## Engineer Doctrine Update

**U.S. Army Maneuver Support Center of Excellence**  
**Fielded Force Integration Directorate, Doctrine Division**

### Publications Currently Under Revision

<table>
<thead>
<tr>
<th>Publication Number</th>
<th>Title</th>
<th>Description</th>
<th>Tentative Publication Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATP 3-34.10</td>
<td><em>Engineer Platoons</em></td>
<td>This new publication represents a collection of engineer platoon doctrine that serves as a one-stop shop for newly assigned platoon leaders, platoon sergeants, and platoon members.</td>
<td>2d quarter, fiscal year (FY) 2021</td>
</tr>
<tr>
<td>ATP 3-34.22</td>
<td><em>Engineer Operations–Brigade Combat Team and Below</em></td>
<td>This update, while incorporating the Field Manual (FM) 3-0, <em>Operations</em>, focus on large-scale ground combat operations, will include task force engineer tasks, enabler integration, and updates to brigade engineer battalion and echelon-above-brigade unit capabilities.</td>
<td>2d quarter, FY 21</td>
</tr>
<tr>
<td>ATP 3-90.4/MCWP 3-34A</td>
<td><em>Combined Arms Mobility</em></td>
<td>This multi-Service publication will be updated with a revised chapter on deliberate gap crossing; it will focus on division/corps synchronization of effort across warfighting functions and domains.</td>
<td>3d quarter, FY 21</td>
</tr>
<tr>
<td>ATP 3-90.40/MCWP 3-17.7</td>
<td><em>General Engineering</em></td>
<td>This multi-Service publication will be updated with comments from across the force, including equipment, construction authorities, and environmental considerations.</td>
<td>4th quarter, FY 21</td>
</tr>
<tr>
<td>ATP 3-90.8/MCWP 3-17.5</td>
<td><em>Combined Arms Countermobility Operations</em></td>
<td>This multi-Service publication will be updated with and follow current U.S. mine policy restricting persistent row mining.</td>
<td>3d quarter, FY 21</td>
</tr>
</tbody>
</table>

Please contact us if you have any questions or recommendations concerning engineer doctrine:
Mr. Douglas K. D. Merrill, Telephone: (573) 563-0003; Captain Adrian W. Stark, Telephone: (573) 563-2732; Engineer Doctrine Team, e-mail: <usarmy.leonardwood.mscoc.mbex.engdoc@mail.mil>.

“War is not an affair of chance. A great deal of knowledge, study, and meditation is necessary to conduct it well.”

—Frederick the Great, Prussian King, 1740–1786
The 55th Mobility Augmentation Company (MAC), 11th Engineer Battalion, Camp Humphreys, South Korea, is responsible for a variety of operations to ensure maneuver capability and mobility, as well as survivability and force protection. The diverse mission requires the 55th MAC to provide subject matter expertise about mobility and countermobility on the Korean peninsula. The 55th MAC helps incoming rotational engineer units adapt to the Korean theater and prepare to “Fight Tonight!”

Mobility Challenges in Korea

One of the most common obstacle types used on both sides of the Korean Demilitarized Zone consists of dragon’s teeth. Dragon’s teeth are typically square or hexagonal fortifications of reinforced concrete used to restrict mounted mobility. They range in size from 1 to 6 cubic meters and are buried deep into the ground, posing a significant challenge when properly employed. In January 2020, the 55th MAC recognized that it lacked a standard operating procedure for breaching these obstacles. Because of this gap and the possibility of being tasked to overcome this type of obstacle, the company conducted a demolitions range, the purpose of which was to determine the most effective method of breaching the obstacles.

The 55th MAC initiated the operation by requesting its sister company, the 643d Engineer Support Company, Camp Humphreys, to construct three dragon’s teeth for the 55th to destroy. The blocks were comparable in size to those typically found at the demilitarized zone.

The 55th MAC decided to focus on the employment of two different blasting techniques—one using an internal charge

By First Lieutenant Kendall J. Munsey
and the other using a counterforce charge. The hypothesis was that the internal charge would be the most effective at reducing the obstacle and would become the preferred method of breaching.

**Internal-Charge Breaching**

An effective method of breaching a concrete obstacle involves placing a charge at the center of mass; however, depending on unit equipment, this may be impractical to achieve. Because the structure of dragon’s teeth can vary, it was necessary for the 55th MAC to experiment with a different methodology. In this method, holes were created using saws, a halligan tool and sledgehammer and C4 was placed in the holes. If there was an advantage to the method, it was the incredible destructive power of the internally placed charge. The results were outstanding; the dragon’s tooth was completely demolished. There was no need for any sort of debris removal. Time and resource requirements may make this method infeasible in a contested environment.

**Counterforce Charge Breaching**

An alternative to internal breaching involves the use of a counterforce charge. By simultaneously detonating two charges placed opposite each other, the concrete is effectively crushed. Two attempts were made to breach a dragon’s tooth using the counterforce charge technique. During the first attempt, the quantity of C4 used was that suggested by doctrine and each charge was primed for simultaneous detonation. The results were underwhelming; the top of the dragon’s tooth was severed from the base, but a significant chunk of the structure remained. The suboptimal results were thought to be due to charge placement and insufficient explosives.

The second attempt at using a counterforce charge produced far better results. By increasing the quantity of explosives and adjusting charge placement, the obstacle was effectively reduced. Although small chunks of rubble remained after the blast, they could be easily removed.

**Takeaways**

The 55th MAC demolitions range proved to be a very valuable learning experience for company Soldiers. They were able to witness the capabilities and limitations of the equipment first-hand. Assets like C4 have a wide
variety of applications; however, in order to take advantage of its versatility, Soldiers must be familiar with how to properly employ C4. Demolitions training was used to train Soldiers on how to overcome a significant countermobility threat in Korea using available resources. Using demolitions in a counterforce charge and common modern demolitions initiators, the 55th MAC could reliably reduce dragon’s teeth, even in a contested environment. In the future, the 55th MAC hopes to conduct further demolitions testing on larger obstacles.

First Lieutenant Munsey is the executive officer for the 55th MAC. He holds a bachelor’s degree in engineering management from the U.S. Military Academy—West Point, New York.
On 27 February 2020, the 517th Engineer Detachment (Geospatial Planning Cell [GPC]), U.S. Army Africa, hosted the first-of-its-kind Best Mapper Competition on Caserme Del Din, Vicenza, Italy. The competition consisted of 12 events that measured proficiency at warrior tasks and the core competencies of Military Occupational Specialty (MOS) 12Y–Geospatial Engineer. The purpose of the event was three-fold: First, it served as a mechanism to certify geospatial engineers on the individual tasks outlined in the mission-essential task list (METL); second, it set the framework for future collective-training progression and illuminated areas requiring refocus; and third, it challenged geospatial engineers’ mental agility and physical stamina while increasing esprit de corps in a competitive environment.

History of Geospatial Engineers

Geospatial engineers maintain a key capability for the U.S. Army. Throughout the history of warfare, terrain has often dictated the outcome of a battle. Seizing and holding the high ground and other types of key terrain provide an unmatchable advantage. From General George Washington’s astute understanding of the terrain and weather effects in crossing the Delaware River to General Dwight D. Eisenhower’s extensive reconnaissance operations and tidal studies of the beaches of Normandy, France, terrain analysis has been a critical component of mission success and the preservation of equipment and resources. Notable efforts beyond warfare include President Thomas Jefferson’s deployment of Captain Merriweather Lewis and Lieutenant William Clark to explore the newly acquired Louisiana Purchase and expand the United States westward by discovering and charting an all-water route from Saint Louis, Missouri, to the Pacific Ocean.

Today, as it has for more than 200 years, the Engineer Regiment trains and equips geospatial engineers to contribute to the ever-important capability of terrain analysis to enable increased understanding of the operational environment. Geospatial engineers serve in geospatial planning cells across the U.S. Army and are assigned at tactical through strategic levels in brigade combat teams and functional brigades, division headquarters, corps headquarters, and Army service component commands. Geospatial engineers collect, generate, and manage geospatial data to support the warfighter requirements and provide visualization decision aids for leaders.¹
Preparation and Validation

In May 2019, the Army Capability Manager–Geospatial hosted an annual working group, which was attended by all seven GPCs, at Fort Leonard Wood, Missouri. The director of Army Capability Manager–Geospatial, Colonel Kevin R. Golinghorst, challenged the GPCs to design an event to validate individual tasks for geospatial engineers in a competitive format. The 517th Engineer Detachment (GPC) accepted the challenge and began initial planning efforts to execute the event at its home station in Vicenza, Italy, in the following months.

Planning began by establishing event categories as technical, tactical, or physical training to guide the design process and appropriately scope the event. Because the overarching purpose of this event was to certify individual level geospatial-engineer tasks, the technical aspect was weighted at 60 percent of the overall score, while the tactical and physical events were weighted at 30 percent and 10 percent, respectively. As the development of the event progressed, special care was taken to ensure that the Soldiers were physically and intellectually tested with high levels of intensity throughout the day to challenge their grit and mental agility.

The foundation of the competition was set within the METL for the GPC. This list identifies the key collective tasks required of the unit and is comprised of supporting individual tasks performed by geospatial engineers. Table 1 shows the mission-essential tasks (METs) and the corresponding competition events for assessment.

**Technical.** The primary event of the competition was a nonstandard production test that challenged the competitors’ mental agility, knowledge of ArcGIS geospatial software, time management, and spatial-analysis capabilities. A written examination covered a broader base of general geospatial knowledge and assessed competitors’ regional knowledge of Africa. The final technical event was a test of the Soldiers’ ability to receive a product and perform quality assurance and quality control measures prior to dissemination of the product.

**Tactical.** Soldiers across the U.S. Army are expected to be proficient at the warrior tasks. The tactical assessment focused on the tasks that a geospatial engineer would encounter when deployed as part of an expeditionary
joint task force level command post. This meant that tasks involving weapons knowledge; land navigation; medical knowledge; and chemical, biological, radiological, and nuclear (CBRN) knowledge were emphasized more than other tasks, such as those involving improvised explosive device detection and detainee searches. Soldier Training Publication (STP) 21-1, Soldier’s Manual of Common Tasks for Warrior Skills Level 1, currently categorizes the subject areas of individual tasks as shoot, move, communicate, and survive. With these factors in mind, the tactical events shown in Table 2 were planned.

**Physical.** While many of the tactical tasks require that Soldiers be physically fit to perform, it was important to conduct an actual measure of physical ability. In line with the Army transition to the comprehensive Army Combat Fitness Test (ACFT), this event was used as the primary physical assessment. Additionally, Soldiers completed a 20-station obstacle course with round-robin lanes while ruck marching with a 35-pound rucksack between the obstacles, for a cumulative effort of 3 miles.

After the events were planned and validated by the officer in charge, a story map was created using the ESRI© ArcGIS website at <http://arcg.is/15jeaD> to provide a useful visual aide showing the flow of the event.

**Execution**

The competition planning resulted in the validation of 12 primary tasks, categorized into six event stations, which were executed in rapid succession over a 14-hour period. The competition included—

- **Event 1: ACFT.** The ACFT served as the primary physical assessment and was worth 10 percent (100 points) of the overall score. Soldiers conducted the ACFT in the operational camouflage pattern uniform and running shoes.
- **Event 2: Written Examination.** The written examination consisted of 35 questions on technical geospatial engineering topics, enterprise functions, database management, and general cartography. The final section required Soldiers to identify the 53 countries of Africa on a map to test their knowledge about the unit area of responsibility.
- **Event 3: Round-Robin Tactical Lanes and Obstacle Course.** Soldiers were assigned to groups with two cadre for command and control and directed to a specified lane. Upon completion of a lane test, Soldiers executed a series of obstacles en route to the next lane. Each lane consisted of a test on knowledge and a practical hands-on exercise.

- **Lane 1: Land Navigation/Map Reading.** For this lane, competitors were given a standard 1:50,000 scale topographic map and tasked with finding the straight-line distance and the roadway distance between two points, performing intersections and resections, plotting points, and identifying terrain features. For the practical portion, they were tasked with using a lensatic compass to determine azimuth and with using their pace count to determine the distance to known points.
- **Lane 2: U.S. Army Weapons Test and Stress Shoot.** Soldiers assembled an M4A1 and an M249 squad automatic weapon (which were disassembled and on a table) and performed functions tests. Soldiers moved to the engagement skills trainer range; donned improved outer tactical vests and advanced combat helmets; and performed 10 burpees, 10 pushups, and 10 four-count flutter kicks. With an elevated heart rate, Soldiers distinguished between enemy and

---

**Table 2. Competition tasks**

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Event</th>
<th>Tasks Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shoot/Maintain, Employ, and Engage</td>
<td>Weapons Assembly and Disassembly</td>
<td>071-COM0032, 071-COM0029, 071-COM0033</td>
</tr>
<tr>
<td>Targets With Individually Assigned Weapon System</td>
<td>071-COM0028, 071-COM0027, 071-COM0030</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stress Shoot</td>
<td>071-COM0503</td>
</tr>
<tr>
<td></td>
<td>Land Navigation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medical Evaluation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medical Report</td>
<td></td>
</tr>
</tbody>
</table>
friendly forces and engaged a series of 16 targets at varying distances.

■ **Lane 3: Tactical Combat Casualty Care.** The tactical combat casualty care lane consisted of a 35-question test on assessing a casualty, treating various types of wounds, and evacuating a casualty. Soldiers then assessed and treated manikin “casualties” with multiple wounds amid simulated loud combat noise. Once the casualties were adequately addressed, Soldiers placed a single-channel, ground and airborne radio system into operation and called in a medical evacuation request.

