavalry scouts wait for engineer support. Merging engineer and cavalry assets at the division level would allow for their synergization into a more effective reconnaissance force.

The merging of engineer and cavalry assets could be implemented through a "hybrid reconnaissance troop," which would fall under the division cavalry squadron and consist of three reconnaissance platoons—one engineer platoon and two cavalry platoons—and one mortar section. This proposed task organization would allow the division commander to gain an early and accurate technical understanding of key terrain and infrastructure prior to the arrival of the division main effort. Additionally, the organic mortar section and heavy weapons platforms within the hybrid reconnaissance troop would provide the lethality required to win in a contested environment.

The assortment of personnel and capabilities, combined with advancements in technology, would provide the hybrid reconnaissance troop commander with flexibility in his or her approach to accomplishing the mission. While maintaining proficiency in traditional reconnaissance methods would remain necessary, leveraging developments in robotics, drones, artificial intelligence, and other technologies will be vital to the success of the proposed force. For example, robots and drones equipped with precision sensors can be used to gather critical information for route, river, and bridge reconnaissance missions. And artificial intelligence can be used to detect patterns in enemy countermobility efforts, allowing an understanding of the greater scheme of maneuver. The unique blend of troop personnel would enable leaders to conduct both "rapid and forceful" and "deliberate and stealthy" styles of reconnaissance, while the two cavalry platoons would continue to make "rapid and stealthy" a viable reconnaissance method (see Figure 1).[3]

The threat posed by our Nation's adversaries, combined with the changing character of war, has increased the need for engineer reconnaissance in Army divisions. Due to competing requirements within brigade engineer battalions, our divisions are lacking in this regard. As the Army modifies its force structure to prepare for the future fight, divisions need a dedicated engineer reconnaissance asset to ensure mission success. The creation of a hybrid reconnaissance troop would satisfy this need by pairing the capabilities of engineers with those of cavalry scouts. If such a troop were implemented, the Army of 2030 would be better equipped to fight and win our Nation's next war in a large-scale environment.

**Endnotes:**

[1]Mark A. Milley, "Strategic Inflection Point: The Most Historically Significant and Fundamental Change in the Character of War is Happening Now—While the Future is Clouded in Mist and Uncertainty," *Joint Force Quarterly*, July 2023, pp. 6–15.

[2]Oleksandr Kubrakov, "10% of Bridge Structures in Ukraine Are in Disrepair," *Ukrainian Government Portal: Official Website,* Ministry for Communities, 23 July 2023, <www.kmu.gov.ua/en/news/oleksandr-kubrakov-10-mostovykh-sporud-v-ukraini-znakhodiatsia-v-avariinomu-stani>, accessed on 28 November 2023.

[3]Army Techniques Publication (ATP) 3-20.98, *Scout Platoon*, 4 December 2019.

