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U.S. Army Engineer School

(573) 563-6192/DSN 676-6192

COMMANDANT
COL Daniel H. Hibner
563-6192, <daniel.h.hibner2.mil@army.mil>

ASSISTANT COMMANDANT (AC)
COL Kyle T. Moulton
563-6192, <kyle.t.moulton.mil@army.mil>

DEPUTY COMMANDANT (DC)
Dr. Shawn P. Howley
563-8080, <shawn.p.howley.civ@army.mil>

REGIMENTAL COMMAND SERGEANT MAJOR (RCSM)
CSM John T. Brennan
563-8060, <john.t.brennan.mil@army.mil>

REGIMENTAL CHIEF WARRANT OFFICER (RCWO)
CW5 Dean A. Registe
563-4088, <dean.a.registe.mil@army.mil>

DEPUTY ASSISTANT COMMANDANT (DAC)–USAR
COL Charles W. Lewis
563-8045, <charles.w.lewis36.mil@army.mil>

DEPUTY ASSISTANT COMMANDANT (DAC)–ARNG
MAJ Michael W. Bailey
563-8046, <michael.w.bailey18.mil@army.mil>

CHIEF OF STAFF (CoS)
LTC Brandon L. Bowman
563-7116, <brandon.l.bowman.mil@army.mil>

COMMANDER, 1ST ENGINEER BRIGADE
COL Gerald S. Law
596-0224, <gerald.s.law.mil@army.mil>

DIRECTOR OF TRAINING AND LEADER DEVELOPMENT (DOTLD)
LTC James T. Palmer
563-4093, <james.t.palmer.mil@army.mil>

DIRECTOR OF ENVIRONMENTAL INTEGRATION (DEI)
Mr. Robert F. Danner
563-2845, <robert.f.danner.civ@army.mil>

COUNTER EXPLOSIVE HAZARDS CENTER (CEHC)
Mr. William E. Secules
563-2767, <william.e.secules.civ@army.mil>

MSCoE CDID, RDD
COL Robert A. Davel
563-7158, <robert.a.davel.mil@army.mil>

ENGINEER DOCTRINE BRANCH, MSCoE FFID DOCTRINE
LTC Laura E. Shiplet
563-2717, <laura.e.shiplet.mil@army.mil>

ORGANIZATIONAL BRANCH, MSCoE FFID
LTC Michael T. Loftus
563-6282, <michael.t.loftus4.mil@army.mil>

TRADOC PROPONENT OFFICE–GEOSPATIAL (TPO-GEO)
COL Kenneth J. Frey
563-8263, <kenneth.j.frey.mil@army.mil>

ENGINEER PERSONNEL DEVELOPMENT OFFICE (EPDO)
MAJ Dana L. Savage
563-3019, <dana.l.savage.mil@army.mil>

PRIME POWER SCHOOL, COMMANDER & DEPUTY COMMANDANT
CW4 Willie Gadsden Jr.
596-0612, <willie.gadsden.mil@army.mil>

By Order of the Secretary of the Army:

JAMES C. MCCONVILLE
General, United States Army
Chief of Staff

Official:

MARK F. AVERILL
Administrative Assistant
to the Secretary of the Army
2135508

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Front cover: Soldiers with the 2d Battalion, 112th Infantry Regiment, 56th Stryker Brigade Combat Team, 28th Infantry Division, Pennsylvania Army National Guard, breach a reinforced razor wire fence during training at the National Training Center, Fort Irwin, California. (U.S. Army National Guard photograph by Sergeant Shane Smith)

Back cover: U.S. Army photographs

DEPARTMENTS

The Engineer Doctrine Update is now available online at: <https://home.army.mil/wood/application/files/8916/3891/7300/EN_Doctrine_Update.pdf>.

FEATURES

Clear the Way

Colonel Daniel H. Hibner
99th Commandant, U.S. Army Engineer School

"With all that the Engineer Regiment is involved in, we must continue to focus and give priority to modernization. . . . In these resource-constrained times, it is essential that the entire Regiment continues to speak with one voice."

—Major General Robert B. Flowers[1]

I am honored and very excited to return to the home of the Regimental headquarters as the 99th Commandant of the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri.

After 90 days, I established seven key requirements, which are depicted in Figure 1. In no order of priority, these seven requirements are intended to maintain focus in the areas that are important to the U.S. Army and the Engineer Regiment. This article provides broad insight into the seven key requirements so that, as Major General Flowers emphasized 22 years ago, we may better "speak with one voice."[2]

One key requirement is to ensure that we *remain synergized*. Our Regiment is large, resides mostly with the Army National Guard and U.S. Army Reserve, and is located broadly across the globe. Especially as the Army goes through many changes and force design updates, it is essential that we have a shared understanding of key issues, that we all speak with the same voice, and that we stand together for the good of the Army and the Regiment.

Of course, at the heart of USAES is the clear key requirement that we *tend to the school* itself. The product produced at the school is the most precious and important commodity to the U.S. Army. It's the people—the Soldiers, noncommissioned officers (NCOs), warrant officers, and commissioned officers who are responsible for making the Army function today and continuing to be successful in the future.

Leader development is central to what we do in USAES, and it is an area into which we must all put forth effort. Much of what we do is focused solely on developing engineer leaders. We do this through all facets of our NCO, Warrant Officer, and Officer Education Systems. The Regiment is here to assist you in your effort to develop leaders. All of our USAES leaders and directorates, the History Office, the Counter-Explosives Hazards Center, and the U.S. Army Training and Doctrine Proponent Office–Geospatial are available and willing to contribute in any way possible.

At the Regimental headquarters, we spend a lot of time and energy working with the U.S. Army Office of the Chief of Engineers, the U.S. Army Maneuver Support Center of Excellence (MSCoE), and the U.S. Army Futures Command, integrating *Doctrine, Organization, Training, Materiel, Leadership and Education–Personnel, Facilities (DOTML-PF)* for engineer equities. Through this key requirement, we tie into Department of the Army level processes to seek necessary funding for new equipment, equipment upgrades, ammunition, and engineer systems of record. We have had some success in these areas, but much work remains to secure the equipment and personnel that our Regiment and our Army need now and for the future.

Talent management is a key requirement that optimizes the alignment of the diverse capabilities of individuals against the Regiment's requirements and developmental opportunities. A deliberate talent management process within the Regiment enables us to meet the future talent demands of the Army. The process starts with recruiting cadets for commissioning and extends through former engineer battalion commander assignments. The process focuses

"It's the people—the Soldiers, NCOs, warrant officers, and commissioned officers who are responsible for making the Army function today and continuing to be successful in the future."