■ **Event 4: Nonstandard Map Production.** The nonstandard map production examination was the premier event of the day. This 3-hour test was a scenario-based practical exercise that tested the Soldiers’ ability to quickly collect data; analyze the situation within the context of the stated requirement; produce a useful, informative product; print the product; and then conduct a 10-minute out-briefing about the assessment to a commander. Soldiers received an initial situation briefing of a medical crisis in Burundi and were tasked with identifying primary and alternate ports of debarkation, primary and alternate routes, and the most suitable sites for the construction of two field medical facilities. They were given a specified data set containing improvised explosive device threats from a violent extremist organization to enrich the route analysis and force them to weigh time with threat level. At the end of 3 hours, Soldiers briefed their product to the cadre, defending their choice of ports of debarkations, routes, and site selection.

■ **Event 5: CBRN Casualty Evacuation.** While in improved outer tactical vests and advanced combat helmets, Soldiers tested their ability to don a protective mask in the allotted 9 seconds. With their protective masks on, Soldiers dragged a 90-pound sled a distance of 50 meters, sprinted 50 meters, high-crawled 50 meters, and then dragged the 90-pound sled another 50 meters. This test assessed the Soldiers’ ability to move a casualty to a casualty collection point and conduct evasive maneuvers in a protective mask.

■ **Event 6: Quality Assurance/Control Review.** The final event of the day required the Soldiers to perform a quality control review of a nonstandard map product of Agadir, Morocco, which contained 25 errors that required standardized corrections. This event required that Soldiers that identify and explain the errors within 30 minutes.

■ **Awards Ceremony.** The events culminated the following day with an awards ceremony in which the U.S. Army Africa Commanding General, Major General Roger L. Cloutier, and Command Sergeant Major Charles W. Gregory Jr. recognized the Soldiers who finished in the top three and 11 Soldiers who achieved certification. First place went to Specialist Tristan B. May, second place to Sergeant Joel W. Burkhart, and third place to Sergeant David D. Proctor.

**Feedback**

The competition ended, a winner was declared, and the critical—yet often forgotten—tasks of review, analysis, and retraining began. The 2020 Best Mapper Competition provided a unique opportunity for large-scale analysis that is not typical in GPCs, which—when deployed—are most frequently dispersed in specialized teams of no more than two to four Soldiers. Conducting large-scale individual certification allowed the unit to identify areas of weakness across the entire GPC and within the functional sections of Data Management, Map Finishing, and Geospatial Intelligence (GEOINT).
For example, the Map-Finishing Section scored above average on the written examination and nonstandard map production, but underperformed on the quality assurance/control event. Based on a review of daily operations, this section began to primarily focus on standard map production. As expected, the GEOINT Section, which frequently works with nonstandard map products, outperformed the GPC average by more than 9 points. Similar trends were seen across each functional section throughout the technical portion of the competition.

Understanding these trends allows leaders within the organization to refine long-term training plans and increase cross-training to maximize proficiency across all METs, rather than focus solely on a specific functional subset. These efforts will ensure that perishable tactical skills are incorporated into routine training, such as sergeant's time training, and enable team level leaders to refine individual training plans to overcome identified weaknesses.

**Lessons Learned**

The planning and preparation for the competition started early—12 weeks prior to execution—and established a deliberate agenda of weekly in-progress reviews, with specific deliverables due at each meeting. The planning process incorporated multiple perspectives from officers, warrant officers, and noncommissioned officers, enabling frequent collaboration and producing a significantly better event. Additionally, feedback from Soldiers suggested that a more comprehensive study guide would be beneficial for deliberate preparation in the future. This led to an initiative to create a more cohesive standard operating procedure within the GPC and the acquisition of relevant quick-reference cards to increase warrior skills knowledge.

Ultimately, the opportunity for geospatial engineers to holistically compete in a validation of their core competencies increased the collective readiness of the 517th Engineer Detachment while also increasing the confidence and self-awareness of individual Soldiers. The competition proved a worthy investment in building the readiness of the geospatial engineers, while ensuring that they stand ready to enable warfighters at all echelons. The Best Mapper Competition will continue, and the 517th Engineer Detachment welcomes the greater Army geospatial enterprise to join—or even host—future events and to continue to share best practices across organizations.

**Endnotes:**


**Major Byrnes is the officer in charge of the 517th Engineer Detachment.** He holds a bachelor’s degree in environmental design from the University of Colorado, Boulder, and a master’s degree in environmental management from Webster University. He is a graduate of the U.S. Army Command and General Staff College, Fort Leavenworth, Kansas, and he holds the GEOINT Professional Certification—Fundamentals credential.

**Captain VanHaefer is the executive officer of the 517th Engineer Detachment.** He holds a bachelor’s degree in environmental design from the University of Colorado, Boulder, and a master’s degree in environmental management from Webster University. He is a graduate of the U.S. Army Command and General Staff College, Fort Leavenworth, Kansas, and he holds the GEOINT Professional Certification—Fundamentals credential.

**First Lieutenant Tarbox is the operations officer of the 517th Engineer Detachment.** She holds a bachelor’s degree in biomedical engineering from George Mason University, Fairfax, Virginia. She is a published author and contributor to peer-reviewed journals within the scientific community and is an inventor of patented low-power ultrasound technology.
ew, if any, U.S. Army branches require officers to have a knowledge set as wide and deep as the Engineer Regiment does. An engineer officer may be placed in a variety of units with vastly different mission sets, yet still be expected to have a strong understanding of the tasks at hand. Given that broad educational requirement, the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, has tailored the educational priorities of the Engineer Captains Career Course (ECCC). USAES successfully exposes ECCC students to the conceptual and practical applications of most of the engineer disciplines. However, with most of the curriculum focused on combat engineering (offense and defense) and general engineering, geospatial engineering is only briefly introduced and the training is not practically effective. More deliberate instruction of geospatial concepts and capabilities is required if the Engineer Regiment expects officers to succeed in future operations.

The Army engineer is the expert on terrain management, either affecting the terrain through combat and general engineering or analyzing and understanding the terrain through geospatial engineering, as indicated in Field Manual (FM) 3-34, Engineer Operations, which states that “Engineer operations are unique because, regardless of the intended purpose, they are directly aimed at affecting terrain or at improving the understanding of the terrain.”1

While Army geospatial engineering capabilities typically reside at the brigade echelon or higher, junior officers must understand the capabilities and practical applications of geospatial engineering in order to successfully leverage those assets in the operational environment. The current ECCC curriculum, however, contains only one full day of geospatial instruction, with several smaller modules attached to other blocks of instruction. A new geospatial pedagogy is required—one that not only ensures awareness, but also an actual understanding of geospatial engineering among future staff captains and commanders.

Fundamentally, pedagogy is the study and practice of teaching. While much of the literature on pedagogy focuses on theoretical or abstract aspects of teaching, the Army already understands the practical value of pedagogy at the strategic and operational levels. The Army University Army Learning Strategy links pedagogy to readiness, stating that “...leaders will require greater proficiency with key learning science principles such as how to design learner-centric efforts to mitigate performance issues.” Moreover, the Army Learning Strategy emphasizes that “...the use of less adept instructional design and delivery techniques leads to negative—not merely stagnate—outcomes.” Therefore, it is not only important that the correct information is transmitted from teacher to student, but also that the information is transmitted correctly. Neither the information nor the manner of instruction is currently leading to the desired end state in which ECCC students understand the geospatial-engineering subject matter.

The ECCC instructional model for geospatial engineering consists of a traditional lecture, with subject matter experts presenting information to the students. At best, the current pedagogy makes use of the initiation-response-feedback sequence to engage students. At worst, the current system subjects students to lectures without effective engagement. However, there are ways to improve the initiation-response-feedback sequence to better relate the material to personal and practical applications. Li Li, a senior lecturer in language education at the University of Exeter, United Kingdom, writes that “Referential questions are more personal and meaningful to students, as individual opinions and perspectives are respected and sought.” In application, this would mean the use of an initiation-response-feedback sequence that draws on ECCC student experiences with geospatial engineering as junior officers, either directly or through products and technologies used operationally. Such a change could help USAES better connect and reinforce...
Increased engagement could help students contextually frame geospatial engineering as applied to the operational environment, increasing understanding and retention.

As a discipline, geospatial engineering has characteristics of both an academic subject and a tradecraft. The science of how geospatial technologies work and the detailed use of those technologies to create geospatial products are too detailed for the scope of ECCC. However, the inclusion of student experience with geospatial engineering as junior officers in the education process would help prime the students to better understand the various assets they will use as staff captains and company commanders. In Learning for Life: The Foundations for Lifelong Learning, David H. Hargreaves, professor emeritus at the University of Roehampton, United Kingdom, argues that “When students are asked questions, particularly open rather than closed ones, they potentially have to think hard about the problem, rework existing knowledge, or apply it to a novel situation.” This is exactly what would happen if ECCC students were asked to include their operational experiences when interacting with the subject matter.

Hargreaves further promotes a vehicle that USAES could use to bridge the academic and tradecraft aspects of geospatial-engineering instruction—the project. The ECCC curriculum already takes advantage of projects to reinforce both general-engineering and combat-engineering subject matter. The general-engineering block of instruction includes a base camp type planning project, and the offense and defense modules require that students write and present operations orders. There is no reason that a geospatial-engineering project should not be included in the ECCC curriculum, either as a stand-alone project or as one aspect of the other projects for courses of instruction. The Army Capability Manager–Geospatial, Maneuver Support Center of Excellence, Fort Leonard Wood, maintains an index of geospatial-engineering tools that are available to Soldiers and can be leveraged to engage ECCC students, placing the capabilities at their disposal. For example, ECCC students could be required to develop map products for operation orders or military decision-making process modules using Army Geospatial Enterprise (AGE) GeoGlobe® (to name just one geospatial-engineering tool). This would decrease the workload of small-group leaders while educating and empowering ECCC students with knowledge and capabilities that they could use when on a battalion or brigade staff. Instead of viewing geospatial engineering as a much-talked-about but never-used domain, ECCC students could learn to practically leverage geospatial information and resources in the operational environment.

USAES has the Herculean task of educating junior officers for the varied and highly technical units that make up the Engineer Regiment. With the majority of the Engineer Regiment composed of either combat or construction units, it makes sense that the ECCC curriculum is focused on the combat-engineering and general-engineering domains. However, as resources across the Army are tightened and the pace of warfare increases, it is more important than ever for junior officers to understand the geospatial engineering domain, be aware of the products and capabilities that are available to them, and know how to leverage those capabilities in the operational environment. A deeper understanding of geospatial engineering could be attained by implementing an ECCC pedagogy that focuses on including and engaging students, while also applying geospatial capabilities in practical applications throughout the course. This could result in higher-quality junior engineer officers who are better able to leverage geospatial capabilities at the brigade, battalion, and company levels.

Endnotes:

1FM 3-34, Engineer Operations, 2 April 2014, p. 1-1.
3Ibid.

Captain Valencia is the commander of the San Diego–South U.S. Army Recruiting Company, Southern California U.S. Army Recruiting Battalion, 6th U.S. Army Recruiting Brigade, San Diego, California. He holds a master’s degree in geological engineering from Missouri University of Science and Technology at Rolla.
As the Headquarters and Headquarters Company (HHC) commander of a field grade U.S. Army Reserve observer, controller/trainer (OC/T) unit, I—like so many others—have experienced both effective and ineffective communication and the resulting consequences. My experiences have been gained from serving with Regular Army, Army National Guard, and U.S. Army Reserve units. Communication is a common challenge and a common solution to mission success.

In preparing this article, I became aware of how much my writing skills had waned over time. The ideas in my head were clear, but they were inconsistent and incoherent in my written delivery. Like any other form of communication, written communication is a skill that can be sharpened or can become dull, based on the frequency of implementation and level of effort expended.

Communication is the process in which a communicator attempts to get an audience to see, feel, and understand what he or she wishes to express. Effective communication is adaptable to any situation, while remaining fitting in tone, pace, and sophistication. Communication can become twice as effective when trust is established, perspectives are understood, and the values of the communicator and the audience are respected. The audience desires feedback through verbal and nonverbal indications. Verbal indications often occur during after action reviews (AARs), when the communicator asks questions of the audience to ensure a shared vision. Misunderstandings breed frustration and further inefficiency; a lack of communication efficiency, in turn, is a key hindrance to progress. As leaders, OC/Ts, and followers, it is imperative that messages are understood. Simply put, communicators must “know their audience.”

OC/Ts collect observations and structure discussions so that evaluated units develop awareness of their actions. Messages are delivered with an encouraging tone and summarized with a positive, forward-moving statement. This gives the evaluated unit confidence to review and reflect on internal practices, resulting in self-discovery and self-awareness. Also, during AARs, OC/Ts collect information about what needs to be sustained or improved, how to go about doing that, and who is responsible for execution. This process exemplifies effective communication through ownership of, and engagement, in actions.

Effective Communication

Of course, effective communication is far more valuable than ineffective communication. We are impressed when a message is delivered with value added; unfortunately, most communication is not as direct
as necessary. Many studies have shown that ineffective communication increases the cognitive load and results in a decreased understanding of the message being delivered. Effective communication, on the other hand, satisfies the needs of a culture that supports understanding—even if effective communication requires more initial effort or resources. Understanding the initial communication dramatically reduces the need for subsequent redundant communication efforts.

Leadership skills have waned during this generation—an observation made most evident through the supplemental and redundant communications required to ensure mission success. Our forces have come a long way from the hand-delivered orders or guidon flags used to communicate plans and changes during battle. We have become faster-paced organizations that must be able to give orders with “mission and intent,” allowing leaders to execute with less guidance and oversight. Abundantly available mediums result in instantaneous and more effective communication and allow for varying degrees of changes in planning. Many studies as well as our own experiences remind us that most communication is nonverbal; therefore, voice enhancements and video communications allow us to better convey our message and communicate what we are seeing, feeling, and understanding.