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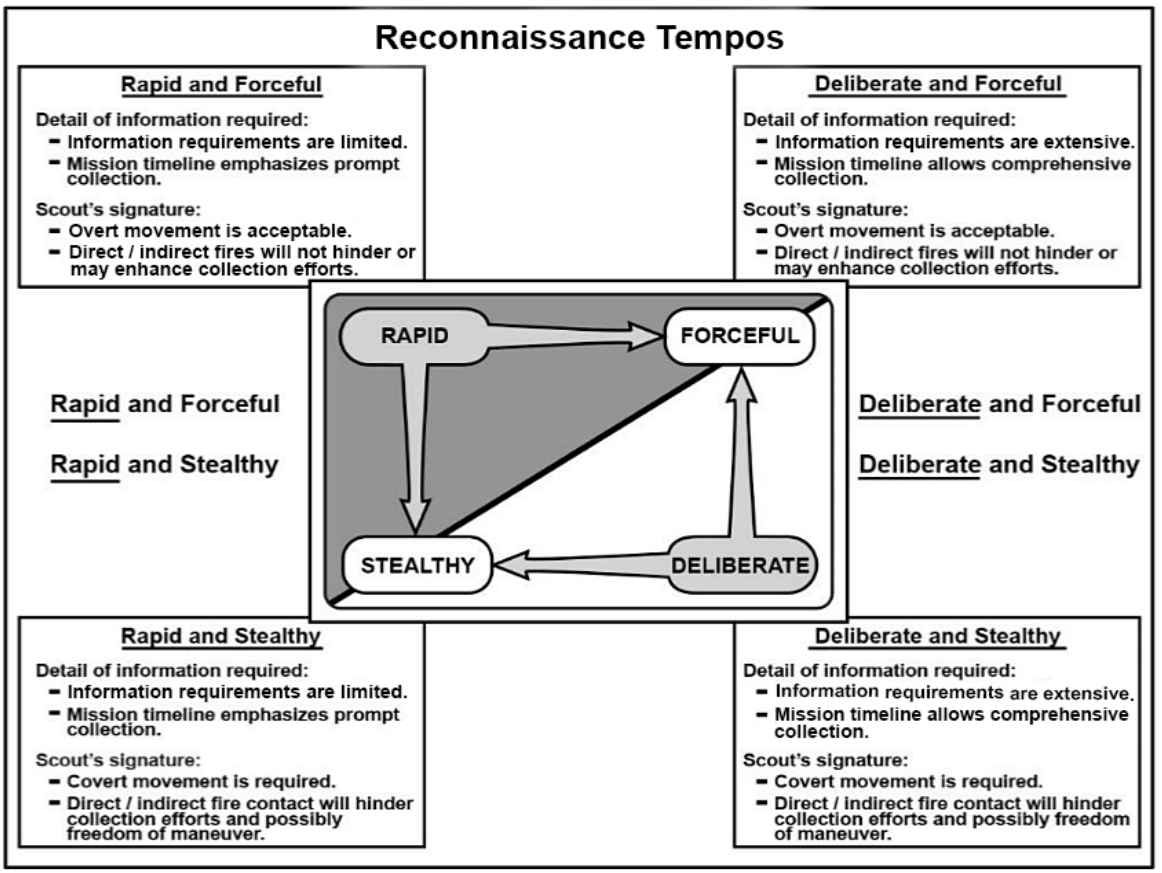


**Figure 1. Reconnaissance tempos[3]**

# PORT DAMAGE REPAIR: USING ARMY ORGANIC EQUIPMENT TO TEST DEVELOPING MISSION SETS

*By Captain Tyler J. Brandt*

The history of U.S. military port damage repair (PDR) and the evolution of warfare and military strategy are closely tied. The concept of PDR became significant during World War II, when the U.S. military recognized the strategic importance of maintaining operational ports for transporting troops, equipment, and supplies. The primary responsibility for developing specialized units and techniques for rapid port repair and construction belonged to the U.S. Army Corps of Engineers. The efforts of the Corps of Engineers included the creation of the 1058th Port Construction and Repair Group, which deployed to the U.S. European Command to repair damaged ports, such as those in Normandy, France, following the D-Day invasion.

Recognizing the critical role of PDR in supporting military operations overseas, the U.S. military has refined its PDR strategies in the years since World War II. Over the last 30 years, the U.S. Navy has made significant strides in PDR. Highly trained Navy Seabee construction battalions, which have been at the forefront of these efforts, can perform various construction tasks, including PDR, under combat conditions. They have deployed to numerous conflicts, including the Gulf War, the Iraq War, and the War in Afghanistan, where they have repaired and rebuilt ports damaged by enemy action or natural disasters. The Navy has heavily invested in advanced technology and training to enhance Seabee capabilities, including those of underwater construction teams.

As the U.S. military increases its presence and deployment of larger forces across the globe, PDR is becoming a joint problem set; the Navy must provide the necessary expertise and experience, while the Army must provide the manpower required to accomplish this strategic mission. XVIII Airborne Corps, Fort Liberty, North Carolina, also known as "America's Contingency Corps," has identified this and other problem sets, including airfield damage repair and railroad and pipeline emplacement and repair. The corps is designed to be highly mobile and flexible, capable of deploying to respond to global crises on short notice. Its ability to quickly assess, repair, and manage port facilities is a critical component of its broader mission to provide rapid, decisive action in response to global crises. Where current U.S. Army doctrine does not exist, the corps has turned to the 20th Engineer Brigade, Fort Liberty, to fill capability gaps. Engineer construction companies and dive detachments from the 92d Engineer Battalion, Fort Stewart, Georgia, are training alongside the U.S. Navy to provide depth in the event of large-scale combat operations in different theaters.