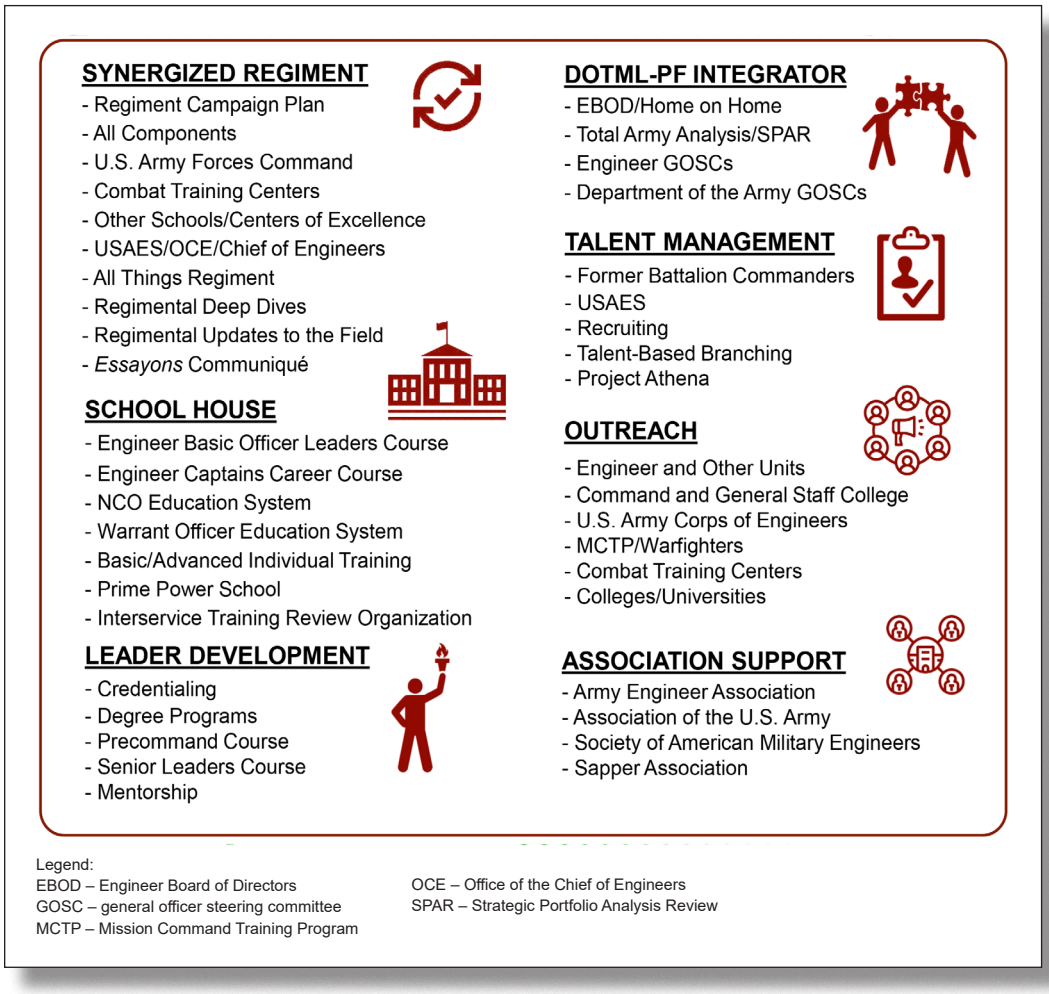


Figure 1. USAES Commandant's Key Requirements

on placing the right leaders in the right jobs at the right time, including jobs within USAES. We must engage with key stakeholders through *outreach*. This key requirement ensures that we are coordinating and communicating with organizations outside of USAES. First and foremost, we must engage with the operating force and we seek opportunities to provide Regimental updates to engineer formations and U.S. Army Corps of Engineers organizations. We must also reach out to combat training centers and observe warfighters so that we can validate or update programs of instruction with current observations and lessons learned.

The last key requirement is to *support professional organizations*. This, of course, is voluntary, but organizational support affords the opportunity for professional organizations to support and represent our Regiment and our Army in ways that we cannot. Support of professional organizations includes participation in organization-hosted events such as the annual Association of the U.S. Army Conference, Army Engineer Association activities conducted during Engineer Week, or luncheons hosted by the Society of American Military Engineers.

I hope this brief orientation provides you with a good feel for what USAES is doing to enable your Regiment and your Army to win now and in the future. I also invite you to please reach out to your Regimental headquarters at any time if there is anything that we can do to assist you.

Endnotes:

[1]Robert B. Flowers, "Clear the Way," *Engineer*, Vol. 30, October 2000.

[2]Ibid.

Lead the Way

Command Sergeant Major John T. Brennan
Regimental Command Sergeant Major

Hello from the U.S. Army Engineer School (USAES). I hope this message finds each of you and your Families doing well. It is absolutely amazing how fast time passes and how much is accomplished by the Soldiers and civilians of this great Regiment throughout that time. Your efforts are truly appreciated and not lost on the team at Fort Leonard Wood, Missouri, as we are honored and proud to serve you.

We recently transitioned several new leaders into USAES. I will take a moment to introduce two senior noncommissioned officers (NCOs) from within our directorates: Sergeant Major Steven P. Evans, who arrived over the summer to assume duties with the Engineer Personnel Development Office and, most recently, Sergeant Major Danny J. Castleberry, with the Directorate of Training and Leader Development. We are excited to have them on the team and confident that they are the right leaders to help shape the future of the Regiment.

Shortly after publishing the last Engineer bulletin, our One-Station Unit Training battalions and the 1st Engineer Brigade, Fort Leonard Wood, incorporated a new and improved method of inculcating our future engineer Soldiers into the U.S. Army and the Engineer Regiment. Engineers are now brought into the Regiment through an inspirational experience entitled "Into the Breach." Early on, they become familiar with the history of the engineers, observe drill sergeants executing a standard Bangalore torpedo breach of a wire obstacle, and conduct physical team-building tasks which correlate to engineer tasks that they will conduct on the modern-day battlefield. This inspirational experience, in conjunction with recent changes to 12-Series programs of instruction and a cresting ceremony in which they are awarded their Regimental Distinguished Insignia and a muster card upon completing Advanced Individual Training, fully indoctrinate them into our great Regiment. The end result is an engineer Soldier with a better understanding of the proud legacy of the Regiment and his or her responsibility to build upon that great legacy.

In May 2021, the U.S. Army Training and Doctrine Command (TRADOC) initiated the optimization and redesign of all military occupational specialty courses, Advanced Leaders Courses, and Senior Leaders Courses across all Army components. This required that the Directorate of Training and Leader Development team conduct an in-depth analysis of each of those courses at all training locations in order to support the initiative while ensuring no degradation to the NCO training experience. The change involves how the course will be delivered to our NCOs, as 55 hours of the curriculum will be removed from the resident experience and delivered through a blended learning environment, where the instruction is provided online by an instructor. The date of implementation for this initiative is yet to be determined.

Due to the 2021 Novel Coronavirus (COVID-19) environment, we were forced to scale back the 2021 Engineer Regimental Week, but were able to execute the 14th Annual Lieutenant General Robert B. Flowers Best Sapper Competition with minimal impact. A total of 46 teams representing all components from across the U.S. Army traveled to Fort Leonard Wood to compete for the coveted title of "Best Sapper." It was absolutely amazing and inspirational to experience the heart and spirit of those sappers who competed for 50 hours and marched more than 50 miles. Every single team did a phenomenal job of representing its unit and the sapper spirit. The USAES team is diligently planning the 2022 Engineer Regimental Week and the 15th Annual Lieutenant General Robert B. Flowers Best Sapper Competition, with fingers crossed that COVID-19 does not adversely impact the ability to gather together a bunch of great engineers on Fort Leonard Wood to celebrate our history, legacy, and future. We hope to see you at Fort Leonard Wood at the end of April 2022.

Lastly, we encourage you to seek opportunities and venues to provide feedback to USAES and let us know what we can do to better support you. There is an incredible team of professionals, both uniformed and civilian, at Fort Leonard Wood, dedicated to supporting you and this great Regiment. I am absolutely amazed by all that you and the team here do to continuously build on our great legacy as engineers, and I am very proud to be a part of it. From all of us at USAES, thank you. *Essayons*. We WILL succeed!

Show the Way

Chief Warrant Officer Five Dean A. Registe
Regimental Chief Warrant Officer

Greetings from the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri.

I would like to emphasize to the warrant officer cohort the importance of attending Professional Military Education at the right time in order to develop the foundational know-ledge that you need for your next-level assignment. This will ensure that the Engineer Regiment continues to *build world-class engineers* who can understand, operate, and dominate in multi-domain operations (MDO) and large-scale combat operations. Warrant officers are an important part of this thread.