Effective communication requires timely, responsive efforts by all concerned parties. As an HHC commander, I am in a unique position of being responsible for ensuring unit readiness without the luxury of daily formations or readily available resources and, often, with teams that are geographically dispersed. Fortunately, my unit is comprised of officers, noncommissioned officers, and a single specialist geographically dispersed. Fortunately, my unit is comprised of officers, noncommissioned officers, and a single specialist and is afforded a level of maturity and experience that is uncommon across the force. These leaders value their individual readiness; but unlike our Regular Army counterparts, our readiness is integrated into our civilian lives. We are charged with maintaining 95 percent administrative, medical, and physical readiness—much the same as any Regular Army unit. This level of readiness requires a small but reliable team of “full-time” Soldiers to support operations.

The most significant point of friction and frustration with communication between Regular Army and troop program unit Soldiers is time. The limited time spent together necessitates effective communication; the “one-third rule” drives our high level of readiness: We spend less than one-third of our time planning a mission and most of our time preparing and rehearsing for it.

Trust is vital to maintaining open communication and fostering an environment of development. Early on, efficient leaders prepare their vision, mission, and philosophy in their offices. Then, when sharing the vision, tone, and desired end state of a mission, trust in the leader allows the unit to autonomously navigate short-term and long-term requirements. Soldiers set their priorities based on what is communicated and individually entrusted. This ensures that the unit culture is supported and that communication is operative. Effective communication is achieved through effort, and effort leads to efficacy. However, communication is also a perishable skill.

Standards

Standards are set through perceptions and pride. Each standard of readiness is communicated through both specified and implied tasks. Specified tasks are less ambiguous and easier to measure than implied tasks, but they do not necessarily signify the true pulse of a unit. Implied tasks reflect the morals and virtues (fitness, health, diet) of an individual or a unit. Intuitively, fewer specified tasks necessitate more implied tasks, which allows teams more autonomy. Implied tasks convey a sense of trust and allow for creativity. They allow subordinate leaders to freely think about the most suitable path to success. Leaders who can solve problems and overcome challenges are more likely to get support from their units and are more likely to help other commanders “see around corners.” In the words of General George S. Patton, “Never tell people how to do things. Tell them what to do, and they will surprise you with their ingenuity.”

Conclusion

Balancing the art and science of communication is fundamental to the continued success of our profession. Learning and establishing the best communication channels based on familiarity, ease, and necessity—balanced with the best approach to implementing the chosen strategy—will result in measureable success in any organization. A question that OC/Ts might frequently ask of evaluated students is: “What is your intended task or purpose?” Such a question would foster clear feedback and effectively promote the efficacy of the communication within the team.

Fluid communication facilitates the way in which adaptable organizations build and enhance their messages. It is essential that each leader hone his or her communication skills. Take a moment to record your thoughts and—

- Determine how easy or difficult it is to convey your message.
- Practice your delivery until you cannot get it wrong. (Do not simply practice until you get it right.)

We owe it to ourselves, our profession, the Army, and the Soldiers whom we lead.

Endnote:


Major Kirschten is the commander of HHC, 2d Battalion, 346th Regiment, Camp Shelby, Mississippi. He holds a master’s degree in business administration from Cameron University, Lawton, Oklahoma, and is a project management professional.
The U.S. Army Engineer Research and Development Center (ERDC), Vicksburg, Mississippi, Robotics for Engineer Operations (REO) project is developing unmanned engineer support capabilities to allow operations in global navigation satellite system (GNSS)-denied, -unpredictable, and -challenged environments at beyond-visual-line-of-sight (BVLOS) standoff distances. The goal of REO is to reduce risk to combat engineers by enabling unmanned engineer operations such as obstacle reduction and removal, route maintenance and repair, and fighting-position preparation. REO adapts currently available engineer platforms, such as bulldozers and excavators, and improves upon them by implementing multimodal sensing, model-driven machine controls, and artificial intelligence/machine learning-based autonomy for use in the operational environment.

Performing combat engineering tasks inherently interacts with the environment, whether moving obstacles or digging fighting positions. When these operations are performed in an unmanned manner (through teleoperation or autonomously), the engineer operator loses the critical feedback that is relied upon during normal operation. The lack of environmental feedback during remote operations means that a knowledge of detailed engineering characteristics of the operational area (such as soil conditions, slopes, and presence of obstacles) is necessary. REO is developing a system for multimodal mapping and semantic segmentation.
of environmental features to aid the operator in the remote performance of these combat engineering tasks. The maps are an integral part of autonomous operation of engineer platforms.

In the past 2 years, REO has developed an autonomous site characterization platform based on the Army’s Squad Multipurpose Equipment Transport unmanned ground vehicle. Additionally, through its Collaborative Research and Development Agreement with Caterpillar, Incorporated, ERDC has acquired a BVLOS teleoperated Caterpillar 308 8-ton, mini-hydraulic excavator and a BVLOS teleoperated Caterpillar 299D3 compact track loader. The site characterization platform is outfitted with a sensor payload that includes multiple light detection and ranging (LiDAR) sensors, an inertial measurement unit, an automated cone penetrometer, and hyperspectral cameras to create the semantic site model.

Similarly, the BVLOS teleoperated mini-hydraulic excavator and the compact track loader are equipped with four cameras that provide a 360-degree camera feed as well as operator control units that provide access to all standard functions of the machines. All of the platforms use military grade encrypted radios for telemetry and are configured to run military software, such as the Robotic Operating System–Military and the Robotic Technology Kernel from the Ground Vehicle Systems Center. As software capability gaps become apparent while adapting to specific engineering uses, ERDC takes advantage of open-source technology (where possible) or develops new in-house capabilities. This allows ERDC to leverage existing Army capabilities; fill in the gaps; and reduce dependency on specific companies, software, or hardware during future development.

The REO user interface was developed using the Android Tactical Awareness Kit (ATAK), a mapping engine that allows for precision targeting, intelligence, navigation, and generalized situational awareness. ATAK is a program that

“The goal of REO is to reduce risk to combat engineers by enabling unmanned engineer operations such as obstacle reduction and removal, route maintenance and repair, and fighting position preparation.”

is used by Soldiers in the field. REO takes advantage of the ATAK plug-in architecture to support features and vehicle operations by—

- Switching between teleoperation mode and autonomous mode.
- Displaying the position of the vehicle on a geopositioned map.
- Commanding the vehicle to execute a user-defined mission route.

Using the widely-available ATAK system ensures swift adoption and integration of REO technology and will reduce the barrier to entry for Army engineers.

The 2 years of development culminated in a successful demonstration of ERDC’s near-real-time autonomous site modeling/mapping and BVLOS teleoperation of the Caterpillar 308 8-ton, mini-hydraulic excavator in a GNSS-denied environment during the Maneuver Support, Sustainment, Protection, Integration Experiment (MSSPIX) held at Fort Leonard Wood, Missouri, the week of 14 September 2020.
During the event, REO demonstrated three different use cases. First, the site characterization platform was deployed to Training Area 230—a military operations in urban terrain site—in teleoperation exploration mode without any a priori information. A three-dimensional site model of the area was constructed without relying on GNSS positioning. In the second experiment, recent geospatial data of the training site was loaded into the ATAK interface to initiate the mission. The site characterization platform was assigned multiple navigation goals on the geospatial map and successfully traversed them while mapping the area. Finally, in remote operation mode, the Caterpillar 308 with a hydraulic shear attachment cut through triple-strand concertina wire. The excavator was teleoperated from a base station located approximately 200 meters away from the obstacle BVLOS. The operator relied completely on the onboard cameras and remote controls to navigate to the concertina wire and defeat it. Senior Army leaders from the Joint Modernization Command, the Maneuver Support Center of Excellence, the U.S. Army Engineer School, and the Maneuver Support Battle Laboratory attended and observed the demonstrations.

For the upcoming MSSPIX 21, REO will conduct a Soldier assessment of capabilities. In addition to what was demonstrated during MSSPIX 20, a BVLOS teleoperated compact track loader will be used to defeat an obstacle to mobility, such as a tank ditch or log obstacle. The REO site model will also be updated to include semantic labels relevant to Army engineers. As the site characterization vehicle maps an area, the system will autonomously identify, mark, and geotag items of interest for the operator. This will allow for improved situational awareness and better planning and decision making for the combat engineer.

Throughout the development cycle, which ends in Fiscal Year 2027, REO will continue to make use of Soldier-led experiments to receive and incorporate feedback from critical stakeholders and to ensure that capability gaps for the engineer Soldier are addressed. The system that ERDC is currently developing will serve as a force multiplier and will reduce personnel risks during future engineer operations.

Dr. Soylemezoglu is the program manager for REO research and development at ERDC. He holds master’s degrees in engineering management and manufacturing engineering and a doctorate degree in system engineering from Missouri University of Science and Technology at Rolla.

Ms. Williams is a research geographer at ERDC. She holds bachelor’s and master’s degrees in geography from Kansas State University, Manhattan.
In 2019, the 2d Security Force Assistance Brigade (SFAB), Fort Bragg, North Carolina, deployed to Afghanistan in support of Operation Resolute Support. Engineer Advisor Team 2511 was comprised of a post command team leader, a senior combat engineer sergeant, a combat engineer advisor, and a construction advisor. The team was assigned to the Train Advise Assist Command (TAAC)–Capital, Kabul, and later moved to TAAC–North, Mazar Sharif. Team 2511 advised SFAB maneuver commanders, local Afghan National Defense personnel, and security forces in the areas of combat engineering and horizontal- and vertical-construction tasks. Team members learned some lessons that may benefit other engineer advisor teams on future advising missions.

Advising With NATO

An integral part of Operation Resolute Support mission success consisted of the contributions of the many North Atlantic Treaty organization (NATO) countries that had operational control over select TAACs. Team 2511 had the unique opportunity to work alongside Turkish and Macedonian engineers at TAAC–Capital and German engineers at TAAC–North. The team supported their advising efforts below the Afghan National Army (ANA) corps level.

Team 2511 spent roughly half of its time in TAAC–North in expeditionary deployment conditions on small bases, assisting maneuver advisor teams that were colocated with ANA units from the 209th and 217th Corps, based across northern Afghanistan. TAAC headquarters staff sections did not have the capacity to train and advise below the ANA corps level, leaving the TAAC–North senior engineer advisor to focus his efforts solely on the ANA corps engineer. The TAAC–North senior engineer advisor relied heavily upon information provided by the ANA corps engineer to assist in parallel planning and advising efforts. Unfortunately, the corps engineer was unable to validate personnel numbers or equipment readiness or confirm if operational information was reaching company level leadership. Through integration with the TAAC–North senior engineer, Team 2511 obtained information while also providing training to the engineer, route clearance, and explosive ordnance disposal (EOD) companies. By acting as the connective tissue, the team assisted in synchronizing engineer efforts across ANA echelons.

A key part of integrating with the TAAC senior engineer advisor was the ability to avoid mission failure. The team learned through the senior engineer advisor that the ANA corps commander wanted to conduct a clearance operation along a particular stretch of enemy-held Highway 1. The plan called for ANA maneuver elements to clear the route and then use ANA engineers to construct a few platoon size
The mission set sometimes does not allow for the task force, company, or team to be collocated on the same operating base. In such circumstances, the entity must exercise mission command to decentralize advising efforts across the operational area and accomplish the mission.

The initial mission of the Team 2511 higher headquarters was to advise the Afghan National Police units responsible for operating the Kabul City gates and the ANA kandaks (battalions) tasked to defend the capital of Kabul. The mission focused on enhancement of the Kabul City gates; force protection posture; and mobility, counter-mobility, and survivability training for the ANA. Kabul City gate personnel and ANA kandaks were advised by different maneuver advising teams. In order to provide the required engineer capability, Team 2511 separated, aligned, and integrated with the maneuver advising teams. Synchronization was key before and after separate missions to gain situational awareness of gate force protection construction progress and any training required by the ANA kandaks. As much as the team wished to operate as one, covering separate areas and advising at the point of need were mission-essential.

Advising Foreign Security Force Partners

Some ANA commanders see the SFAB advisor as someone who can accomplish what they could not or someone who will solve all of the unit issues based on preconceived notions or previous interactions with U.S. counterparts. During engagements, the advisor must be forthright, with the purpose centering firmly on the principles of training, advising, and assisting.

Team 2511 had the opportunity to meet numerous ANA maneuver and engineer commanders in Kabul and across TAAC–North. Most of the ANA commanders had little or no experience in working with U.S. advisors or had previously worked with U.S. advisors who provided their units with ample supplies and resources. Based on previous experiences, some ANA commanders expected Team 2511 to provide fuel, sandbags, and air support. In an attempt to manage expectations, the team began informing ANA commanders that support would be provided in the form of training on the equipment, advising the commander and staff on operations, and leveraging logistical support through the advisor network. Some commanders were disappointed; they wanted immediate material and operational support—not a commitment to follow through with supply requests or discuss training plans. As team members continued to travel across the country, they believed it best to lay out expectations in advance to set the tone for current and future engagements. Although the reactions were unchanged, this approach gave the team a chance to get ahead of the curve and focus on unit readiness and training. Over time, questions regarding sustainment led to questions regarding upcoming missions. These discussions inevitably led to opportunities for the team to share thoughts and appropriately advise the commanders about partner force plans. The ANA commanders grew to understand that the team, which was trained differently than previous advisors, was a team with which they could build rapport through training and honest advising rather than through dependency.
Managing Advising Expectations

Foreign security force counterparts may operate vastly differently than SFAB or other NATO advisors. The advisor must then shift from a doctrinal mindset to one that supports the ANA initiative—and that’s okay.