**Soldiers drive a timber pile into place in the Savannah River during low tide.**

**Soldiers deconstruct damaged sections of a pier.**

Under the constraining condition of completing work with organic Army equipment, the 92d Engineer Battalion developed a basic PDR package consisting of carpenters, electricians, hydraulic equipment kits, and a hydraulic excavator fitted with a pile-driving attachment. The pile-driving attachment is an enhanced pavement breaker attachment with a welded metal cage to maintain the stability of piles while being driven into the seafloor. After completing iterations to refine pile-driving solutions, the 92d Engineer Battalion needed to employ a barge to float the hydraulic excavator into position. Working together, the 554th Engineer Construction Company (ECC) and the 497th Multi-Role Bridge Company (MRBC) tested the placement of the hydraulic excavator on a seven-float improved ribbon bridge (IRB). Three bridge erection boats were required in order to maintain positioning of the IRB. The test was successful, with minimal sway or stress on the internal bays of the IRB. The 554th ECC and the 497th MRBC determined that to mitigate tidal and wave patterns, an anchoring system would be necessary for future iterations in open seawater.

Over the past 2 years, the 92d has worked closely with Navy Seabees on the reconnaissance, scope of work, project timeline, technical surveying, and execution of different missions at locations ranging from the Savannah River, Norfolk, Virginia, to Gulfport, Mississippi. The 554th and 526th ECCs completed port demolition, reconstruction, construction of entry control point security positions, and timber pier construction across these locations. The primary execution cost is that of contracting for crane support to load equipment onto barges following each mission set.

Plans to put an IRB in seawater and continue testing the limits of Army equipment are in process for future operations. As the U.S. Army Corps of Engineers continues to develop solutions to this joint engineering problem set, doctrine, training, and technology must be developed. As we prepare for contingency operations, PDR is paramount to getting troops, equipment, and supplies to forward-deployed locations in strategic military operations worldwide. Together, the U.S. Army and Navy have the capacity to complete this mission set under multidomain conditions, which is why we say, *"Essayons!"* Let us try!


**The 554th ECC and the 497th MRBC move a timber pile into place to test pile driving from an IRB.**

*Captain Brandt is the commander of the 554th ECC. He holds a bachelor's degree in industrial engineering from the University of Arkansas and a master's degree in engineering management from the Missouri University of Science and Technology at Rolla.*

# Data-Driven Risk Management in USACE Construction Contracts

*By Captain Robert B. Skinker and Captain Timothy J. Naudet*

## USACE Business Impact

On average, the U.S. Army Corps of Engineers (USACE) currently experiences a 60 percent time overrun and 7 percent budget overrun on construction contracts.[1] These contract overruns cost the government years of construction potential and billions of dollars, adversely affecting training and readiness capabilities.[2]

USACE collects information pertaining to all construction contracts through the Resident Management System (RMS), which tracks contract performance, including data on awards, execution, and closeouts of projects. The data-rich RMS is an untapped resource that represents an opportunity to analyze data to mitigate contract risk—the source of time and budget overrun.

## Data-Driven Study

To enhance the ability to determine and predict the performance of projects, the authors, Captain Robert B. Skinker and Captain Timothy J. Naudet, performed a machine learning technical analysis of USACE construction contracts. The goal of the study was to use RMS to measure performance as a percentage of time and budget overrun and to ascertain how to effectively determine and predict project overrun—not to find ways to replace human analysts.

## Data Collection and Organization

As a starting point, Captain Skinker and Captain Naudet partnered with USACE–Louisville District subject matter experts, who provided 307 completed military construction and multiple award task order contracts for analysis. The dates of all contracts were within the 10-year period from 2009 to 2019.

Next, the data set was pruned from 307 to 186 contracts (admittedly, a relatively small number) to avoid biases that could be introduced by unique or scenario-based situations. The data was then "cleaned" (organized for computation) since computers—much like humans—require strict data organization regimens. For example, whereas English-speaking people read from left to right, computers read data row by row. As a result of the initial data-cleaning efforts, it was recommended that the Louisville District alleviate the use of "free text" in favor of "vetted categorical variables," thereby preventing the data corruption that occurs when users refer to one entity in multiple ways ("Fort Leonard Wood" versus "Fort Wood" or "FLW," for example). This would establish a higher standard of "data governance" and streamline future projects. Once the data had been cleaned, it was ready to be analyzed for patterns of overrun.