In the ever-changing Army environment, there has been an increase in demand for engineer warrant officers in new and different formations across the Army. The Army is continuing to *revolutionize the formation*, as demonstrated by the new roles and opportunities for engineer warrant officers in multidomain task force units. There has also been significant progress in leveraging the military construction expertise of our Military Occupational Specialty (MOS) 120A–Construction Engineering Technician warrant officers at the U.S. Army Corps of Engineers (USACE) districts. In addition, there has been a keen interest in our MOS 125D–Geospatial Engineering Technicians serving at the Artificial Intelligence (AI) Integration Center, U.S. Army Futures Command, Pittsburgh, Pennsylvania, assisting with AI cloud technology and geospatial integration at Carnegie Mellon University in Pittsburgh. Three MOS 125D Soldiers underwent months of studies at Carnegie Mellon University, where they focused on cloud technology and AI systems implementation and became certified on CompTIA Cloud Essentials©, Microsoft Azure Fundamentals®, and Entry-Level Python Programming.® These engineer warrant officers were then assigned to projects in the AI Integration Center, which provided on-the-job training with a civilian data scientist to further develop their understanding of cloud technology and AI implementation. The ultimate goal is to create an AI-ready force within our military ranks.

In the past year, the Engineer Regiment has been aggressively pursuing warrant officer accessions mission goals for all components to decrease warrant officer shortages across the force and to *support Army readiness*. The Regiment's Regular Army numbers are currently at 100 percent for MOS 125Ds and at more than 100 percent for MOS 120As. Now that we have reached the targeted goal, we have reduced the number of yearly accessions for Regular Army MOS 120As to normalize our projected strength levels and to ensure that we are able to retain that same talent for several years to come.

In our Army National Guard and U.S. Army Reserve formations, commanders and senior leaders who planned to fill engineer warrant officer positions made progress toward that mission. Commanders who do not make a plan will continue to have the same vacancies and nothing new to report about how the issue will be resolved. There are success stories of "growing our own replacements" in the Regiment, and a fine example of that is illustrated by the Mississippi Army National Guard (MS-ARNG). In a recent briefing to the participants of the All Things Engineer Regiment Reserve Component quarterly conference call, Chief Warrant Officer Five Thomas W. Smith, MS-ARNG, described how the leadership of MS-ARNG has gone "all in" on developing a program to identify candidates for warrant officer positions and to provide strong mentorship and guidance to those candidates to assist in their transition to MOS-qualified warrant officers. Chief Warrant Officer Five Smith compares the framework of this program to that of the Army National Guard Recruit Sustainment Program, which is used to prepare recruits for Basic Combat Training

(continued on page 24)

"In the ever-changing Army environment, there has been an increase in demand for engineer warrant officers in new and different formations across the Army."

Once More Unto the Breach—

The U.S. Army Brigade Engineer Battalion in Future LSCO

By Captain Brendan F. Fries and Captain Grady A. White

The shift toward a training and doctrinal focus on future high-intensity wars and peer-on-peer combat is apparent in all branches of the U.S. military. In the U.S. Army, this shift has revealed a capabilities shortfall in the areas of fires and unmanned systems compared to those of peer threats such as Russia and China. Additionally, gaps and unknowns in developed doctrine—from the strategic level to company tactics, techniques, and procedures—leave us potentially vulnerable, as units and leaders are accustomed to operating in low-intensity counterinsurgency conflicts. This is a weakness discussed in a recent *Military Review* article entitled "Field Manual 3-0 Doctrine Addressing Today's Fight," which recommends that doctrine be revisited and tested for success or failure on a future large-scale combat operations (LSCO) battlefield.[1] One of the key areas where such a review is most needed is in the Engineer Branch—particularly in the field of breaching operations. The engineer breach force faces multiple challenges in executing against a modern combatant, and its structure must be updated to remain viable on the high-intensity battlefield.

As the Army pivots to focus more on threats in LSCO, Army engineers must adapt to the challenge of once again overcoming intentional military obstacles. The Army has not encountered reinforced, supporting obstacles in depth since the Gulf War. During the invasion of Iraq in 2003, Army units encountered surface-laid mines and some hastily dug antivehicle ditches, but none of these obstacles were covered by direct or indirect fire.[2] Fighting on land with adversaries such as the Russian army or the People's Liberation Army of China will include obstacles in depth (a combination of wire, mines, and antitank ditches) that are covered by concealed and dug-in troops and likely pretargeted by massed indirect fires. Considering all of this, the average brigade combat team (BCT) brigade engineer battalion (BEB) does not possess adequate breach assets to successfully cross an obstacle belt of significant depth and width or multiple obstacles in a row without risking destruction of the breach force. With the inherent known unreliability of some platforms and technical deadlines looming, the two engineer companies in a BCT are not enough to fight against a prepared and dug-in force. Vehicle models such as the Rapidly Emplaced Bridge System and the M200A1 or M353 Mine-Clearing Line Charge trailer are especially unreliable in combat conditions, and there are only a few backups of more reliable platforms such as the M1132 Engineer Squad Vehicle in a single platoon company if the primary breach asset is destroyed.

A secondary consequence of this issue is that alternate breach strategies and techniques are rarely practiced. Breach training opposition is often simulated and usually hand-waved if primary systems go down. Overall, units need to train on alternate methods for breaching, marking, and

establishing passage lanes in case systems or vehicles are unusable. Field Manual (FM) 3-0, *Operations*, highlights the importance of brigades again learning to fight as divisions—and even of divisions fighting as corps.[3] Engineer assets not organic to the BCT will need to be utilized as the enemy attrites primary friendly breach assets, and breaching is a task that is not often practiced by horizontal-engineer companies. Engineer forces outside of the BCT will need to start practicing the combined arms breach with maneuver forces, and units will need to train on breaching for other formations, such as those of a different type of brigade, in case the need for breaching arises.

The personnel formation of the modern BEB has emerged during the counterinsurgency era as a battalion in which to place any maneuver support units that do not have a home (for example, the BCT military intelligence and signal companies). In addition, because it often operates as a decentralized unit attached to each maneuver battalion, the BEB is often understaffed with medics, communications Soldiers, and armorers. However, if the BEB and its constituent companies must fight in a contested breach in the future, these functions will become critical to mission success. Most maneuver units lack the equipment and training necessary to conduct the breach, so the BEB must be considered the main effort for any breaching operation and must be resourced as such.

To address these potential shortfalls, the organization of the BEB should be shifted to prepare for LSCO conflicts with a capable and proficient enemy. The BEB should be structured to support each of the maneuver units in the BCT with three engineer companies, each with breaching, gap-crossing, and clearance assets. The medical company should be brought into the BEB from the brigade support battalion, as mass-casualty events are very common and even expected in contested breaching events, with contested breach operations casualty estimates approaching 50 percent of the breach force. This new composition would provide more support, allow for each maneuver battalion to practice breaching with a dedicated engineer company, and provide the brigade with 33 percent more breaching assets for the inevitable attrition that will occur during the course of regular operations and actions of the enemy. Only one company in the BEB currently contains route clearance assets; this should be modified so that every company contains route clearance assets, as enemy actions in rear areas are likely—and once an obstacle lane is breached and cleared, it must be maintained. As with the contested breaches of World War II and the Korean War, more resources will likely be demanded for future conflicts in order to overcome enemy obstacles and defenses—and the BEB must be reorganized and provided with more engineer assets in order to be successful.

According to Lieutenant General Todd T. Semonite, the 54th U.S. Army Chief of Engineers and commanding general of the U. S. Army Corps of Engineers, "If you took all the bridging in NATO [the North Atlantic Treaty Organization] and put it together, we couldn't get a brigade combat team across a 400-meter river."[4] In combat operations, in order to maintain freedom of maneuver in the effort to seize, retain, and exploit the initiative per the commander's intent, a Stryker or armored division requires four crossing sites and a BCT requires two crossing sites. The current inventory of U.S. Army Forces Command dry- and wet-gap crossing assets in Western and Eastern Europe is inadequate in the face of a moderate or large enemy force—especially in the region from Germany to Estonia. More than 4,500 bridges provide mobility across the six major rivers (the Danube, Volga, Rhine, Elbe, Oder, and Dnieper Rivers) in this region, of which 800 are wider than 100 meters. Significant degradation or destruction of even a small number of these bridges would require at least 5,500 meters of bridging equipment—most of which is not available in a BCT organic bridging arsenal.[5]

A vehicle from the 926th Engineer Brigade crosses a unit-constructed bridge at Fort Stewart, Georgia, in June 2021.