The ANA mission was to construct a small, platoon size battle position to secure key terrain around Highway 1. During planning, the discussion focused on the battle position location, size, and layout and the bill of materials on hand. Referencing the map of the operational environment, the TAAC–North senior engineer advisor and Team 2511 identified key terrain that would be easily defendable and had clear fields of fire and suitable access routes for construction. After considering the proposed location, the ANA corps engineer insisted on using an alternate location that had a high ridgeline on one side, a river on the other side, and poor access roads for the construction of entrance/exit roads. The decision of the ANA corps engineer not to use the proposed location caused confusion and frustration among the team members. The senior engineer advisor and the team wanted the construction to succeed, giving the ANA soldiers tactical advantages over the enemy. After several discussions, the ANA corps engineer and the TAAC–North senior engineer managed to agree on a location that provided better fields of fire. As expected, ANA engineers encountered issues with bringing in heavy equipment to berm and fill the force protection bastions. They were forced to use less-capable and less-effective equipment, which resulted in a final product that was less than perfect by Team 2511 standards. However, the ANA took the initiative to plan, resource, and build the battle position with little help, which was the ultimate desired goal of advising.

Team 2511 was also required to manage expectations when it came to route clearance operations. The team met with an ANA EOD company and observed its route clearance tactics to establish a baseline and identify strengths and shortfalls. This particular unit demonstrated that it was very familiar with some of the U.S. Army reporting procedures, but it used nondoctrinal methods for detection. Team members explained and demonstrated some U.S. Army doctrinal methods for early detection in the hopes that the EOD unit would adopt them; however, the EOD commander was skeptical and reluctant to incorporate them. The team stressed how the doctrinal methods would be beneficial to the ANA during clearance operations. Team members informed the EOD commander that training his unit on early detection methods would have significant benefits during operations and that training on these tactics would continue during every engagement. Although the team would not be able to verify whether its efforts paid off, it had trained to standard and planted the seed with the EOD company. In the end, it was up to the brave ANA soldiers of the EOD company to clear the stretch of Highway 1. Success was up to them.

Handling Technology Challenges

In an established forward environment, the reliability of the communications network to provide the ability to communicate between echelons is often taken for granted. The people of Afghanistan, including those in the ANA, have become accustomed to reliable mobile telephone and Internet networks that allow the real-time exchange of information at a moment’s notice. However, due to technology, communication during deployment was difficult at times.

At TAAC–North, Team 2511 advised ANA units that were geographically separated from the team by a rotary wing flight of an hour or more. The team saw each unit for a period of 1 week once a month and called for visits in between to build rapport, gather information, and set training conditions. The operational area was so vast that the mission required the use of different mobile subscriber identity mobile cards for each location. A setback occurred in one area when the local mobile telephone tower was turned off, eliminating telephone and message communication with the ANA partners; it would be a few days before Team 2511 could get back to its location, and gathering information was essential to synchronizing efforts with TAAC. With the help of some NATO partners in the area, messages were able to be sent and received over secure platforms—without a break in advising—until the functionality of the cellular telephone tower was restored.

Major Baldwin is the leader of Team 2511, 5th Battalion, 2d SFAB. He holds a bachelor’s degree in criminal justice from Stephen F. Austin State University, Nacogdoches, Texas, and a master’s degree in geological engineering from Missouri University of Science and Technology at Rolla.
In April 2019, U.S. Army Europe (USAREUR) deployed a small group of engineers from the 902d Engineer Construction Company, Grafenwöhr, Germany, 300 miles away, to Karliki, Poland, to build infrastructure to facilitate a large influx of U.S. Army Soldiers to the small Polish training area. USAREUR tasked the company to construct a 3-mile-long, semi-improved gravel road with two 3,000-square-foot concrete turn points and a 5,000-square-foot steel targetry warehouse foundation. The 902d deployed with its two horizontal-construction platoons, a vertical-construction platoon, and a field maintenance section to complete the projects in time for the arrival of the 1st Armored Brigade Combat Team, 1st Infantry Division.

The engineers who traveled along an unimproved sand road to conduct route reconnaissance from a railhead to a tank firing range and expeditionary logistic supply point in western Poland found that the general area was quiet, rural, and heavily vegetated except for a 1,000-acre sandy field. The vehicles could not travel more than 10 miles per hour because potholes and remnants of a World War II era cobblestone road were scattered along the route. What should have been a 5-minute drive took 25 minutes. A local Polish citizen taking advantage of an all-terrain vehicle zoomed by. This sole road is part of an underdeveloped Polish training area. In less than 1 month, a Polish mechanized company would move into the area for a field training exercise. In less than 2 months, the 1st Armored Brigade would arrive by rail to the training area to serve as part of Operation Atlantic Resolve.

In a matter of 6 weeks, the 902d managed to complete $800,000 worth of construction and deploy to Hungary for follow-on missions. As impressive as the recounting of this single deployment is, it is only a snapshot in the long, rich, and unique history of the company.

The 902d Engineer Construction Company was originally

By Captain Giancarlo C. Rindone and Captain James “Beau” Wasson
constituted as the 902d Engineer Air Force Headquarters Company at Mitchel Field Army Air Base, Long Island, New York, on 21 April 1942. Over the next year and a half, elements of the newly minted company deployed to New Hampshire, Connecticut, Virginia, and Michigan to conduct surveys, construct training facilities, and provide training in the art of camouflage. The 192 Soldiers of the company set sail for England aboard the U.S. Army Transport J. W. McAndrew on 27 February 1944. Upon arrival, they were assigned to the Ninth Engineer Command of the Ninth Army Air Force and they began preparing for the invasion of Europe. The company, with its unique reproduction platoon, was entrusted with reproducing top secret military plans and constructing facilities in support of training for Operation Overlord. On 7 June 1944, elements of the company crossed the English Channel to assist in defeating Festung Europa. Altogether, from 6 June 1944 to 21 March 1945, the 902d built more than 300 airfields in France, Belgium, Holland, Luxembourg, Austria, and Germany.

As part of its occupation duties, the 902d began the construction and rehabilitation of permanent airfields. The
The unit was inactivated just before Christmas of 1947 and was dormant for 20 years. On 26 May 1967, it was reactivated and redesignated as the 902d Engineer Company (Float Bridge) at Fort Belvoir, Virginia. In its new role, the “Deuce” had the multifaceted mission to provide training support to the U.S. Army Engineer School (USAES), Fort Belvoir, and to deploy worldwide as a U.S. Army Forces Command quick-response force. The 902d was unique in that every type of bridge in the Regular Army inventory was assigned to the unit during this period. The 902d demonstrated its readiness and expertise in July 1970, when the company was alerted to provide two 180-foot M4T6 bridges at Great Bridge, Virginia. The bridge crewmembers maintained the bridge sections for 38 days, and more than 170,000 vehicles crossed without incident. The company continued to deploy in support of civil authorities for more than 2 decades.

In the immediate aftermath of the devastating Hurricane Agnes in June 1972, the Soldiers of the 902d utilized their training and equipment to provide emergency rescue and rafting operations in order to rescue civilian flood victims in Fairfax, Alexandria, and Occoquan, Virginia. A week later, the company deployed to Pittston, Pennsylvania, to help salvage damaged property and alleviate destruction; then to Lancaster, Pennsylvania, to construct an M-2 bailey bridge; then to Laceyville, Pennsylvania, to operate an M4T6 raft; and finally, to Ellicott City, Maryland, to recover a railroad car. The 902d continued to provide emergency bridging to civil authorities at
Engineer 67
2021 Annual Issue


On 15 February 1990, after 2 decades at Fort Belvoir, the 902d followed USAES to Fort Leonard Wood, Missouri. In January 1991, the 902d deployed 35 bridge specialists to the Middle East within 72 hours to support the growing need for engineers during Operation Desert Storm. Following Operation Desert Storm, the company maintained a high operational tempo, supporting USAES and multicomponent training exercises until it was inactivated on 15 September 1994.

At the height of the Global War on Terrorism, the Army called the 902d into service once again. The company was reactivated in Schweinfurt, Germany, on 15 July 2008 and was designated as the 902d Engineer Company (Vertical). The 902d, then known as the “Gladiators,” put its new vertical-construction skills to the test by deploying to Padarevo, Bulgaria, to repair a kindergarten as part of the North Atlantic Treaty Organization (NATO) Joint Task Force-East humanitarian civic-assistance training. The company returned to the Middle East on 23 October 2010 and was based at Camp Arifjan, Kuwait. From there, the 902d provided support across the Central Command area of responsibility. The company constructed pre-engineered buildings, foundations, communications towers, wood frame structures, entry control points, and maintenance facilities throughout Kuwait and Afghanistan. On 14 October 2011, the company reconsolidated and redeployed to Schweinfurt and began preparing for relocation to Grafenwöhr in April 2013.

On 1 January 2014, after relocating to Grafenwöhr, the 902d deployed to Mihail Kogălniceanu Air Base, Romania, to build a personnel transit facility. Despite frigid temperatures and gale force winds, the Soldiers completed the construction on schedule to accommodate the flow of Soldiers into and out of European and Central Asian operating areas. In January 2015, the company deployed Soldiers to Liberia to build Ebola treatment facilities to stop the spread of the deadliest outbreak of Ebola in history. In the summer of 2015, after returning from Liberia, the Soldiers deployed to Läsna, Estonia, to build wood frame structures to support NATO training rotations. Following its mission in Estonia, the company was transformed from an engineer company (vertical) to an engineer construction company. Under this new designation, the company had horizontal- and vertical-construction capabilities and an expanded mission.

In January 2016, the 902d deployed one of its newly minted horizontal-construction platoons to Rena Leir, Norway, to conduct winter engineer training and participate in Exercise Cold Response. The training served to build on a close, enduring relationship with the 5th Company of the Norwegian engineer battalion. In the summer of 2016, the 902d returned to Läsna, where the two new horizontal-construction platoons built 2.5 miles of road and the vertical-construction platoon poured 250 cubic yards of concrete.
of concrete. The company returned home in the fall of 2016 to conduct live-fire exercises and field the Ultimate Building Machine® (UBM)—a machine that bends steel to rapidly create durable steel frame structures. In May 2017, with the new UBM, the 902d convoyed from Grafenwöhr to Powidz, Poland, to construct an aviation headquarters facility. The company simultaneously deployed a horizontal-construction platoon to Hohenfels, Germany, to support maneuver units. In August 2017, the company returned to Grafenwöhr to begin preparations for Exercise Allied Spirit, which was to take place at the Joint/Multinational Readiness Center, Hohenfels, in October 2017. During Exercise Allied Spirit, the 902d provided 24-hour support to maneuver elements by digging antivehicular ditches, constructing obstacles, and repairing airfields.

The Gladiators continued to build training area capacity in Eastern Europe by constructing two helicopter landing pads, an ammunition holding area, and a half-mile-long road in Trzebień, Poland, in 2018. Upon completion of construction in Trzebień, the 902d convoyed more than 745 miles to Rukla and Pabradė, Lithuania, for Exercise Saber Guardian. In Lithuania, the Soldiers built wood frame structures, roads, tank ditches, berms, and assorted obstacles in support of NATO forces.

In July 2018, the 902d returned to Grafenwöhr, convoying more than 810 miles without incident. Upon arrival at Grafenwöhr, the company quickly reset its equipment to prepare to deploy to Hohenfels for Exercise Combined Resolve XI at the Joint/Multinational Readiness Center. During Exercise Combined Resolve, the Soldiers endured freezing temperatures, snow, rain, and ice to provide mobility and counter-mobility operations in austere conditions.

This brings us to the intrepid engineer reconnaissance team in Karliki. By May 2019, the Gladiators had completed the construction of critical infrastructure. The 3-mile-long semi-improved gravel road connects the railhead to nearby staging areas and mounted weapons ranges. The two new reinforced concrete slabs, integrated into the road, will increase the longevity of the road against tracked-vehicle use. The reinforced concrete foundation will enable the future construction of a 5,000-square-foot warehouse. With these projects completed, the 902d conducted a multimodal deployment of a horizontal platoon and maintenance element to Szentes, Hungary, to provide support for a NATO gap-crossing operation. After successfully supporting the gap crossing, the company redeployed and consolidated in Grafenwöhr. In August 2019, the 902d built a cross-section of a concrete airstrip at the Grafenwöhr Training Area to provide an airfield demolition and repair training asset to USAREUR units. The time at home in Grafenwöhr was short-lived.

Bracing themselves against subfreezing temperatures, the Soldiers of the 902d once again headed to the Joint/Multinational Readiness Center to support NATO forces in January 2020. The Gladiators had faced these conditions many times before. This time, however, the 902d was the only American force in a multinational, Polish- and Dutch-led task force. Working with its NATO allies, the 902d enabled defensive operations and subsequent rapid breaches for counteroffensive operations. After a brief respite, the Gladiators returned to Grafenwöhr and immediately began focusing on increasing their lethality through ranges and field training.
Throughout its 78-year history, the 902d Engineer Construction Company has always had a unique role and mission. The Soldiers of the 902d maintain a connection to the company heritage through the symbolism of their distinctive unit insignia: The red coloring and vertical shovel represent the Corps of Engineers, the blue coloring and horizontal perforated steel planking represent the unit connection to the Army Air Corps and its role in building airfields, and the motto “We Will Conquer” embodies the fighting spirit of the Soldiers of the company.

Today, the 902d maintains a high operational tempo, providing critical construction and combat capabilities throughout Europe. Despite the company’s history as an engineer Air Force headquarters company, an assault float bridge company, a vertical-construction company, and an engineer construction company, the indomitable spirit of the Soldiers of the 902d has remained the same. Wherever the Gladiators go, one thing is certain: We Will Conquer.