## Data Analysis and Conclusions

In the investigation of project overrun, the first variable analyzed was the effect of "small business" versus "unrestricted" contracts. A graph illustrating the relationship between the initial contract cost (award) and the original time (period of performance [POP]) for each of these types of contracts indicates that contracts for larger projects tend to be awarded as unrestricted (implying a preference for larger firms), while contracts for smaller projects tend to be "set aside" for small businesses (Figure 1). Such an imbalance in contract awards renders a direct comparison of all awards invalid; however, a "fair comparison window" (within which there is equal opportunity for the award of either type of contract) has been delineated by a dotted red box on the graph in Figure 1. When comparing contract awards within the fair comparison window, this study concluded that, on average, small businesses are just as effective at eliminating overruns as large firms are.

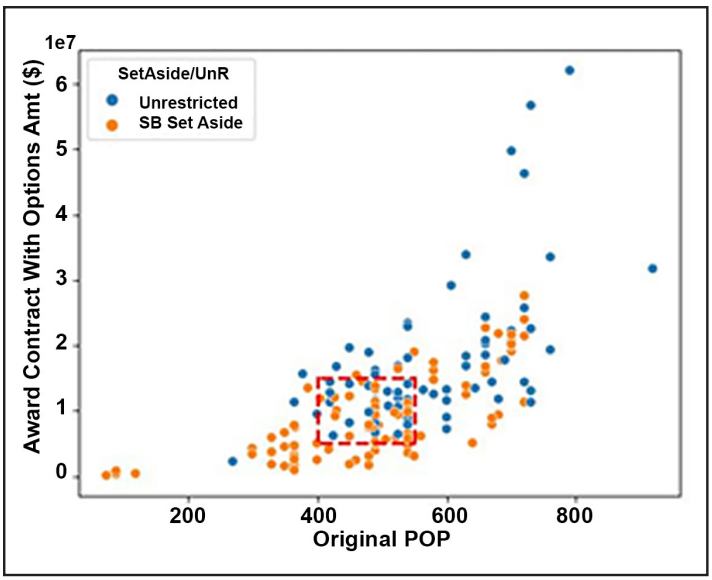


**Figure 1. Initial contract cost (award) versus the original time (POP), separated by type (small business or unrestricted). The dotted red box delineates the region in which there is equal opportunity for the award of either type of contract.**

The second variable analyzed in the project overrun investigation was the effect of design-bid-build (DBB) versus design-build (DB) procurement methods. With the DBB procurement method, the design is completed by one firm and another firm bids on and builds the project; in contrast, with the DB procurement method, a single firm designs and

builds the project. Histograms depicting cost and time overruns for each of these procurement methods are presented in Figure 2. Based on the data, it was determined that there is only a slight difference in cost overrun and no statistically significant difference in time overrun between the two procurement methods. The study concluded that for eliminating overrun, DB is the more effective of the two procurement strategies—but only slightly so.

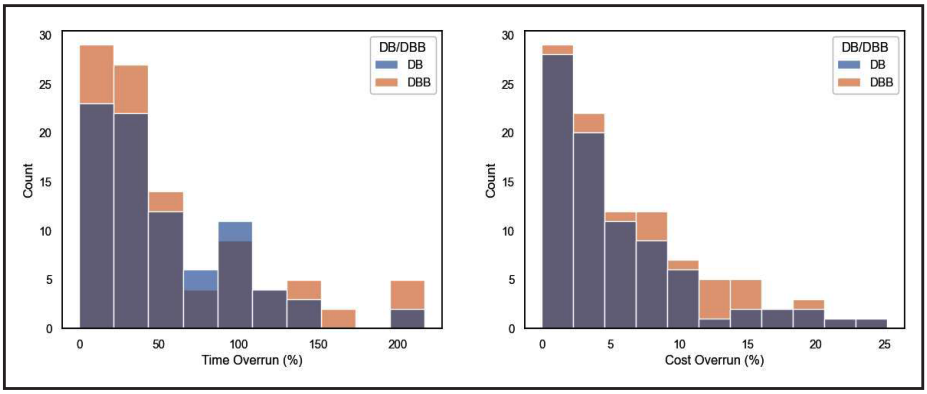


**Figure 2. Histograms of counts of project procurement methods (DB versus DBB) separated into "buckets" based on overrun. The histogram on the left shows time overruns, and the histogram on the right shows cost overruns.**