The quantity of bridging assets is not the only limiting factor in providing freedom of maneuver to NATO units in Europe. The U.S. M1A2 Abrams weighs 91 tons, the German Leopard tank weighs 80 tons, and the British Army Challenger 2 tank weighs 95 tons. The majority of bridges in NATO countries are rated less than the military load classification of 70 tons, preventing a widespread deployment of combat rolling stock even without the intentional targeting of bridges.[6] In armor brigade combat teams, the armored vehicle-launched bridge, built on the M60

Engineer Soldiers with the 671st Engineer Company and the 301st Maneuver Enhancement Brigade rehearse wet gap-crossing operations on the Columbia River, Yakima Training Center, Washington. (U.S. Army photograph by Sergeant John Weaver)

Patton tank chassis, is being replaced with the M1 Abrams chassis-based M1074 Joint Assault Bridge, which is capable of bridging gaps of 18 meters and has a military load classification of 95 tons; in Stryker brigade combat teams, the rapidly emplaced bridge is capable of bridging gaps of 13 meters and has a military load classification of up to 50 tons.[7] For larger spans, multirole bridge companies deploy improved ribbon bridges with spans of up to 210 meters.

What happens when the establishment of these bridges is contested with peer-to-peer enemy forces? Enemy peer-to-peer unmanned aerial systems have the ability to monitor bridge emplacement and send information to a command node, which, in turn, triggers the launch of enemy rotary- or fixed-wing aircraft or indirect fires to disrupt and destroy friendly bridging operations. Contested bridging operations are high-risk operations similar to complex breaching operations, which require rigorous practice against both a notional and simulated enemy. With no bridging assets currently available in the BCT, contested gap crossings of more than an antitank ditch are not routinely practiced during combat training center rotations.[8] While the Army does not have enough multirole bridge companies to place them organically in BCTs, the practice and cohesion built by training on extended wet-gap crossings, when executed simultaneously by the BEB and a multirole bridge company, are keys for success in real-life contested gap-crossing operations. Familiarization allows for the development of standard operating procedures and builds institutional knowledge in the BEB command and Military Occupational Specialty 12C–Bridge Crewmember that are invaluable in executing the full scope of gap crossings under degraded conditions such as obscuration, darkness, or chemical attacks. Attachment of multirole bridge companies and the development of contested wet-gap crossing scenarios at combat training centers are vital to maintaining the mobility advantage provided to a BCT by the BEB in future LSCO.

While contested combined arms breaching and extended wet-gap crossings have rarely been practiced on recent battlefields, history tells a different story and the U.S. Army will likely face such challenges again. For this reason, it is critical that the BEB is appropriately trained and equipped to go, as William Shakespeare wrote more than 400 years ago, "once more unto the breach."[9]

Endnotes:

[1]Sam Fishburne et al., "Field Manual 3-0 Doctrine Addressing Today's Fight," *Military Review*, January–February 2019, <https://www.armyupress.army.mil/Portals/7/military-review/Archives/English/JF-19/Fishburne-FM-3-0.pdf>, accessed on 30 November 2021.

[2]Nicolas Fiore, "The 2003 Battle of Baghdad: A Case Study of Urban Battle During Large-Scale Combat Operations," *Military Review*, September–October 2020, <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2020/Fiore-Battle-Baghdad/>, accessed on 7 December 2021.

[3]FM 3-0, *Operations*, 6 October 2017.

[4]"Mind the Gap: The Army Looks to a New Assault Bridge for Heavy Armor Maneuvers in Europe," *Breaking Defense*, 17 October 2019, <https://breakingdefense.com/2019 /10/mind-the-gap-the-army-looks-to-a-new-assault-bridge-for-heavy-armor-maneuvers-in-europe/>, accessed on 7 December 2021.

[5]Army Techniques Publication 3-34.22, *Engineer Operations—Brigade Combat Team and Below*, 14 April 2021.

[6]Ibid.

[7]Ibid.

[8]Joseph S. Kendall, "To the Far Side: Engineer Support to Division and Corps Wet-Gap Crossings," Army School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas, 23 May 2019.

[9]William Shakespeare, *Henry V*, Act III, Scene I, 1599.

Captain Fries is a U.S. Army Reserve civil affairs team leader serving in the 450th Civil Affairs Battalion (Airborne), White Plains, Maryland. He holds a bachelor's degree in biology from Arizona State University, Tempe, and a master's degree in epidemiology from Johns Hopkins University, Baltimore, Maryland.

Captain White is a U.S. Army Reserve civil affairs team leader serving in the 450th Civil Affairs Battalion. He holds a bachelor's degree in economics from the University of Georgia, Athens, and a master's degree in nursing from South University, Savannah, Georgia.

Engineer Canine and Explosive Ordnance Disposal Integration Into Wet Gap-Crossing Operations

By Lieutenant Colonel Stewart D. Bailey, Major Scott A. Darhower, Major Jared A. DeMello, and Captain Cole T. Andrekus

As the Army returns to large-scale combat operations, there is renewed focus on wet-gap crossings and their importance to movement and maneuver functions. Executing a successful wet-gap crossing demands detailed planning and preparation to integrate warfighting functions throughout all phases of the operation. Tactically, while multirole bridge companies (MRBCs) play a key role in conducting wet gap-crossing operations, successful integration and evaluation of low-density assets such as military working dogs and explosive ordnance disposal capabilities during training are paramount.

In early August 2021, Soldiers of the 50th MRBC, 5th Engineer Battalion, Fort Leonard Wood, Missouri, conducted training on assault boat crossing, mine clearance, and float bridge construction on Milford Lake, near Fort Riley, Kansas. The company, consisting of two line platoons of bridge crewmembers and one support platoon, regularly trains on these collective tasks. During this event, the 50th MRBC integrated support from the 94th Engineer Canine Detachment, Fort Leonard Wood, and two teams from the 774th Explosive Ordnance Disposal Company, Fort Riley, to clear the far side objective.

The 94th Engineer Canine Detachment rehearses dog-loading procedures on an inflatable combat assault craft.

A canine team maneuvers to clear bank objectives in limited visibility.

After the company established support-by-fire positions, 50th MRBC Soldiers conducted a covert crossing with night vision devices to inspect and clear the far side for crossing forces. Once on the ground, bridge crewmembers utilized AN/PSS-14™ mine detectors to identify unexploded ordnance. While bridge crewmembers conducted their own clearance, the 94th Engineer Canine Detachment investigated how mine detection dogs might be employed to expedite far side clearance. When unexploded ordnance was detected, either by traditional means or by canine, explosive ordnance disposal teams disposed of the threat and provided feedback to inform the command and improve tactics, techniques, and procedures development. The exercise was beneficial to everyone who participated.

With few Regular Army MRBCs currently in the U.S. Army inventory, maximizing opportunities for combined arms training is necessary for capability development and operational readiness. Integrating canine and explosive ordnance disposal teams into training scenarios is the first step for future exercises, the 50th MRBC plans to expand on training by incorporating field artillery capabilities and a mechanized assault force to better simulate the combined arms team that it would realistically support as a corps level asset.

Wet-gap crossing capability initiatives are occurring at multiple echelons, including at the 36th Engineer Brigade, Fort Hood, Texas, where plans to develop a Wet Gap Center of Excellence are underway.

Lieutenant Colonel Bailey is the commander of the 5th Engineer Battalion. He holds a bachelor's degree in criminal justice and psychology and a master's degree in operational studies from the University of Alabama, Birmingham.

Major Darhower is the operations officer of the 5th Engineer Battalion. He holds master's degrees in environmental engineering from Missouri University of Science and Technology at Rolla and operational studies from the U.S. Army Command and Staff College, Fort Leavenworth, Kansas.