Captain Rindone is the commander of the 902d Engineer Construction Company. He holds a bachelor’s degree in civil engineering from the U.S. Military Academy—West Point, New York, and a master’s degree in civil engineering from Missouri University of Science and Technology at Rolla. He is a certified project management professional and professional engineer.

Captain Wasson is a project manager in the New Orleans District, U.S. Army Corps of Engineers in Louisiana. He holds a bachelor’s degree in engineering management from the U.S. Military Academy—West Point, New York, and a master’s degree in engineering management from Missouri University of Science and Technology at Rolla. He is a certified project management professional and a certified associate in engineering management.

Colonel Lloyd is the command engineer for U.S. Forces Korea. He is the chair of the Demining Committee for the UNC. He holds a master’s degree in strategic planning from National Defense University, Washington, D.C.

Major Born is the command operations engineer for U.S. Forces Korea. He is also the UNC mine action officer and liaison with ROK engineers. He holds a master’s degree in geological engineering from Missouri University of Science and Technology at Rolla.

Endnotes:


5 Ibid.


7 The demining season is determined by weather conditions that permit the activities necessary for removal of mines and unexploded ordnance. The length of the season depends on the location, but the season generally consists of warmer months with little precipitation, as lower temperatures can cause freezing and excess precipitation can cause unsafe conditions.

8 “Full Text of President Moon Jae-in’s Speech.”


10 “Full Text of President Moon Jae-in’s Speech.”
According to Army Doctrine Publication (ADP) 3-90, Offense and Defense, “Wet-gap crossings are among the most critical, complex, and vulnerable combined arms operations. A crossing is conducted as a hasty crossing and as a continuation of the attack whenever possible because the time needed to prepare for a gap crossing allows the enemy more time to strengthen the defense. The size of a gap, as well as the enemy and friendly situations, will dictate the specific tactics, techniques, and procedures used in conducting the crossing.”

The Third Infantry Division (3ID) recently conducted a wet-gap crossing leader professional development session in the greater Fort Stewart, Georgia, area as a part of the Lieutenant General Michael E. Kurilla (XVIII Airborne Corps Commander) Corps Leader Forum. A wet-gap crossing is a complex operation that begins with the critical steps of site selection and preparation. Upon mission assignment, one of the first problems that 3ID identified was determining the location of a site suitable for executing wet gap-crossing operations. After staff analysis and the presentation of courses of action, Major General Antonio A. Aguto, 3ID Commander, decided that the wet-gap crossing would occur on Pineview Lake (Pond 1), in the Fort Stewart Training Area.
Pond 1 is located on the western boundary of the Fort Stewart Training Area. The maximum dimensions of Pond 1 are 800 meters in width by 1,000 meters in length. The pond serves as a recreation site for Fort Stewart Soldiers, civilians, and retirees to enjoy kayaking, fishing, and other water sports. Depending on the time of year and the amount of rainfall received, the water level of the pond rises or falls, preventing or enhancing opportunities for activities.

In November 2019, the 3ID notified the 92d Engineer Battalion, Fort Stewart, of a ramp emplacement project for a wet gap-crossing exercise on Pond 1, scheduled for July 2020. Upon receiving notification, the Operations Section, 92d Engineer Battalion, inquired about conceptual plans and products regarding how the wet-gap crossing would be conducted on the selected site. Additionally, the survey and design officer in charge inquired about ramp design and construction to support the wet-gap crossing operation. The 3ID informed the 10th Brigade Engineer Battalion, Fort Stewart, that the 1st Armored Brigade Combat Team, Fort Stewart, would take the lead on developing the concept of operation for the exercise and that the brigade design engineer, 926th Engineer Brigade, Montgomery, Alabama, would take the lead on design.

Army maneuver units rely on Army engineer units to provide gap-crossing capabilities. The engineer unit that most commonly provides gap-crossing capabilities is the multirole bridge company (MRBC). A brigade engineer battalion has organic gap-crossing capabilities, but not enough to support gaps that are larger than 18.3 meters. An MRBC has the capacity to bridge one 213-meter gap or two 107-meter gaps and requires a minimum depth of 2 meters in order for bays to expand when placed in a body of water. At the time of site selection for the wet-gap crossing operation, Pond 1 depths were unknown. Planners assumed that since the depth of the pond supported personal boat launching, the pond could support an MRBC bay launch.

As planning progressed, the U.S. Army Reserve units of the 361st MRBC, Spartanburg, South Carolina, and the 310th MRBC, Fort A. P. Hill, Virginia, received warning orders to provide support to the 3d Battalion, 69th Armored Regiment, Fort Stewart, and the 1st Armored Brigade Combat Team for the wet gap-crossing exercise. Meanwhile, the 92d Engineer Battalion continued coordination with the 926th Engineer Brigade design engineer for a design of the ramps to support the wet gap-crossing exercise. Over a planning period of 4 months, with in-progress reviews occurring over holiday leave, the initial concept of operation and design for the wet-gap crossing were distributed to stakeholders for bottom-up feedback and refinement. The concept identified the requirement for engineer dive support to determine the depths of the pond and construction support to emplace up to seven ramps as launch points for the MRBCs.

The 92d Engineer Battalion continued coordination with the 926th Engineer Brigade design engineer for a design of the ramps to support the wet gap-crossing exercise. Over a planning period of 4 months, with in-progress reviews occurring over holiday leave, the initial concept of operation and design for the wet-gap crossing were distributed to stakeholders for bottom-up feedback and refinement. The concept identified the requirement for engineer dive support to determine the depths of the pond and construction support to emplace up to seven ramps as launch points for the MRBCs.

The 92d Engineer Battalion has an engineer dive team and construction support assets organic to its organization. The battalion assigned the 569th Dive Detachment and the 526th Engineer Construction Company to support the mission. The 569th is one of five Regular Army dive
detachments stationed at Joint Base Langley–Eustis (JBLE) with three additional dive detachments. The 526th is one of the two battalion construction companies. After receiving the mission, issuing a warning order, and conducting a site reconnaissance, the 526th began refining the plan to construct the ramps and accomplish the mission. The 569th completed a side sonar scan and determined that the pond was deep enough to support emplacement of the improved MRBC ribbon bridge bays. The ramps were constructed so that they were 20 feet wide by 40 feet long, with a 15 percent slope along the last 20 feet of ramp leading into the water. This slope enabled the end of the ramp to descend to a depth of 2 feet below the surface of the water, allowing for unobstructed equipment launching. Construction of the ramps occurred in three phases.

The first phase of construction consisted of excavation of the site and construction of the ramp base. A few different methods were used for excavation. When soil conditions permitted, a D6 bulldozer cut and pushed material into the water, creating a temporary dam. When soil conditions could not support heavy equipment, a 240D hydraulic excavator removed soil from the site. Once excavation concluded, the ramp base was constructed. This included—

- Stretching geotextile fabric over the length of the ramp.
- Adding 12 inches of #4 (1–2-inch diameter) gravel.
- Covering the gravel with another layer of geotextile.

After the base was complete, the surface was constructed.

The second phase of construction began with the creation of the ramp surface. Four 20-foot by 10-foot sections of Geocell™ panels were filled with 8 inches of gravel. An additional 4 inches of gravel was laid on top of the Geocell panels to protect them from heavy-equipment traffic.

During the third phase of construction, equipment operators placed loose stone at the end of the ramp to assist users in recognizing it as the end.

The execution of this construction project occurred under Novel Coronavirus (COVID-19) conditions. The 92d Engineer Battalion briefed and received approval from Major General Aguto to execute the construction on 27 April 2020, with a “no-later-than” completion date of 15 June 2020. Only 30 of the 42 days allotted to complete the project were actual workdays. Each ramp took approximately 3 to 5 days to construct, and the company completed the project ahead of schedule.

While the MRBCs rehearsed the execution of the wet-gap crossing exercise, the boat operators discovered spoils on the banks of Pond 1. The spoils, which created an inability to properly set the ramps, required removal. At the time of the rehearsals, the Soldiers of the 526th who executed the project were in preventive quarantine due to COVID-19 mitigation and the battalion assigned the equipment platoon of the 530th Clearance Company to remove the spoils. The company accomplished the mission and the wet-gap crossing exercise was a success.

Having the appropriate equipment and experience saves time. The Soldiers who designed and constructed the seven ramps in support of this wet-gap crossing exercise had no previous experience in executing this type of mission. When a pandemic is factored in, mission accomplishment becomes even more difficult. The leaders and Soldiers of the 92d Engineer Battalion demonstrated how to live the motto “Essayons.”

Endnote:


Major Woodlin served as the operations officer of the 92d Engineer Battalion, 20th Engineer Brigade, during the wet-gap crossing exercise described in this article. He holds a bachelor’s degree in construction management from the North Carolina Agricultural and Technical State University, Greensboro, and a master’s degree in real estate development from Auburn University, Alabama.
How many sappers and how much time does it take to conduct line-of-communication bridging operations? These were the questions that were to be answered at the Yakima Training Center, Washington, in August 2020. With no experience in wet-gap crossing operations, the 2d Platoon, 571st Sapper Company, 864th Engineer Battalion, was directed to conduct gap-crossing operations using the Acrow© 700XS prefabricated bridge system. This article highlights how the mission was accomplished and discusses lessons learned. The goal is to provide a baseline of knowledge and expectation for units with little to no experience in conducting gap-crossing operations using the Acrow 700XS system.

2d Platoon included 24 sappers, seven horizontal-construction engineers, and two wheeled-vehicle mechanics. Horizontal-construction engineers were essential due to the heavy use of engineer equipment such as the hydraulic excavator (HYEX) and 30-ton bucket loader. There was enough manpower available to complete the mission, allowing for a greatly needed and forgiving work-rest cycle, considering that temperatures exceeded 110°F. Novel Coronavirus (COVID-19) mitigation measures were also put in place to ensure Soldier safety throughout the exercise. All Soldiers remained in a bubble while at the Yakima Training Center, they wore masks while staying in the barracks, and their temperatures were checked twice a day. However, facemasks were not worn during the actual exercise due to safety concerns regarding heat casualties and to allow for clear communication. Interaction with people outside of the platoon was limited. There were no COVID-19 cases, and no Soldiers demonstrated symptoms during the operation.

The 571st is one of the first non-bridging units to conduct gap-crossing operations of this scale. The exercise took place in two phases. The first phase consisted of an instructional operation led by a subject matter expert; the second consisted of a confirmation operation without guidance. At the start of the mission, the 571st did not have a working knowledge of the bridge system. For future units conducting gap-crossing operations, a clear understanding of the equipment that will be required is critical to mission success.

### Essential Equipment

The minimum equipment necessary for constructing a successful crossing using the Acrow 700XS system includes—

- **HYEX.** The HYEX is as the primary equipment asset and is required for Day 1 construction.
- **Levels.** Bubble levels or laser levels are required for preparing the bridge construction site.
- **Cribbing.** The following items are required for cribbing:  
  - 32 feet of 4-inch by 4-inch wooden planks.
  - 32 feet of 2-inch by 4-inch wooden planks.
  - Six pallets of 0.5-inch-thick wood for leveling the rollers on the construction site.
- **Chain.** Four sets of 14-foot-long chain, with hooks on either end, are needed in order to lift, tie down, and transport equipment and to secure the bucket loader to the bridge.
- **D-handle pickets.** Three-foot-long D-handle pickets with maximum 1.5-inch-diameter solid metal poles are used to slam pins into tough-to-reach gaps as well as to lock the bridge in place.

Once on-site, the bulk of the equipment, which was tightly packed inside six 40-foot containers, was pulled out with the use of a 6-ton forklift, which allowed for maneuvering inside the containers. The use of this small forklift avoided the need to connect chains to the equipment to drag it out of

Editor's note: Appropriate social distancing protocols were followed, masks were removed for the purpose of the images in this article.
the containers. After the equipment was inventoried, it was transported to the gap-crossing site, approximately 5 miles away. The recommended transportation equipment consists of a palletized load system with at least four flat racks and an M870 trailer to transport the longer pieces of equipment.

Site Layout

The first task at the gap-crossing location was to conduct site layout, which entailed removing vegetation, leveling dirt, and placing rollers, as shown in Figure 1. Leveling the dirt was a larger undertaking than originally anticipated due to the tolerance requirements of the rollers. The rollers needed to be within 0.25 inch apart across the site. Insufficient time and effort went into the site layout process during the first phase of the exercise, and that was manifested during the first bridge launch. The launching process was greatly hindered by the uneven surface that resulted from inaccurate leveling of the dirt and placement of the rollers and overnight settling of the ground. Consequently, the bridge constantly needed to be jacked up and releveled, adding well over an hour to the launch process.

General Construction Method

The construction process is broken down and organized based on the number of bays required by the bridge. Bays serve as the building blocks of the bridge and act as joints between sections. Each bay is approximately 14 foot long by 10 feet wide, weighs in excess of 4,000 pounds, and is composed of two side walls, with transoms bolted between them. The side walls are comprised of two panels connected by cross braces. Transoms are large I-beams that connect the left and right walls together. The side walls serve as linking points between the bays, and are joined by driving pins into eyelets. Figure 2 shows a transom being lifted into place with a HYEX.

The general bridge construction process is systematic and repetitive and can be learned in 2–3 days of training. Bridge construction starts by building the nose, which is similar to a full bay, except that the side walls have single panels, making the nose much lighter. The next step involves building the desired number of bays, adding
decking, and then placing counterweights at the ends of the bridge to correct the center of gravity. The counterweights consist of stacks of decking that allow for the bridge to safely span the gap. Once all steps are completed, a final check is made to ensure that the bridge is ready for launch. The bridge is then pushed across the gap, primarily through the use of heavy engineering equipment. (During this phase of the exercise, a 30-ton bucket loader with forklift attachments was used to move the bridge forward, as shown in Figure 3. Use of the bucket loader allowed for making small adjustments to the height and glide path of the bridge.) Once the bridge is fully across the gap, the near side is jacked down, ramps are added, and decking is constructed. The bridge is then ready for use.