The next aspect of project overrun that was analyzed was the stability of both time and cost overrun by year. As can be seen in Figure 3, there were relative spikes in time overrun for contracts awarded in 2012 and 2014 and an even more significant time overrun spike for contracts awarded between 2017 and 2019. These time overruns appear to be closely related to environmental variables, which can include laws, regulations, and weather. The spike in time overrun for contracts awarded from 2017 to 2019 is likely due to the administrative effects of the COVID-19 pandemic. Unfortunately, the data set does not contain information about environmental variables that may have affected time overrun of annual projects; it is suggested that SMEs be consulted with regard to the causes of the observed environmental effects. It is also recommended that data governance be restructured to address this information shortfall in the future. The study concluded that when analyzing overrun stability by year, efforts should be focused on time overrun, as cost overrun tends to be predictably stable.

Another project overrun variable that was analyzed in this study was that of geography. Figure 4 contains a heat map showing the average project overrun by state across the United States, with brighter colors indicating states with higher overruns. Based on the data, the North Atlantic Region—comprised of New York, Massachusetts, New Jersey, and New Hampshire—has statistically higher overruns than other regions of the country. It is presumed that the time and cost overruns associated with this region are due to environmental variables; however, the lack of environmental information in the data set requires speculation.

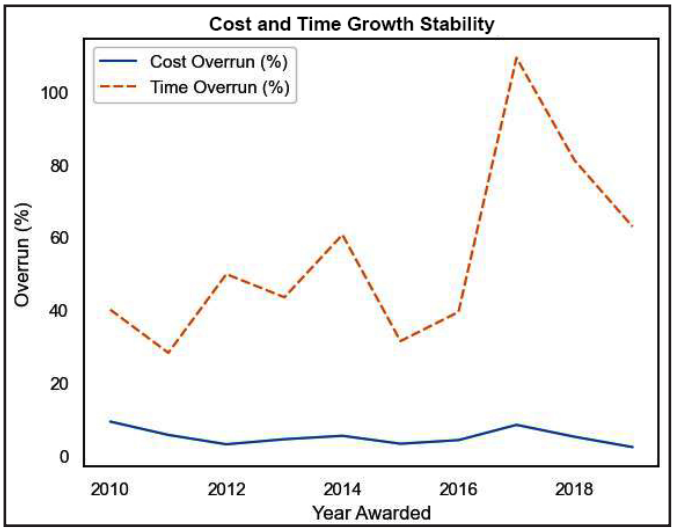


**Figure 3. This plot shows the stability of cost and time overrun for the 10 years for which contracts were analyzed.**

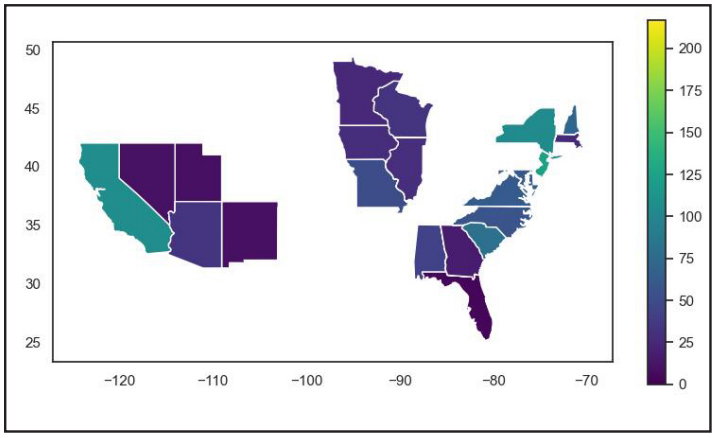

**Figure 4. Map of the United States where the colors indicate the average overrun percentage observed in projects contained within those states.**

The final aspect analyzed in the project overrun study was the relationship between overrun and the two variables of initial contract cost (award) and original time (POP). Contracts were categorized as "low overrun" (if in the lower 50 percent of contract overruns) or "high overrun" (if in the upper 50 percent of contract overruns) and plotted on the graph on the right in Figure 5—with low-overrun contracts depicted in blue and high-overrun contracts depicted in orange. The graph on the right, therefore, represents real-world data (the ground truth). Upon analysis of this data, a predictive relationship between contract overruns and the two variables (initial cost and original time) was identified; that relationship is defined by the following "Golden Ratio" equation:

Budget overrun = [$10 million x (d/350)] - $4 million; d ∈ {200 . . . 700} days

(which is read as: budget overrun is equal to $10 million multiplied by d/350, where *d* is the number of days and is an

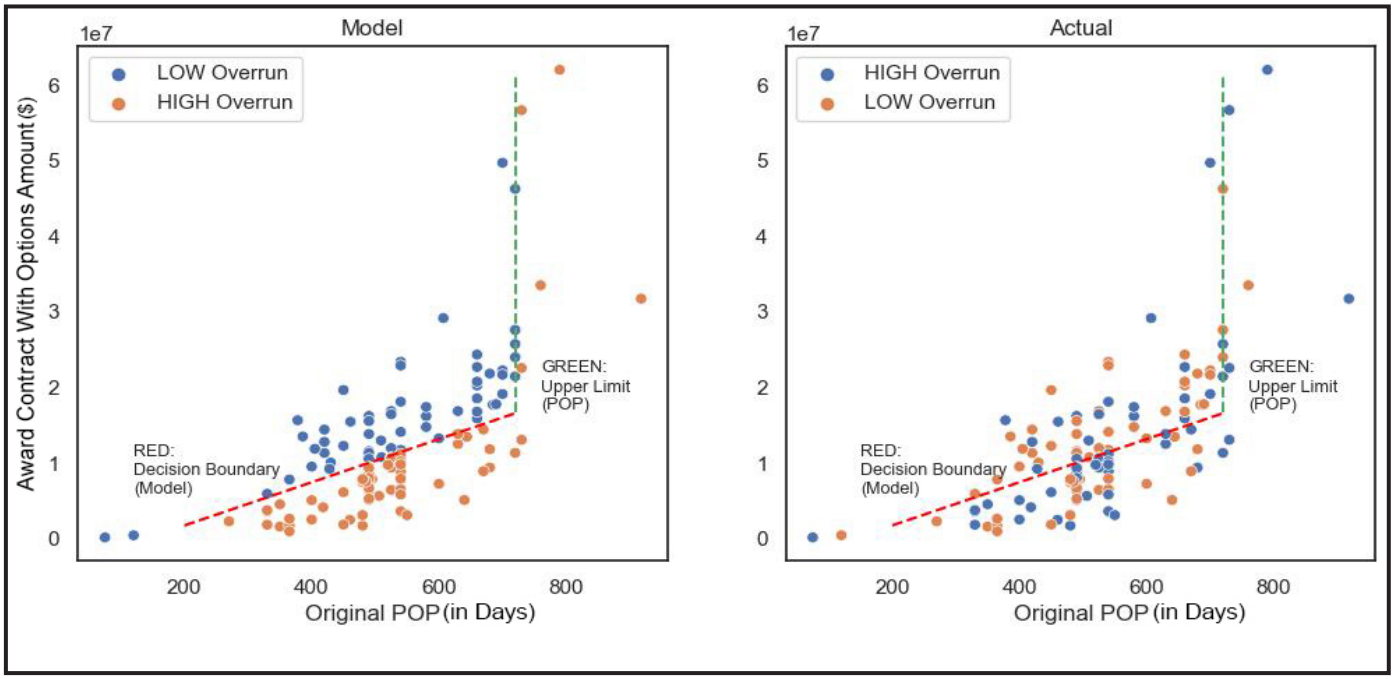


**Figure 5. The graph on the right shows the "real-world" (actual ground truth, as recorded by humans) overrun classification of the contracts in relation to the initial budget amount (designated as "Award Contract With Options Amount") and the original POP. The graph on the left depicts the linear model developed to predict the overrun of a contract based on its initial budget amount and original POP. The disbursement of low-overrun and high-overrun contracts is uniform in the graph on the left; contracts above the Golden Ratio line (depicted in blue) are under the average overrun, and contracts below the Golden Ratio line (depicted in orange) are above the average overrun.**

integer inclusively contained between 200 and 700). The plot on the left in Figure 5 is a graphic representation of the linear model, again with low-overrun contracts depicted in blue and high-overrun contracts depicted in orange. The graph demonstrates that for projects with original POPs of 200 to 720 days, contracts with lower initial awards or shorter POPs are more likely to result in overruns. When applied at scale, the model can be used (with 60 percent accuracy) to predict cost and time overruns of contracts and determine whether a particular project is likely to be high-risk (categorized as high-overrun). This is the most significant contribution of the study. It is recommended that the Golden Ratio be applied to future contracts and that, if necessary, contractor adjustments be requested prior to USACE acceptance. The savings could potentially be significant; a savings of 10 percent across all contracts for a given year equates to 10 percent of the budget that can be used for other projects.