Major DeMello is the executive officer of the 5th Engineer Battalion. He holds master's degrees in engineering from Missouri University of Science and Technology; public administration from Virginia Polytechnic and State University, Blacksburg; and operational studies from the U.S. Army Command and Staff College.

Captain Andrekus is the commander of the 50th MRBC. He holds a bachelor's degree in economics from St. Norbert College, De Pere, Wisconsin, and a master's degree in engineering management from Missouri University of Science and Technology.

4TH ENGINEER BATTALION SUPPORTS RESOLUTE CASTLE 21

By Major Shawn M. Cook, Captain David R. Creger, Captain Hunter W. Firebaugh, and Captain Andrew Huang

The Republic of Poland is a central-European Slavic nation that serves as a crossroads between North Atlantic Treaty Organization (NATO) allied countries to the west and former Soviet countries to the east. Each of these countries pursues different strategic goals and alliances, creating a complex environment for diplomatic relations. Given the centralized geographic location of Poland, the Polish people have endured a long history of war, foreign occupation, successive waves of invaders, and civil uprisings. Based on these historic and current events, the Polish are acutely aware of an ever-present danger still posed to many military leaders today—the Suwalki Gap. Often the decisive terrain in operational exercises, this 40-mile corridor comprises the border between two NATO countries—Poland and Lithuania. On opposite ends of this gap are Kaliningrad, an 86-square-mile Russian exclave, and Belarus, a strong Russian ally. Should Russian forces mobilize beyond Ukraine toward this area, they would effectively cut off the NATO allies Lithuania, Latvia, and Estonia—all former Soviet states. This scenario would force a NATO response, and Poland would once again become the epicenter of a military conflict. The purpose of this article is to detail planning and construction efforts and highlight lessons learned in order to assist future engineers in construction training outside the continental United States (OCONUS).

To combat the threat of Russian mobilization in the area, NATO and the U.S. European Command have employed a European Deterrence Initiative.[1] This strategic objective employs exercises such as Defender–Europe, Saber Guardian, Saber Strike, and Resolute Castle. Alternating each year between Poland and Romania, task forces comprised largely of Army National Guard and U.S. Army Reserve construction units assist the host nations with training-area improvements and infrastructure development. The focus of these projects is on increasing training capacity and improving quality of life for training units.

This past year, the 4th Engineer Battalion, Fort Carson, Colorado, was afforded the opportunity to deploy as Task Force North and participate in Resolute Castle 21 at Drawsko Pomorskie Training Area, Poland. This 2-month mission offered a significant chance to train on key technical areas of construction mission-essential tasks in a multinational, joint environment. U.S. Army Europe and Africa led the planning effort, and the 301st Forward Engineer Support Team–Main (FEST-M), Denver, Colorado, designed the projects. Cooperative security missions like Resolute Castle help units gain experience in foundational training tasks and build partnerships with host nation allies and NATO forces. These partnerships augment and enhance the strategic

Soldiers survey the area.

deterrence that the European Deterrence Initiative is designed to provide.

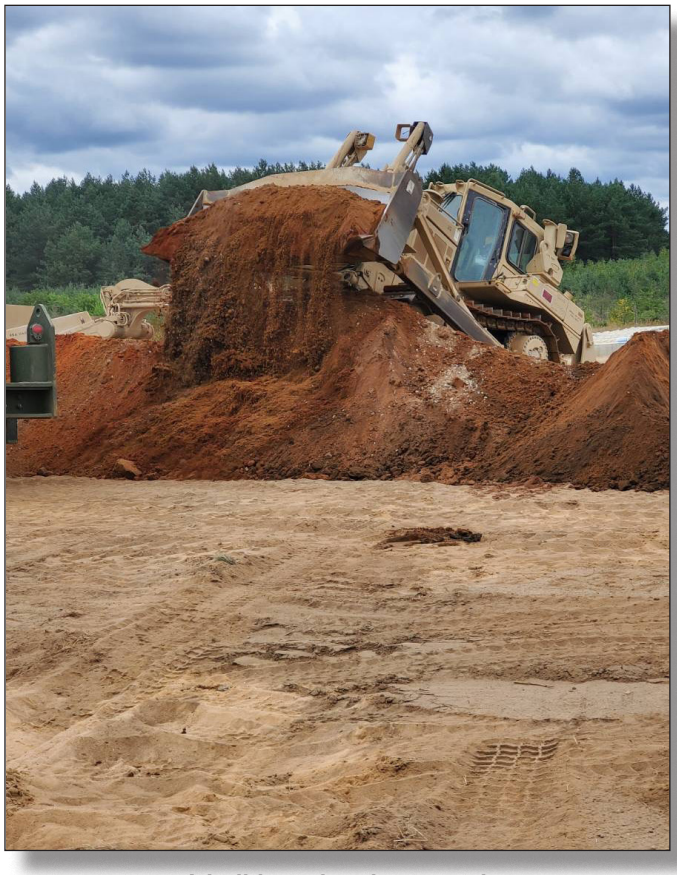
Planning Effort

In early 2021, the 4th Engineer Battalion was notified of its upcoming participation in Resolute Castle 21. Due to the complexity imposed by the Novel Coronavirus (COVID-19) pandemic, as well as restrictions in funding, traditional Army National Guard and U.S. Army Reserve units found themselves unable to carry out training. As a result, the 4th Engineer Battalion volunteered to execute the mission 6 months prior to the "boots on the ground" date. Due to the operational environment, the battalion conducted a deliberate but expedited military decision-making process to ensure successful execution of the exercise.

Upon receipt of the mission, the battalion staff immediately began to gather historical data from past exercises and establish points of contact with key OCONUS personnel. Due to the condensed nature of the planning timeline, the battalion was, from the outset, significantly behind schedule on several milestones, including project selection, submission of contracting requirements, and participation in planning conferences. However, synchronization was greatly improved by conducting planning in parallel with U.S. Army Europe and Africa staff and developing a habitual relationship with higher headquarters early in the planning process.

As the battalion staff continued with the mission analysis process, the operating environment continued to develop. The establishment of a generalized timeline for deployment, construction, and redeployment was critical in enabling the staff and companies to visualize the requirements necessary to accomplish the mission while also understanding the limitations and constraints of the operation. During this time, companies worked in tandem with the battalion operations construction cell to finalize the project execution list based on assets, personnel, equipment, and time available for construction. By the end of the mission analysis, the battalion had settled on a finalized project list and had published an initial warning order that detailed a deployment and execution timeline for companies, with tasks for subordinate units.

The evaluation criteria developed during the mission analysis consisted of life support area availability, training of mission-essential tasks, financial optimization, command and control, leader development, and project completion. Each course of action maximized certain aspects of the evaluation criteria and minimized those that were deemed less vital. However, as in any operation, planning assumptions that were made by the staff became validated or invalidated with the receipt of new information. One of the major pitfalls during planning involved the assumption that Task Force North would not need to share operational space or resources during the construction mission; the information received from higher headquarters indicated that there would be no restrictions on life support areas or training areas. However, less than 3 months from deployment, the staff was alerted by the office of the Drawsko Pomorskie mayor that a rotational maneuver battalion would be collocated and have priority in the life support and training areas in support of a gunnery exercise. This significantly impacted the living capacity of Drawsko Pomorskie Training Area, which, in turn, negatively affected initial timeline plans due to the necessary reductions in Soldier allocations and equipment that could be supported by the facility. During execution, construction efforts were affected by training schedules and range shut downs. It was determined that coordination with U.S. Army Europe and Africa operations would help ensure that an accurate picture of adjacent units was obtained and that it should be a priority during the initial stages of mission analysis in future operations. In light of the new planning constraints, the battalion was forced to select a course of action that, due to life support area limitations, would minimize boots on ground.



A bulldozer breaks ground.