There are specific requirements for the number of bays, length of the nose, and amount of counterweight needed to safely launch each bridge. These factors are determined by the distance of the gap, bank conditions, and the maximum weight of vehicles to be supported. For this specific operation, the span covered a distance of 25 meters and the banks were already improved. These factors were used to determine that the bridge needed to have four nose bays, six bays consisting of double panels, and 11 stacks of decking counterweights.

**Task Organization**

To complete this exercise, the platoon was separated into left, right, and center teams and a heavy-equipment crew. Each right, left, and center team was composed of five sappers, and the heavy equipment crew was composed of seven construction engineers. The noncommissioned officer in charge of each team was assigned tasks that entailed rigging loads, hammering pins in place, bolting cross braces, moving transoms into place, and ensuring Soldier safety. The heavy-equipment crew split its time between the HYEX and 30-ton forklift. The HYEX served as a crane by attaching load-lifting equipment by the cables suspending the transom, as shown in Figure 2. It moved the transoms and side walls into place, while the 30-ton forklift was used to prepare more loads for transport, allowing the HYEX to remain stationary and speeding up the construction process.

**Results**

The time required to complete each section was recorded in order to gauge improvement and estimate construction times for future operations. Time comparisons are shown in Table 1. The instructional phase revolved around learning how to construct the
sections. The subject matter expert allowed Soldiers to make mistakes so that they could learn how to correct them for the future. This added considerable time to the process, but it paid off during the confirmation phase, as the platoon was able to fix the issues as they arose. Both phases were relatively limited, so major assumptions cannot be made from the data; however, a few simple conclusions can be drawn.

Before starting the instructional phase, the subject matter expert indicated that, for planning purposes, construction of each bay was assumed to take 1 hour. For the first portion of that phase, the HYEX was unavailable and the nose portions were built by hand. Manipulation of the 1,000+-pound pieces of equipment into place proved to be as challenging as it sounds. The platoon did come to appreciate the presence of the HYEX for the construction of subsequent bays. After working with the equipment and gaining a better understanding of the building process, the confirmation phase took approximately half of the time of the instruction phase.

The site was generally flat, causing the site layout process to go much quicker than it would with steeper terrain. Very experienced HYEX operators also made the construction go much quicker since the operators were comfortable maneuvering equipment while Soldiers worked on the ground. With these two factors, construction speeds were consistently faster than the planning factor of 1 hour per bay. This is particularly notable, given that Soldiers were working in temperatures in excess of 110°F. Using the 30-ton forklift to push and manipulate the bridge during launch prevented the need to jack the bridge up every time the glide path was off, also resulting in time savings during the mission.

The equipment proved to be easy to take apart and transport. 2d platoon was able to fully disassemble all components, load them onto flat racks and M870 trailers, and transport them back to the equipment yard in less than half a day. The size of the bridge may have made this process faster than most; however, the speed at which the bridge was broken down and moved was surprising.

**Conclusion**

Having trustworthy and capable noncommissioned officers is critical to mission success. Every portion of the bridge construction requires leaders to step up and take responsibility for completing team tasks. Early integration of the attached construction engineers into the platoon was instrumental in ensuring unit cohesion. The platoon gained a significantly stronger understanding of the construction process during the confirmation phase and was able to cross the gap in half the time of the instructional phase. A platoon of 24 sappers and seven construction engineers proved to be sufficient manpower to construct the bridge. After 3 weeks of training, the Soldiers of the 571st felt confident in conducting follow-on line-of-communication bridging missions.

First Lieutenant Schreck is a platoon leader for the 571st Sapper Company, 864th Engineer Battalion, 555th Engineer Brigade, Joint Base Lewis–McChord, Washington. He holds a bachelor’s degree in hydrology from the University of California, Santa Barbara.
Full fielding of the Grove Manitowok K-Series 4060 (GMK4060HC) heavy crane depends on the implementation of simulators, national accreditation, and prioritization of multirole bridge companies (MRBCs). The fielding of the GMK4060HC comes at a time of tremendous change within the Horizontal-Skills Division (HSD) at the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri. The implementation of simulators focused on reducing the costs of fuel consumption, and on-site equipment requires the attention of every division chief at Training Area 244. A shift from operating time on actual heavy equipment to simulator training time upends the traditional program of instruction (POI), creating the need to revisit it. Additionally, HSD crane instructor accreditation and the conduct of mobile training teams consume the focus of key personnel. Over the next year, HSD will maximize its efforts to train Soldiers currently residing in, or moving to, high-priority units that require personnel to be trained on the 60-ton crane.

Heavy-Equipment Simulators

Implementation of heavy-equipment simulators understandably initiates an overhaul of labor, equipment, and POI considerations at Training Area 244. Furthermore, in order to understand the full effect of the machines on the HSD table of distribution and allowances, an analysis of new training on simulators is required. Six of the 10 HSD training annexes, which include training for the additional skill identifier of C4–Crane Operator, will receive simulators over the next 2 years. Many USAES leaders intend for these machines to reduce the hefty fuel requirements and equipment-to-personnel ratios needed to train the equipment operators of tomorrow. However, this does not mean that we can rename the so-called...
“million-dollar hole” the “half-million-dollar hole” anytime soon. Instead, an expectation of many changes during the Training Area 244 simulator transformation is more realistic.

Repurposing of buildings to facilitate the addition of simulators requires contract support from the Department of Public Works, Fort Leonard Wood. HSD received specific instructions from the U.S. Army Program Executive Office of Simulation, Training, and Instrumentation, Orlando, Florida, regarding the heating, cooling, electric, and dimension requirements of each building. Next, representatives from Applied Visual Technology Simulations©, Orlando, must validate that the buildings meet the specifications prior to the installation timeline. Outfitting the buildings with operational simulators marks the start of the POI revision process.

With the help of the Directorate of Training and Leader Development, USAES revision of the POI is the last step in converting to the use of simulators for training. Crane Operator Course instructors will teach Soldiers to operate the 22-ton crane and the new 60-ton heavy crane. This addition will extend the course by 2 weeks, for a total duration of 5 weeks and 2 days. Additionally, the POI will include two hands-on testing fields. Adding the heavy crane to the POI and training the instructors on the new piece of equipment has led HSD to seek national accreditation for those who complete the Crane Operator Course.

National Accreditation

The Crane Operator Course is currently undergoing a national accreditation process through the National Commission for the Certification of Crane Operators (NCCCO), which has been in existence for 25 years and is represented by contractors, labor unions, rental firms, business owners, government agencies, manufacturers, distributors, consultants, and many others. Two civilians who work in HSD are leading the national accreditation initiative—Mr. Desmond A. Walker and Mr. Jack R. Ulrey, who are prior military members serving as the primary course instructors. They are the first Army civilian instructors to go through the NCCCO process. Facilitating local instruction, leading mobile training teams, and equipping the training site with crane simulators represent only a few of their responsibilities in seeking national accreditation. The ability of Mr. Walker and Mr. Ulrey to certify students will depend on their successful completion of the NCCCO process.

The NCCCO requires that all accreditation candidates complete written and hands-on examinations and that they graduate from the Examiner's Course. The computer-based written examination can be taken at one of 438 regional test facilities throughout the United States. The hands-on examination requires that the operator demonstrate proficiency at moving objects at an accredited testing site. The Examiner's Course certifies individuals to test others on their ability to complete the hands-on portion of the certification process. After obtaining the credentials to test students, the civilian instructors will shift their focus to the fielding of the 60-ton crane.

MRBCs

The U. S. Army Corp of Engineers (USACE) possesses the only significant capability to conduct rapid dry- and wet-gap crossings for the U.S. military. Strategic maneuver of the U.S. military depends on the MRBC ability to bridge the gap. There are only four MRBCs in the Regular Army: the 74th MRBC, Fort Hood, Texas; the 50th MRBC,
Fort Leonard Wood; the 814th MRBC, Camp Humphreys, South Korea; and the 502d MRBC, Fort Knox, Kentucky. The limited number of MRBC units means that these units remain in high demand and high priority.

Lieutenant General Todd T. Semonite, USACE Commanding General and Chief of Engineers, acknowledged an insufficiency in North Atlantic Treaty Organization bridges, as many of those bridges cannot withstand a load greater than a Military Load Classification of 70. River crossings present a problem in Eastern Europe since six major rivers exist between Germany and Estonia: the Danube, Dnieper, Elbe, Oder, Rhine, and Volga Rivers. Furthermore, river-crossing concerns in Korea led the 814th MRBC to relocate from Fort Polk, Louisiana, to the Korean peninsula. Ensuring that MRBCs possess the ability to maneuver in regions of concern is dependent on the proper training of MRBC Soldiers during the Crane Operator Course.

Obtaining the C4 additional skill identifier from the Crane Operator Course is a prerequisite to conducting new-equipment training on the GMK4060HC heavy crane. Obtaining the C4 additional skill identifier does not require instruction on the new crane itself. Units can reserve a seat for their qualified heavy-equipment operators during any available class. HSD is exploring the option of conducting insert classes within the Army Training Requirements and Resource System for newly graduated basic trainees and Regular Army Soldiers who are scheduled for a permanent change of station to an MRBC during fiscal year 2021.

**Conclusion**

The inclusion of the GMK4060HC heavy crane in the Crane Operator Course comes at a time when the way that HSD trains operators is under revision. The implementation of simulators, national accreditation, and a focus on MRBCs is leading HSD to prioritize, ensuring acquisition of the 60-ton crane at the unit level.

By the second quarter of 2021, HSD plans to run its first nationally certified Crane Operator Course. Over the next year, HSD plans to include the historical Army 22-ton crane and the new 60-ton heavy crane in the course.

Moving the Engineer Regiment into the future of warfare is dependent on adopting the most up-to-date training techniques and equipment. HSD looks forward to assisting the Regiment in implementing those changes at Fort Leonard Wood and elsewhere.
In a brigade combat team (BCT) or regiment, battalions/squadrons typically have a fire support team (FIST) that consists of one battalion fire support officer (FSO) who is a Military Occupational Specialty (MOS) 13A—Field Artillery Officer captain, one battalion fire support noncommissioned officer who is an MOS 13F—Joint Fire Support Specialist sergeant first class, one company FSO who is an MOS 13A first lieutenant or second lieutenant, one company fire support noncommissioned officer who is an MOS 13F staff sergeant, and one forward observer (FO) and one radio telephone operator who are MOS 13F privates through sergeants per platoon. However, brigade engineer battalions (BEBs) do not have MOS 13 Series fire support personnel to provide fire expertise. This article discusses why BEBs should have FISTs and support options.

In force-on-force operations, BEBs are typically in charge of the rear area and are divided across the brigade for different support functions. FISTs are not usually employed with BEBs. Engineer companies are normally tasked out, and attached to, a maneuver battalion that has its own FISTs that can provide local fire support to engineers who are located with maneuver units.

The human intelligence, signal intelligence, and unmanned aerial systems elements of a military intelligence company are typically tasked across the brigade to support maneuver units and the brigade headquarters; therefore, other battalion FISTs must provide support for those attached elements. The same applies for the signal company. This leaves military police personnel, who usually comprise just a platoon size element.

While the BEB priority for assigned or attached FIST personnel is low, after seeing multiple rotations at the Joint Multinational Readiness Center, Hohenfels, Germany (where Soldiers train for force-on-force operations and BEBs suffer significant losses to opposing forces [OPFORs] that manage to penetrate the defensive lines of maneuver battalions), I believe they require this support in some form. Once the OPFOR is in the rear area, there is little that a BEB can do to prevent being decimated—especially if it is by an enemy armored force. While it may be possible to shift fire to limit OPFOR movement and capabilities, the BEB has no fire support experts to direct this shift in fire.

During each rotation at the battalion headquarters, I spoke with the BEB staff about the fires plan and who is in charge of it. Every BEB staff member told me that they either have no fires plan for the rear area or that they were provided with the grid coordinates of a few targets upon which to request fires should OPFOR reach those locations. However, except for requesting from higher headquarters that the grid be fired upon, staff members do not know how to call for fire. Even if they do manage to get the predetermined target fired upon, they have no idea how to adjust fire or what to do after the target is hit. Most BEBs designate the battle captain in the tactical operations center, typically an operations (S-3) captain, to act as the coordinator for fire.
The BEB employs elements that conduct movement on their own within the area of operations (AO) and could, therefore, encounter an enemy force, resulting in a situation in which fire support may be critical to mission success. A route clearance team may have an escort when conducting movement around the battlefield, but neither the route clearance team nor typical route clearance escorts are accompanied by a FIST. While members of the route clearance team can call for fire, the lack of trained fire support personnel diminishes the likelihood of accurate and timely fire support. The same applies to the forward support companies that are responsible for conducting resupply missions across the AO.

BEBs frequently employ military police who conduct movements throughout the AO. Due to their flexibility and gun truck capabilities of high mobility, light armor, and weapon systems, the military police are frequently employed to escort BEB organic assets, such as the forward support companies, or set up traffic control points throughout the AO. With the wide coverage of the AO and the use of traffic control points (which act as observation posts), FOs could observe possible targets and increase the lethality of military police movements should they encounter an OPPOR.

Assigning a full FIST to BEBs is the first option proposed to address the lack of fire support. While this proposal would benefit the BEB, it is also the proposed action that is least likely to occur. Not only would the manning of a full FIST in a support battalion be an issue, but some of the FIST members would also be sparcely used in companies that are attached to maneuver units with their own FIST members.