## Summary of Results

The statistically significant findings of the USACE construction contract study include the following:

- Contracts awarded to small businesses perform in a manner similar to those of large firms.
- The DB procurement process is only slightly more effective than the DBB process at eliminating overrun.
- Environmental variables undoubtedly affect time overrun; however, those variables are not currently captured in the project data set.
- There is a significant relationship between time overrun and the year of contract award, while cost overrun is independent of the year of contract award.
- The North Atlantic Region of the United States experiences statistically higher overruns than other regions of the country.
- The Golden Ratio can serve as a tool to predict cost and time overruns of certain projects with 60 percent accuracy.

These findings should help enable USACE professionals to make data-driven decisions in order to mitigate project overrun; parties who are interested in obtaining a more complete report of the study may reach out to the authors of this article.

## The Way Ahead

The machine learning technical analysis of USACE construction contracts is aligned with the recently distributed "Message to the Army Team"[3]—primarily with the continuous transformation policy, as the study meets the criterion of integrating technology as soon as it is useful. However, future goals include obtaining additional data and standardizing data governance, thereby enabling dramatic improvements to predictive model performance. Other USACE districts are encouraged to contact the authors of this article to become involved in future studies.

**Endnotes:**

[1]These estimates are based on data from the USACE–Louisville District; it is reasonable to expect similar numbers throughout USACE.

[2]"U.S. Army Corps of Engineers: FY 2023 Appropriations," Congressional Research Service, 20 April 2023, <https://crsreports.congress.gov/product/pdf/IF/IF12090>, accessed on 4 January 2024.

[3]Michael R. Weimer, Randy A. George, and Christine E. Wormuth, "Message to the Army Team," 27 October 2023, <https://www.army.mil/article/271225/october_26_2023_message_to_the_army_team>, accessed on 4 January 2024.

**Reference:**

Stew Magnuson, "AUSA News: Army Leader Signals Change in 'Big Six' Modernization Priorities," *National Defense*, 11 October 2023.

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## *Engineer* and Last Remaining Fort Belvoir USAES Employee Retires

On 31 December 2023, Ms. Virginia (Jennifer) C. Morgan, long-time graphic designer for *Engineer,* retired with more than 37 years of federal civilian service to the U.S. Army. Ms. Morgan was reportedly the last remaining employee who had made the transition from Fort Belvoir, Virginia, to Fort Leonard Wood, Missouri, with the U.S. Army Engineer School (USAES) in the late 1980s.

After earning a bachelor of fine arts degree from East Tennessee State University in 1986, Ms. Morgan began her career as a visual information specialist with the Publications Section, Directorate of Training and Doctrine, USAES, at Fort Belvoir. In 1987, Ms. Morgan was transferred to the Bulletin Section of that directorate, where she began serving as the graphic designer for the *Engineer* professional bulletin; she continued in that capacity through the USAES move from Fort Belvoir to Leonard Wood in 1988 as well as several subsequent reorganizations—the most recent of which involved her employment in the Publications Branch, Doctrine Division, Fielded Force Integration Directorate, U.S. Army Maneuver Support Center of Excellence, Fort Leonard Wood. Over the course of her career, Ms. Morgan designed, compiled, and laid out 115 issues of *Engineer*. She also helped produce three issues of the *Maneuver Support Magazine* (from 2008 to 2009). In 2022, Ms. Morgan was reassigned as an editor (printed media) within the Publications Branch.

Ms. Morgan's efforts and accomplishments have directly influenced the professional development of engineer enlisted Soldiers, noncommissioned officers, warrant officers, commissioned officers, and organizations at every echelon in each of the Army components. She has helped shape the future of the Engineer Regiment and has significantly contributed to the overall readiness of the U.S. Army and our Nation. In recognition of her distinguished and dedicated service, Ms. Morgan has received numerous awards throughout her career, culminating in the de Fleury Medal—Bronze and the Meritorious Civilian Service Medal, both presented to her shortly before her retirement.

Thank you for your commitment and professional excellence, Jennifer! And best wishes in your retirement!

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