In planning for Resolute Castle 21, the 4th Engineer Battalion staff learned several valuable lessons that might assist in the planning of future OCONUS construction missions. The first lesson learned was that all key stakeholders must be identified and included from the very beginning of the planning process. One of the first steps outlined in the Project Management Professional task list[2] is to identify stakeholders. Task Force North was only alerted to the existence of the Polish district infrastructure management officers (the host nation signature authority) upon its arrival in-theatre. Had staff members known how critical district infrastructure management officers were to infrastructure in Poland, they could have established a relationship and communicated expectations early in the planning process and created a shared understanding before deploying. Documents such as memorandums of understanding and foreign construction codes must be provided early in the planning process to ensure that stakeholders and the construction unit are following the same required legal and construction procedures.

Another lesson learned was that logistics plays a critical role in the success of a task force during an exercise such as Resolute Castle. Logistics planners from the 4th Engineer battalion staff spent countless hours validating unit deployment lists, ensuring the fidelity of contracts, and coordinating vessel and line-haul movements. The staff quickly learned the importance of early coordination with key personnel from each logistics entity (veterinarians for agricultural cleaning, port personnel), which was essential for the timely execution of each movement.

Early integration with the FEST-M team was found to be critical in understanding the specific construction efforts necessary to fulfill project design objectives. Task Force North coordination with FEST-M resulted in the identification of issues with the bill of materials, the recognition of long-lead items, the determination of training requirements for nonstandard construction techniques, and the allocation of Soldiers and equipment. Microsoft Teams© and other digital mediums served as the primary means of coordination between battalion staff and FEST-M; however, meetings held in-person were invaluable, as they provided an opportunity to perform a detailed analysis of drawings as a team. In future operations, early face-to-face meetings between construction and operations planners and FEST-M might make the process much more efficient and result in better and earlier understanding.

One of the most significant lessons learned was the importance of conducting a predeployment site survey (PDSS) early enough to influence the decision-making process. Due to the constrained nature of the deployment timeline and

A Soldier cuts a beam.

Soldiers pour concrete.

COVID-19 restrictions, the PDSS team was able to deploy just 45 days before the main body deployment. The information gathered from the PDSS was extremely beneficial; and if the survey had been conducted earlier, the chosen course of action would have shifted. As it was, only minor changes could be made, as unit deployment lists and contracts had been locked in weeks prior to the PDSS. Therefore, the 4th Engineer Battalion recommends that, if possible, the PDSS should be conducted well in advance to allow for any necessary changes to the predeployment plan.

Construction

The U.S. Army construction capability is distinct from that of the U.S. Navy and U.S. Air Force in that the Army maintains the ability to rapidly deploy and construct in an austere environment with little reach-back and comparatively minimal project planning. Army construction provides a critical interim mobility and life support capability beyond that of austere livability in areas of the world that are too unstable for contracted support. The primary issue with maintaining a trained and ready rapid-construction capability arises from the lack of customers in the continental United States (and increasing numbers of OCONUS customers) who are willing to accept rapidly constructed Army products. Most units are forced to make do with sourcing longer-duration, meticulously planned training projects that generally fail to realistically prepare Army construction engineers for the tempo they are expected to maintain in-theater. In short, the only means of training that has proven effective for Army construction personnel is training that takes place on the job while deployed.

The disconnect between unit capabilities and the needs of customers was one of the major challenges to construction during Resolute Castle 21. Early in the planning phase, the 4th Engineer Battalion was asked to modify the Joint Construction Management System standard designs and construct walls from an insulated concrete form (ICF) product, rather than from concrete masonry units. The use of ICFs is quickly becoming one of the most popular construction techniques in Europe due to their price, availability, durability, integral insulation, and versatility of installation. However, ICFs are unlike any other material with which the 4th Engineer Battalion construction engineers had ever worked and unlike anything with which most construction professionals in the continental United States have ever worked. ICFs are preengineered to be fitted together like puzzle pieces and then braced externally, in preparation for the form-poured concrete. ICF products from the United States are more commonly manufactured as foam-on-plywood laminates and then assembled in large panels, with much less need for bracing prior to the pour.

The solution to the lack of technical expertise regarding ICFs was to hire a local contractor who was experienced with ICF installation. To claim that the project would have completely failed without his assistance is no exaggeration. Shortly after the contractor arrived on site, he began to explain the ICF installation process; it became very apparent that proper installation would require a variety of custom tools that were not owned or sourced by the unit. For example, ICF installation commonly involves heavily reinforcing the walls with small-grade rebar. With only heavy-grade rebar on hand in significant quantities, the battalion was forced to cut and bend more than a thousand sections of reinforcing steel to fit within the small confines of the ICF wall system. The bracing system for the ICF is a proprietary rental product and highly customized to the project. Without the bracing system that was rented from the manufacturer, project construction would not have progressed past the installation of a wall.

The Resolute Castle 21 experience drew attention to the fact that the Army places emphasis on certain construction material disciplines that are swiftly approaching obsolescence. Concrete is, by far, the most commonly available construction material in the world—and it is quickly becoming the cheapest. On the contrary, wood is becoming increasingly expensive and difficult to procure OCONUS—and it is becoming less desirable as underdeveloped nations seek fire-resistant structures and reduction in deforestation. However, Army engineers are expected to maintain their carpentry competency. Likewise, plumbing is considered essential enough that construction units are supplied with basic plumbing tool kits, yet the Headquarters, Department

Soldiers finish the building.

of the Army, mission-essential tasks list for an engineer construction company contains no plumbing collective tasks. An engineer construction company is allocated equipment sufficient only to route the most basic interior supply and waste lines. The demand for Army plumbers is also extremely limited in austere construction projects, where all potable water is delivered via the Army's robust logistics capability. Furthermore, Army plumbers lack the training capabilities and tools necessary to construct all but the smallest-scale waste management (septic) systems.

During the 2-month Resolute Castle 21 mission, the 4th Engineer Battalion completed nine projects and turned them over to the Polish government. This represented the first time that any Army engineer unit had successfully completed a construction project since Resolute Castle began 7 years earlier. Resolute Castle and similar real-world exercises provide assurances to our NATO allies while also providing critical training for our Soldiers and development opportunities for our future leaders.

Endnotes:

[1]The European Deterrence Initiative funds exercise, training, transportation, and maintenance costs for U.S. rotational forces in order to increase the scope and size of engagements with NATO allies and partners throughout the European theater of operations.

[2]Project Management Professional is an internationally recognized professional designation, offered by the Project Management Institute, that certifies the ability to plan, organize, and direct the completion of projects for an organization while ensuring that the projects are on time, on budget, and within scope.