Another possible option would be to assign a partial complement of FIST members to BEBs. The BEB could be assigned a small team that is structured to best support its needs. A first lieutenant and staff sergeant could serve as the battalion level FSO and fire support noncommissioned officer, respectively. An FO and radio telephone operator could serve as the company level FIST members for the engineer companies and military police platoon, but would not be assigned to the military intelligence company, to the signal company or, for the engineers, at the platoon level.

A third option would be to specifically attach FIST members to the BEB for operations, exercises, or individual missions as needed. The FIST members would be requested by the BEB and provided from the field artillery brigade, division artillery, or field artillery battalion, if available. After the task was completed, they would return to their organic field artillery organization. Because the attachment would be for a specific task, either of the two previous options (full FIST or partial FIST) could be utilized.

Finally, the simplest possible option would be for the BEB to designate and properly train a coordinator for fire support. At the local level, the coordinator could contact the supporting field artillery unit and any FIST element to establish fire support training or attend preexisting training together. For official training, the BEB could send its designated representative to the Joint Fires Observer Course and Joint Firepower Course. The representative would then be properly trained for directing fires for BEB operations.

While there is currently no requirement for a FIST in the BEB, it is imperative that BEBs gain some form of trained fire support. The proposed options need not be standard across the force, but may be standard for all armored BCTs, infantry BCTs, or Stryker BCTs. The main point is that BEBs need some form of fire support. With the focus of the military transitioning from counterinsurgency to force-on-force operations, fires will become an even more crucial aspect for all operations. The need for trained fire support personnel will increase across all operations.

Captain Homrighausen is the chief of analysis for the security office (G-2), Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri. He holds a bachelor’s degree in justice systems from Truman State University, Kirksville, Missouri.
If professional journals and books provide a clue about how we, as an Army, are discussing current trends and future requirements, then we are not giving enough credence to one of the three types of combat-engineering capabilities—countermobility. The Army University Press published a nine-volume set entitled *Large-Scale Combat Operations*, which includes almost no elements of defensive operations. Thematically, this set discusses military deception, combined arms maneuver, cross-domain fires, sustainment, maneuver, mobility, information operations, special operations, and close combat. Of the three types of combat-engineering capabilities (mobility, countermobility, and survivability), only mobility is a focused topic.

The lack of coverage regarding defensive-oriented operations, including countermobility and survivability, can become a prevalent problem if units do not actively address these operations at home station. The topics discussed in this article have been derived from experiential learning with infantry brigade combat teams (IBCTs); however, most of the proposed solutions can be applied beyond this singular formation.

### Trends

IBCTs, which are lighter than armored brigade combat teams (ABCTs) and Stryker brigade combat teams (SBCTs), are mostly dismounted, with some motorized elements. Because IBCT Soldiers are limited to the equipment in their rucksacks, they tend to be assigned to mobility or countermobility during dismounted operations—and IBCTs are not as well-equipped with countermobility assets as ABCTs or SBCTs. As most dismounted infantry units focus on the attack, a selection bias occurs in which dismounted sapper squads support situational and live-fire exercises with mobility (explosive) breaching capability. But why does this bias occur? And what can we do to address it?

First, home station training tends to focus on mobility over countermobility. Engineers progress through the engineer qualification tables, from Table I—Leader Task Certification to Table VI—Platoon Qualification Field Training Exercise. The training strategy impacts equal weight to mobility (and other tasks) and countermobility/survivability. We must adhere to the equal

---

**Table 1. Sample training strategy for engineer qualification tables**

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>Live</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table I</strong></td>
<td><strong>Table II</strong></td>
</tr>
<tr>
<td>Squads and Platoons</td>
<td>Leader Task Certification</td>
</tr>
<tr>
<td>Recommended Days Required to Train</td>
<td>5</td>
</tr>
<tr>
<td>Training Days Remaining on the Critical Training Path to Collective Task Proficiency</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- L - live
- STT - sergeant’s time training
- STX - situational exercise
distribution of training time, as the engineer qualification tables are designed to ensure that our formations have the requisite skills. Where the plan may go awry is with Tables V and VI. It is much easier to conduct Bangalore and brazier breaches than it is to employ craters and mines in training areas. As mines are not available and the rules for employing buried demolitions (cratering charges) vary with each installation, mobility training is the easier choice. It is incumbent on commanders and staffs to resource countermobility collective training events at home station within the applicable rules and constraints.

Second, infantry companies focus on mobility as they progress through their company level live-fire exercises. Because engineer companies—specifically sapper platoons—tend to support infantry live-fire events with mobility, this demand can interrupt or dilute countermobility training. When a BCT conducts collective training at a combat training center, it can, unfortunately, be the first time that infantry and engineer Soldiers execute countermobility in a situational or live-fire training exercise. This is due to infantry battalion live-fire training progression requirements. Although necessary, this mobility-focused training path can be an impediment to engineer countermobility training progressions. Commanders and staffs must actively seek countermobility training opportunities for engineer units.

Next, conducting countermobility training is difficult. It requires more resources (wire, pickets, mines, demolitions, heavy equipment, capable training areas) than mobility training does. Engineers are not allowed to employ mechanical means or demolitions required for abatis obstacles at some installation training areas. The opportunity to execute an abatis is rare in a Soldier’s career. Furthermore, the availability of training mines is rare outside of combat training centers. Volcanos and modular pack mine systems are neither readily available nor on all units’ modified tables of organization and equipment. An IBCT field artillery battalion rarely, if ever, employs the family of scatterable mines in a training environment. U.S. policies limit the use of different types of mines as well as the use of mines in certain geographic areas. Mobility training becomes the preferred choice by default.

Finally, our way of thinking causes us to favor mobility over countermobility training. The framework of offense versus defense inhibits our ability to consider employing hasty defenses after each offensive operation. Each time that a unit conducts an attack, it must secure and consolidate gains (except in a planned raid). The enemy generally has the ability to conduct a counterattack, which requires some level of countermobility and survivability to protect the force. When commanders decide to establish a consolidation area (particularly in the offense, as the friendly force gains territory), the transition from the attack to a hasty or deliberate defense enables freedom of action. This is true even in an infantry company. Whether mounted or dismounted, as the company maneuvers from objective to objective, it applies the protection warfighting function. Using terrain for cover and foliage for concealment, the company protects its forces. If time allows and if it has the capacity, the company can emplace point obstacles to reduce the risk or increase the chance of destroying enemy armor, with or without attached engineers.

Acknowledging these trends and remaining aware of them during training and operations provide the mental framework necessary to address countermobility shortcomings.

**Engineer Countermobility Planning**

Commanders and staffs have many engineer planning tools at their disposal when conducting operations and considering countermobility. Several doctrinal publications address bills of material and rates of work, which help to initiate planning. However, units must modify these items to fit their own version of reality. For example, specified antivehicular ditch dig rates for various blade teams do not account for operator skill, visibility, soil conditions, or weather. Leaders must continually refine unit standard operating procedures to reflect the time and assets that are realistically required to emplace obstacles.

One technique for successfully accounting for operator skill, soil conditions, and weather factors with echelon-above-brigade engineer units involves the use of a liaison. An engineer support company has a Military Occupational Specialty 120A—Construction Engineer Technician, who can liaise with the BEB staff. This warrant officer provides a critical link in realistic countermobility and survivability planning. Similarly, the construction engineer technician in a BEB operations section can serve as the BEB liaison to the IBCST staff, enhancing the capability of the assistant brigade engineer. The distribution of these warrant officers creates liaisons at echelon, enabling BCT and BEB planning efforts with realistic planning factors.

Another critical element of countermobility planning is the disposition and distribution plan for obstacle sustainment requirements. The empowerment of obstacles is a supply-intensive effort; engineers need construction materials, barrier materials, and demolitions during different parts of an operation. The use of configured combat loads (CCLs) can help (see Table 2, page 84). Specifically focused on future engineer needs, CCLs reduce the time required to build obstacle packages. However, not every plan survives first contact.
To configure the combat loads, commanders and staffs must analyze the terrain and the enemy. The steps of intelligence preparation of the battlefield cover this analysis, but engineers can do more. Working with the IBCT geotechnical intelligence team to identify where enemy armor cannot operate due to seasonal weather can prove useful. The obstacle effort can be reduced if enemy armor is further restricted due to hydrology. Using the enemy situational template created by intelligence staffs can help determine probabilistic obstacle requirements. With this knowledge, engineer units can more accurately determine their basic countermobility load. Beyond the basic load, sustainers must place CCLs with distribution teams, including company trains, field trains, and the brigade support area. Commanders need distribution plans based on the battlefield framework, the phase of the operation, and triggers that enhance the transition from offense to defense or vice versa.

Whether platoon leaders or company commanders, task force engineers embedded in maneuver battalion staffs can increase the network of knowledge across the IBCT and provide realistic planning factors. Brigade engineer planners, BEB operations and logistics teams, and task force engineers form a network that reports the CCL status across the IBCT operational area. This effort reinforces successes and can mitigate failures when IBCTs execute hasty and deliberate defensive operations. This network allows the IBCT and BEB to synchronize all engineer assets.

**Synchronization of Engineer Assets**

A well-known task organization framework concept that could be useful involves a company team, commonly referred to as a team dig. With this company team organization, all blade assets are traditionally placed under a single company command—either in an engineer support company or another engineer organization. All blade assets are centralized in the command to execute countermobility and survivability tasks for the organization that the company supports. This team concept also includes a synchronization matrix focused on maximizing the blade capability.

This organizational concept is flawed for two reasons. First, it limits the synchronization of engineer assets to blades only. It fails to include high-mobility engineer excavators, which provide hasty countermobility and survivability support through the use of the bucket, backhoe, and chainsaw attachments. Second, it omits sapper squads/platoons. Although these sapper units are typically task-organized to infantry battalions, their efforts to construct obstacles as part of the brigade obstacle plan are not included in overall synchronization if that is solely a team dig function.

The team dig approach can work if commanders and staffs consider the operational framework and phasing of the operation. Consider a combat training center rotation in which an IBCT controls three infantry battalions, a reconnaissance squadron, an engineer battalion, a fires battalion, a support battalion, and a direct-support aviation task force. All of these units require some form of countermobility and survivability capability during different phases of the operation. They experience these needs at differing places—in the deep, close, or consolidation areas of the IBCT. It is possible that blades are required for digging antivehicular ditches near the forward line of troops, deflade positions for M119s and M777s in the close area, and protective positions for AH64s in the consolidation area. The sheer size of the IBCT area of operations is larger than that which a single engineer company headquarters can effectively command and control. Thus, it is the responsibility of the IBCT engineer battalion to synchronize and manage.
Consider the team dig concept, and reflect on the points that Captain Gregory M. Shepard makes in his article entitled “Team Dig Versus Organic Task Organization: Observations from an OTC at the NTC,” when he discusses sustaining and prioritizing the needs of the ABCT across its area of operations. IBCTs need to understand the limits of a company headquarters in synchronizing multiple operations for eight battalions in a large-scale combat operation. An expanded engineer synchronization matrix that includes blades, high-mobility engineer excavators (HMME), and sapper units is a helpful tool. The hidden problems with this approach include the limited number of light equipment trailers and the requirements for bulk fuel, construction materials, demolitions, and maintenance. Once commanders and staffs identify these concerns and mitigate the risks, engineers can implement actions in varying formations and unique operations.

**Formations, Actions at the Halt, and Forced Entry**

We tend to understand the basic load of an individual or crew-served weapon system, but not potential basic loads for countermobility needs. If a dismounted engineer squad were to cross the line of departure, planning to reduce a single dismounted breach lane, then it would have the demolitions required to perform this mission. However, the leaders would be unlikely to assess the potential countermobility needs after assisting in seizing the objective. Some useful questions that leaders might ask when considering countermobility for the mission include—

- What is the demolition requirement for this breach lane?
- What else can we do with these demolitions if we bypass the obstacle?
- What other demolition components should we carry to employ this combat load in other situations?

Consider an engineer squad supporting an infantry company and carrying two brazier charges’ worth of components to execute one dismounted breach. If the squad does not need to use these demolitions, or only needs to employ one of them, how many other components could it bring to create an abatis if the enemy can employ a vehicle? Could the squad members carry a few selected lightweight attack munitions for an antivehicle ambush? The abatis and selected lightweight attack munitions provide different capabilities when added to the combat load. The brazier breach employs C4 explosive, detonation cord, and initiators for other uses. A few additional demolition items can expand the capability of the squad and enable countermobility.

If the engineer formation is mounted, leaders might ask a similar set of questions. In this case, it would be more likely that the engineer formation could add construction materials (concertina wire, barbed wire, pickets) to its basic load. This would increase its ability to conduct countermobility operations as it performed actions at short and long halts. Leaders could add HMMEs to mounted formations, as the equipment is capable of maintaining the tempo of the formation, further increasing hasty countermobility and survivability operations. However, enemy identification of these capabilities can trigger actions to destroy the HMEE. Similar ideas apply to blade and gap-crossing capabilities.

Forced-entry operations offer different challenges. When units conduct air assaults, leaders must invest special consideration, as not every countermobility asset fits neatly inside, or slung underneath, a helicopter. The same applies to airborne operations. Demolitions are smaller than construction materials and add to countermobility. Soldiers can easily carry shape charges, crater charges, and block explosives inside aircraft. Leaders must apply risk mitigation measures to initiators, as necessary, to keep the operation safe.

**Conclusion**

To maintain the necessary balance between training and knowledge of the three elements of combat engineering across the Engineer Regiment, we must account for, and plan to improve, our countermobility capability. When offensive operations halt, stall, or achieve their objective, units must defend the newly found gains. Whether hasty or deliberate, countermobility operations preserve combat power, protect critical assets, and allow offensive operations to continue.

**Endnotes:**

8. *Blade teams* is the author’s term for bulldozers, including the D5, D6, D7, armored combat earthmover, and deployable universal combat earthmover.

Major Carvelli is the operations officer for the 326th Brigade Engineer Battalion, 1st Brigade Combat Team, 101st Airborne Division (Air Assault). He holds a bachelor’s degree in civil engineering technology from the Rochester Institute of Technology, New York, and master’s degrees in operations management from the University of Arkansas, Fayetteville; civil engineering from the University of Florida, Gainesville; defense and strategic studies from the U.S. Naval War College, Newport, Rhode Island; and military operations from the U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.
After two rotations as an observer/coach-trainer (O/CT) augmentee and one as a horizontal-construction engineer platoon leader, I hope to give back to the U.S. Army Engineer Regiment by providing a valuable discussion on how to best employ horizontal-construction engineers to support maneuver. This article makes two points: It is a duty to maximize horizontal-construction engineer employment, and all leaders are responsible for doing so.

When my horizontal-construction platoon emplaced 700 meters of antitank ditch on a cold, wet, rainy/snowy, November evening at the Joint Multinational Readiness Center, Hohenfels, Germany, I couldn’t help but smile and be proud; on the downside, that was the only planned horizontal-obstacle effort for the 72-hour defense. For the next 48 hours, the D7 bulldozers were not employed; instead, they sat idle behind the lines. Feedback from rotation to rotation indicates that this is a trend. Leaders underemploy horizontal-construction engineer assets. The maneuver commander, task force engineer, engineer commander, platoon leader, and noncommissioned officers are the leaders responsible for employing engineer assets to leverage maneuver commander positions.

The Joint Multinational Readiness Center is one of three Army central training centers. It serves as the training area for brigade size training exercises conducted by U.S. forces in conjunction with allies and partner nations. The first half of the exercise is normally focused on defense, followed by a focus on offense during the second half. On defense, horizontal-construction engineers support maneuver by shaping the terrain—emplacing antitank ditches, vehicle positions, and berms. On offense, horizontal-construction engineers improve rear areas by berming the brigade.
support area. Joint Multinational Readiness Center statistics indicate a low percentage of “dig time” on both defense and offense. During the rotation in which I participated as a horizontal-construction platoon leader, we dug the aforementioned 700-meter antitank ditch in approximately 9 hours over the course of one night and then sat idle. Digging for 9 hours resulted in a dig rate of 12.5 percent based on the total amount of dig time available on defense (72 hours).

The maneuver commander wanted a 700-meter antitank ditch to be constructed without vehicle fighting positions. He was concerned that the bulldozers would give away the location of the antitank ditch if vehicle fighting positions were constructed. We satisfied the commander’s requirement by completing the requested antitank ditch. At that point, the maneuver commander indirectly requested that we integrate with the combat engineers, laying wire and pounding pickets. I did not jump on the opportunity, knowing that we had four D7 bulldozers with which to provide support and that we were horizontal-construction engineers—not combat engineers.

Was it right for us to lay idle for the next 48 hours? Were those 48 hours wasted, considering that the mission was complete? If it had taken 72 hours to complete the antitank ditch, then would we have been considered successful since we would have had a 100 percent dig rate? We were capable of providing much more than 700 meters of antitank ditch in 72 hours; thus, we should have provided more. Army Doctrine Publication (ADP) 6-0, Mission Command: Command and Control of Army Forces, states, “Disciplined initiative refers to the duty individual subordinates have to exercise initiative within the constraints of the commander’s intent to achieve the desired end state.” We had the duty of providing maximum horizontal-construction engineer support to enable a successful defense. In a perfect world, horizontal-construction engineer support would consist of the emplacement of one obstacle after another, according to the order of priority necessary to support the mission.

Who’s fault was it that 48 hours of dig time were wasted? Was it the maneuver commander’s fault? Was it the task force engineer’s fault? As the platoon leader, was it my fault? Or was it the fault of the noncommissioned officers? Upon realizing how quickly we had completed the antitank ditch, the maneuver commander should have requested more from us. He could have asked for decoy vehicle fighting positions to give away a false location. The task force engineer should have realized that we could put in more effort and, thus, should have planned for more. As the platoon leader, I should have better communicated our capabilities to the maneuver commander during planning and more aggressively pursued dig work in the remaining
48 hours. The noncommissioned officers should have shared more of their experience and subject matter expertise to produce a better plan and aggressively pursued dig work during execution.

During my second rotation as an O/CT augmentee, a horizontal-construction platoon leader really took the initiative. He completed all of the assigned obstacle construction with more than 24 hours left to set up the defense. He made known his available dig assets and requested more obstacles for emplacement. Although his command notified him that there was no other requested dig effort, the platoon leader decided that his horizontal-construction platoon and its valuable assets would not sit idle for 24 hours. Instead, he had the platoon emplace an antitank ditch across the entire battalion area of operations engagement area. In the after action review, the maneuver commander stated that the obstacle had not been emplaced in the correct area, but did not deny its usefulness. A permanent-party O/CT indicated that he was the best platoon leader in the brigade because, in the absence of orders to meet the maneuver commander’s intent, he had taken the initiative and put his blade assets to use, understanding the big-picture mission and desired end state. Did the platoon leader’s actions constitute disciplined initiative, or did they represent gross disobedience to orders and command authority? Were the platoon leader’s actions right (as stated by the O/CT) or wrong—or somewhere in the gray area between right and wrong? Paragraph 1-45, ADP 6-0, states, “The commander’s intent . . . helps subordinate and supporting commanders act to achieve the commander’s desired results without further orders . . .” The platoon leader took disciplined initiative to meet the commander’s intent; therefore, his actions were right.

It is a duty to maximize horizontal-construction engineer employment, and all leaders are responsible for doing so. Former Secretary of Defense James (Jim) Mattis states in his book entitled Call Sign Chaos: Learning to Lead, “You don’t control your subordinate commander’s every move; you clearly state your intent and unleash their initiative.” Furthermore, General Mark A. Milley argues that leaders should be empowered to take “disciplined disobedience to achieve a higher purpose.” To accomplish the duty of maximizing horizontal-construction engineer employment, superiors must enable initiative and subordinates must seize it.

Endnotes:

2Ibid.

Captain Swanson is currently attending the Civil Affairs Qualification Course, Fort Bragg, North Carolina. He is a graduate of the U.S. Military Academy–West Point, New York.
In the summer of 2020, the 502d Multirole Bridge Company (MRBC), 19th Engineer Battalion, Fort Knox, Kentucky, teamed up with the Fort Knox Department of Public Works (DPW) to demolish two maintenance bays. Both buildings had been erected in the early 1940s as part of the build-up to World War II, and both buildings were located in the 19th Engineer Battalion Mansfield Motor Pool. The buildings had been condemned for years, were filled with asbestos, and occupied approximately half an acre of valuable real estate in the motor pool.

3d Platoon, 502d MRBC, was assigned to oversee project execution. 3rd Platoon is a horizontal-construction platoon made up of 23 Soldiers; it possesses construction equipment ranging from a D7 bulldozer to a hydraulic, electric, pneumatic, petroleum-operated equipment kit. 3d Platoon's manpower and access to battalion equipment allowed the project to proceed with minimal assistance from outside contractors. The platoon augmented its organic capabilities with equipment from other companies, including dump trucks and a skid steer from the 42d Clearance Company, Fort Knox; a hydraulic excavator, BOMAG® roller, water distributor, and grader from the 15th Engineer Construction Company, Fort Knox; and BROCO® torches from the 541st Sapper Company, Fort Knox. Coordination with DPW and the Ginn Group, Fort Knox, provided the unit with straw wattles, silt fencing, power tools, a fork-lift, and a sky lift.

By First Lieutenant Anne M. Schreiner

Predemolition photograph of one of the Mansfield maintenance bays
The planning phase started by identifying the safest approach for building removal. After consulting with DPW, the 19th Engineer Battalion survey and design team, and the 19th Engineer Battalion leadership, 3d Platoon concluded that the first step should be the implementation of its environmental plan. Next, the platoon would remove internal structures, followed by the walls. Finally, the bulldozer would be used to compromise strategically located I-beams in order to collapse the building on itself.

One of the stipulations of building removal involved separating metals from the rest of the debris so that the metal could be sent to the Fort Knox Recycling Center. During the initial walk-through of the site, Staff Sergeant Kyle Ferguson, platoon sergeant, 3d Platoon, and noncommissioned officer in charge of the project, pointed out that the majority of the internal pipes, electrical boxes, air ducts, and cages, could potentially become lost in the debris or difficult to remove once the buildings were down. In an attempt to recycle as much metal from the building as possible, 3d Platoon started the demolition process by removing internal items for recycling. Internal structures were removed using the hydraulic, electric, pneumatic, petroleum-operated equipment kit and a rented scissor lift. Soldiers used sledgehammers and crowbars to dismantle the dry wall and drop ceiling. Pipes, electrical boxes, doors, and windows were removed from each maintenance bay.

With internal structures removed, 3d Platoon used the skid steer to knock down exterior concrete masonry walls. The walls easily came down, allowing for the quick removal of debris before moving on to the main structure.

Although the initial plan involved using the bulldozer to degrade the I-beams and to bring down the structure, unforeseen challenges were encountered. For example, the I-beams were surrounded by reinforced concrete bollards to prevent vehicles from damaging the structure while it was in use. The bollards quickly stopped the D7 bulldozer in its tracks. The strategy was then adjusted, and the bulldozer was used to tap and loosen the I-beams. Once complete, the hydraulic excavator was brought in and used to pull the overhead I-beams down. The platoon methodically worked from the east to west end of each building, pulling the main frame of each bay over in less than a day. This change allowed Soldiers from 15th Engineer Construction Company to spray sections of the crumbling building with the water distributor (a previously unused technique) while the hydraulic excavator brought the building down, immediately forcing airborne debris to the ground.

Debris was separated into piles of recyclable materials and waste. Recyclable materials were transported to the post recycling center. A total of 206,880 pounds of metal was turned in at the recycling center, earning the Army $11,275. Waste was removed using dump trucks and light-equipment transporters with M870 trailers and was transported to the landfill. Waste included concrete, rock, gypsum tiles, vegetation, and soil. The vegetation that was removed from the job site was replaced with gravel, creating an improved area for the 502d fleet.
At the beginning of the project, 3d Platoon had no experience with demolition of buildings this size. The platoon began with the eastern building, where the removal of internal structures took 4 days. Upon gaining experience and confidence with the equipment, the Soldiers completely removed the internal structures from the western building in just 2 days. After breaking through the initial learning curve with the first building, the same task for the second building was executed in half the time. This increase in efficiency became a theme throughout the project. A final analysis of the equipment, materials, and labor used to complete the project indicated that the Army saved a total of $384,000 by contracting this project to the 19th Engineer Battalion.

3d Platoon, led by First Lieutenant Anne M. Schreiner and Staff Sergeant Kyle Ferguson, undertook a similar but larger project for the U.S. Army Cadet Command at Potts Motor Pool Fort Knox, in August 2020. That task included demolishing three larger maintenance bays with the help of 4th Platoon, 42d Clearance Company, led by First Lieutenant Shane M. Marit and Sergeant Jeremy D. Meccariello. The platoons successfully demolished the maintenance bays, which stood adjacent to three additional maintenance bays undergoing renovation by civilian contractors. 3d Platoon, 502d MRBC, eagerly incorporated the lessons learned from the Mansfield demolition project, improving efficiency and procedures for the Potts Motor Pool project and saving the Army approximately $303,908. Freeing up the extra space significantly expanded the motor pool, creating additional room for the 502d MRBC and the Cadet Command.

First Lieutenant Schreiner is a platoon leader for the 502d MRBC. She holds a bachelor's degree in engineering management from the U.S. Military Academy–West Point, New York.
Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted Soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after action type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in Microsoft PowerPoint or Word. Save digital images at a resolution no lower than 200 dpi. Images copied from a website must be accompanied by copyright permission. Please see the photo guide <https://home.army.mil/wood/index.php/download_file/view/5278/676> for more information.

Provide a short paragraph that summarizes the content of the article. Also include a short biography, including your full name, rank, current unit, job title, and education; your mailing address; a fax number; and a commercial daytime telephone number.

Articles submitted to Engineer must be accompanied by a security release by the author’s unit or activity security manager prior to publication; the security release cannot be signed by the author. All information contained in the article must be unclassified, nonsensitive, and releasable to the public. Engineer is distributed to military units worldwide. As such, it is readily accessible to nongovernment or foreign individuals and organizations.

We cannot guarantee that we will publish all submitted articles, photographs, or illustrations. They are accepted for publication only after thorough review. If we plan to use your article in an upcoming issue, we will notify you. Therefore, it is important to keep us informed of changes in your e-mail address and telephone number. All articles accepted for publication are subject to grammatical and structural changes as well as editing for style.

Engineer is published once a year; in March, the article deadline is 15 December. Send submissions by e-mail to <usarmy.leonardwood.mscoe.mbx.engpb@mail.mil> or on a CD in Microsoft Word, along with a double-spaced copy of the manuscript, to: Managing Editor, Engineer Professional Bulletin, 14010 MSCoE Loop, Building 3201, Suite 2661, Fort Leonard Wood, Missouri 65473-8702.

Note: Please indicate if your manuscript is being considered for publication elsewhere. Due to the limited space per issue, we usually do not print articles that have been accepted for publication at other Army venues.
ENGINEER’S CREED

As a Professional Engineer, I dedicate my professional knowledge and skills to the advancement and betterment of human welfare.

I pledge

- To give the utmost of performance.
- To participate in none but honest enterprise.
- To live and work according to the laws of man and the highest standards of professional conduct.
- To place service before profit, the honor and standing of the profession before personal advantage, and the public welfare above all other considerations.

In humility and with the need for divine guidance, I make this pledge.