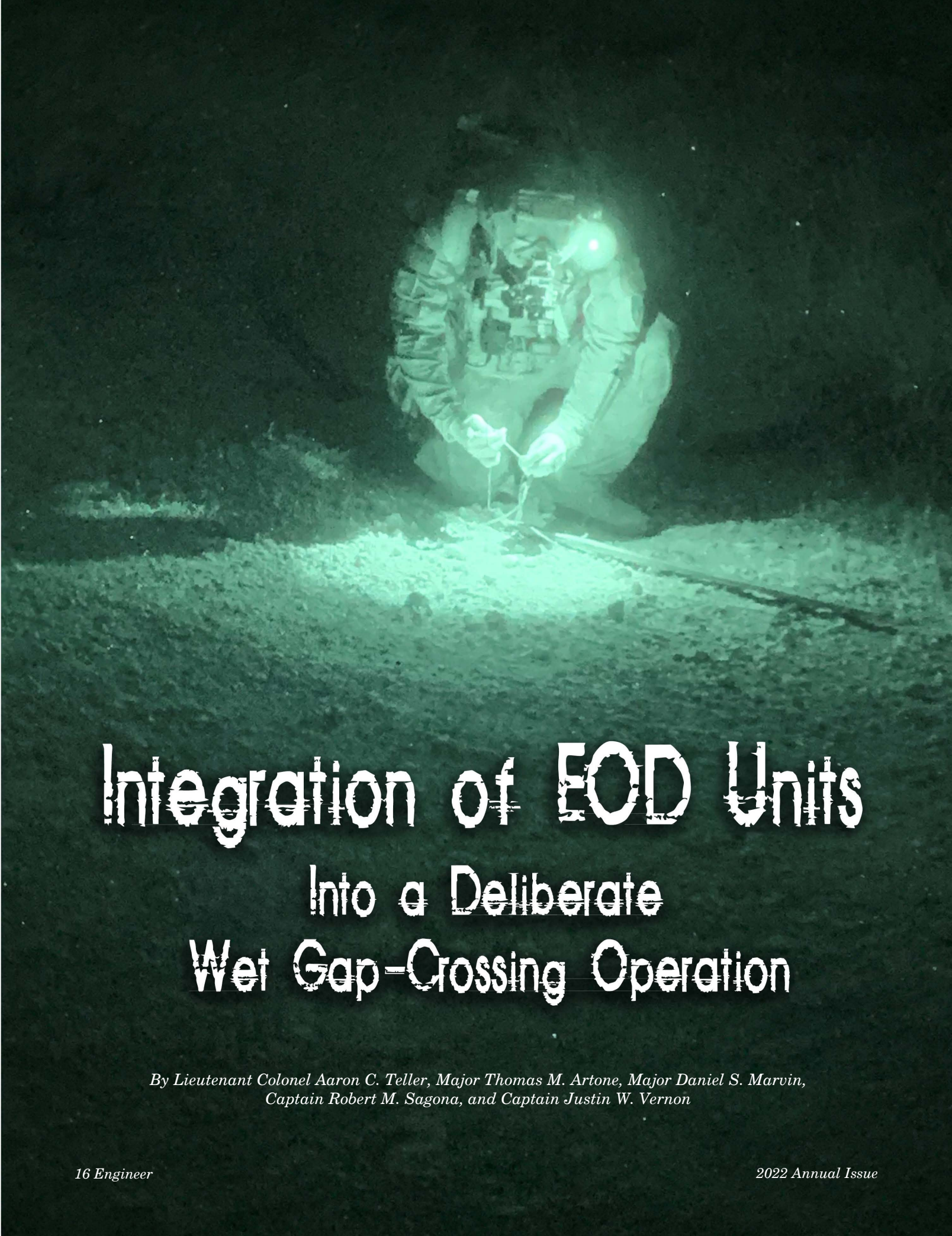
Major Cook was dual-slotted as the 4th Engineer Battalion operations officer and executive officer during the planning and deployment of Resolute Castle 21. He holds a bachelor's degree in economics from The Citadel, Charleston, South Carolina, and a master's degree in technological entrepreneurship from the University of Notre Dame, Indiana.

Captain Creger was the commander of the 615th Engineer Construction Company during Resolute Castle 21. He is currently the lead planner for Resolute Castle 22 for the 4th Engineer Battalion. He holds a bachelor's degree in manufacturing engineering from Missouri Western State University, St. Joseph, and a master's degree in engineering management from the Missouri University of Science and Technology at Rolla.

Captain Firebaugh was the 4th Engineer Battalion assistant operations and chief plans officer during the planning portion of Resolute Castle 21. He is currently the commander of the 569th Engineer Company (Mobility Augmentation Company), 4th Engineer Battalion. He holds a bachelor's degree in environmental engineering from the U.S. Military Academy–West Point, New York, and a master's degree in engineering management from the Missouri University of Science and Technology at Rolla.

Captain Huang was the 4th Engineer Battalion chief plans officer during receipt of the Resolute Castle 21 mission and served as the commander of Task Force North during the exercise. He is currently the commander of Headquarters and Headquarters Company, 4th Engineer Battalion. He holds a bachelor's degree in mechanical engineering from the U.S. Military Academy—West Point.

VANGUARD 4 THE REGIMENT



Integration of EOD Units Into a Deliberate Wet Gap-Crossing Operation

By Lieutenant Colonel Aaron C. Teller, Major Thomas M. Artone, Major Daniel S. Marvin, Captain Robert M. Sagona, and Captain Justin W. Vernon

Explosive ordnance disposal (EOD) formations must more frequently integrate with maneuver and protection forces at echelon during the planning and execution of large-scale combat operations training. EOD is an essential element for enabling freedom of maneuver and lethality. Wet gap-crossing operations highlight the requirement for EOD, as a combat multiplier, to precisely render-safe and reduce explosive hazards in environments in which the protection of personnel and infrastructure is critical. EOD units must actively integrate with adjacent maneuver and protection units and seek out training opportunities early in the planning process in order to educate the force on EOD capabilities and enhance EOD training on large-scale combat operations scenarios. Doctrinal publications must be updated to include the utilization and requirements of critical enablers such as EOD formations.

EOD technicians from the 774th Ordnance Company (EOD) and 630th Ordnance Company (EOD) defeat mock explosives and enable the 50th Multirole Bridge Company, 5th Engineer Battalion, to build and operate an improved ribbon bridge.

A wet-gap crossing conducted during offensive operations requires detailed sequencing that includes crossing times and the order of march from the initial advance to the gap, across the gap, and through continuation of the attack. Appendix I of Army Techniques Publication (ATP) 3-90.4, *Combined Arms Mobility*,[1] describes additional assets that may be required. Current doctrine does not dictate utilization or requirements of critical enablers such as EOD formations. A robust task force that includes EOD is required to sustain or increase the momentum of a division across the gap.

On 11 August 2021, the 79th Ordnance Battalion (EOD), Fort Hood, Texas, supported the 5th Engineer Battalion, Fort Leonard Wood, Missouri, with four EOD teams during a wet gap-crossing event at Fort Riley, Kansas, to demonstrate how EOD operations can be a force multiplier during a deliberate wet-gap crossing. The EOD teams were integrated into initial planning processes with the 5th Engineer Battalion. The planning process included discussions about capabilities that may be required during Phase II (assault across the gap) and Phase III (advance from the far side) of the gap crossing. EOD leaders identified vulnerable areas on the near side, such as call-forward and staging areas, and on the far side, such as exit bank and bridgehead objectives. These areas are prone to direct and indirect enemy fire as the maneuver element advances to the gap. Injects were added to the crossing scenario, and they focused on the far side objectives.

Large-scale combat operations explosive hazards consist of a mesh of conventional and improvised threats. Maneuver forces should expect to see a wide range of unexploded ordnance in all manners of employment, from large caches left behind by withdrawing enemy forces to first-seen/unknown ordnance items. While executing a wet-gap crossing, heavily emplaced antitank and antipersonnel landmines positioned for area denial along the far side objective and exit bank objective should be anticipated. Other anticipated problems might include improvised explosive devices, weapons caches, and booby traps in and around the far side, exit bank, and intermediate objectives. For these reasons, EOD forces constitute critical force multipliers required for a deliberate wet-gap crossing during large-scale combat operations. EOD forces are the only assets on the battlefield that can conduct both render-safe and disposal operations for explosive hazards.

Recommendation

EOD employment should be focused on mitigating explosive hazards from the exit bank. Doctrinally, EOD formations may render-safe explosive hazards, rather than dispose of them by detonation. This results in two specific benefits—the ability to remain clandestine when required and the ability to protect critical infrastructure

EOD technicians from the 774th and 630th Ordnance Companies cross Milford Lake on boats at night.

and key terrain. Rendering-safe, versus disposal by detonation, limits the risk involved to critical infrastructure such as bridges, dams, or electrical power grids identified for use in securing the bridgehead line (Phase IV of the gap crossing). If the hazard is not within a mission-critical area, EOD formations can destroy the hazard to allow the assault element to continue movement. The following text should be added to the doctrine contained in ATP 4-32, *Explosive Ordnance Disposal (EOD) Operations,*[2] and ATP 3-90.4:[3] *When conducting a wet-gap crossing, EOD should be implemented in a reserve boat or rotary asset on the near side of the gap in support of the assault element for two reasons—protection of EOD assets and employment flexibility. Staging an EOD team in a reserve transportation asset protects the maneuver commander's limited EOD assets, limiting exposure to direct enemy fire from the far side of the gap. It also affords the maneuver commander greater latitude in employing EOD teams across the entire assault force as specific explosive hazards are identified. When they are properly staged forward in the close area, EOD teams are able to quickly respond to any explosive hazards encountered. They become force multipliers, protecting the assault elements from explosive hazards and maintaining momentum as the force assaults the gap.*

Based on the current modified table of organization and equipment, EOD forces operate in teams of two. Both of the EOD technicians are required to be on the scene in the event of an explosive hazard, which means that both are required to be staged with the reserve boat or rotary asset. As a result, EOD Soldiers are not located with their vehicles. With the upcoming force design update, EOD teams will consist of three team members; however, it will still be recommended that all EOD Soldiers be staged in the reserve boat or rotary asset. This will allow the EOD team to operate at maximum capacity, as team members support the team leader in preparing equipment and special explosive charges. If EOD capability is required on the exit bank, the EOD team will rely on assistance from the supported unit in order to maneuver across the wet gap.

Endnotes:

[1]ATP 3-90.4, *Combined Arms Mobility*, 8 March 2016.

[2]ATP 4-32, *Explosive Ordnance Disposal (EOD) Operations*, 30 September 2013.

[3]ATP 3-90.4.

Lieutenant Colonel Teller is the commander of the 79th Ordnance Battalion. He holds a master's degree in national security and strategic studies from the U.S. Naval War College, Newport, Rhode Island.

Major Artone is the operations officer for the 79th Ordnance Battalion. He holds a master's degree in operational studies from the Command and General Staff College, Leavenworth, Kansas.

Major Marvin is the executive officer for the 79th Ordnance Battalion. He holds a master's degree in operational studies from the Command and General Staff College.

Captain Sagona is the commander of the 630th Ordnance Company (EOD), Fort Riley. He holds a bachelor's degree in systems management from the U.S. Military Academy–West Point, New York.

Captain Vernon is the commander of the 774th Ordnance Company (EOD), Fort Riley. He holds a bachelor's degree in civil and environmental engineering from the Virginia Military Institute, Lexington.

Training Engineer Soldiers for a New Threat Environment

By Captain Joseph M. Prinzinger

"We had lost all of our recovery equipment as they unloaded on Normandy Beach, and they told us that we were infantry now. We cleared three towns before we got new equipment and became a recovery company again. I killed a sniper." Those chilling words, spoken to me by a World War II veteran while I was visiting the National D-Day Memorial in Bedford, Virginia, reminded me that, despite our specialized equipment and training, we are ultimately combat Soldiers and must be prepared for anything. I was also reminded that large-scale combat operations (LSCO) are fluid and ever-evolving and that they will require that we be adaptable in order to fight and win. As a result, we must train for events which will unfold in ways that we cannot imagine.

Naturally, engineers want to perform engineer tasks. (If we didn't, we'd be infantry or field artillery Soldiers or members of some other worthy branch.) This is a good thing. We want a force that is dedicated to the various engineer disciplines—combat engineering, geospatial engineering, and general engineering. Construction support, a key component of general engineering, is the core mission of the 877th Engineer Battalion (Combat Heavy), 226th Maneuver Enhancement Brigade, Haleyville, Alabama—the lone engineer battalion in the Alabama Army National Guard. Whether it's constructing a tank ditch, constructing a map, or constructing a base camp, rolling up our sleeves and building whatever is needed to accomplish the mission is fundamental to our Corps. The Engineer Corps must be able to build anything, anywhere, at any time; however, we must also be ready for whatever combat mission we are assigned.

As engineer leaders, we must continually assess how warfare is changing and question how we must protect ourselves while conducting our assigned missions. We have developed tactics, techniques, and procedures for handling improvised explosives, indirect fire, sniper attacks, and small-unit ambushes over the last 20 years of combat. But how do we respond to a drone sighting? What are the disengagement criteria for retrograding from a job site? Do we abandon our equipment or scuttle it first? The proliferation of portable and accurate guided missiles that are used in conjunction with unmanned drones, for example, has drastically changed warfare.[1] How will these and other emerging technologies affect engineer operations in evolving threat environments? These are among the many questions that the Engineer Corps should now be asking itself in the ever-changing, always-evolving threat environment.

Engineers should challenge the assumptions that "Enemy forces will be far away" or that "Security will be provided for us." In all likelihood, assets as valuable and vulnerable as a combat heavy engineer battalion (such as the 877th

OPFOR trucks

Engineer Battalion) will be based in the rear, or consolidation area, but Soldiers and equipment are likely to be spread across the area of operation, providing engineer support in a myriad of ways throughout the division and corps battlespace. Engineer Soldiers might be digging tank ditches in front of an infantry brigade combat team, constructing vehicle and individual fighting positions for an armored brigade combat team, repairing critical supply routes for the support brigade and its assigned combat sustainment support battalions, or fortifying critical division assets such as air defense radars. Coordination with receiving units will help ensure security for these vital engineer Soldiers, but the Soldiers should also be ready to defend themselves.

Faced with these questions and challenges, the 877th worked to develop its personnel to better meet these threats, using the annual 2-week training as the training ground. Targeted situational tactical exercise (STX) lanes were chosen as a means to provide focused training on scenarios that our platoons would likely encounter in the consolidation area. Over teleconferences, we discussed the threats that our platoons could face in LSCO and ideas to simulate these threats, ultimately settling on scenarios featuring threats from special-purpose forces, nonstate actors, drones, and indirect fire while working in the consolidation area.

After conceptualizing the enemy forces, we worked to simulate them in the training environment. A volunteer spouse used fabric comprised of a dark camouflage pattern (which was purchased online) and other camouflage patterns to tailor jerseys for the opposing forces (OPFOR). Mixing and matching camouflage patterns is a common practice among militaries throughout the world, and it worked for our OPFOR as well. We then developed and rehearsed detailed scripts for each lane, synchronizing our observer coach-trainer evaluators and OPFOR. For example, although a drone attack is challenging to simulate, a simple script can help provide adequate training. In our drone scenario, the STX lane event began with a radio call indicating that an air intrusion had been detected on radar. The officer in charge and the noncommissioned officer in charge then received a picture of a drone and were told that the drone had been spotted overhead. The key leaders then enacted their tactics, techniques, and procedures—dispersing and sheltering in a simulated bunker. A simulated drone strike on a unit vehicle was then initiated using an artillery simulator and smoke grenade.

During the STX, we discovered that artillery simulators comprised a vital training resource that created a realistic combat environment in many ways. We could use the artillery simulators to simulate antitank rockets, air-to-ground missiles, and artillery. In counterinsurgency environments, the indirect-fire capabilities of enemy forces are likely to be limited. In LSCO environments, however, a peer or near-peer enemy can mass artillery fires of many types. The employment of larger quantities of artillery simulators than normal was necessary in order to simulate the noise and confusion of massed artillery. Smoke grenades further provoked a more realistic response from OPFOR. We used smoke for simulating vehicle destruction and chemical attacks, marking landing zones, and obscuring friendly and enemy forces. Engineer Soldiers must learn to overcome the harsh sounds of battle and the cries of the wounded, and they must be able to keep their wits about them in stressful situations. The use of artillery simulators and smoke was instrumental in creating a combat-like environment.

We also found it helpful to instruct members of the unit that was under evaluation to become an extension of the observer coach-trainer/OPFOR team. In one STX lane, a light-medium tactical vehicle driver in the target audience was employed to support the script without compromising the unit mission. In another lane, we enlisted an operator to simulate the destruction of a dump truck while out of sight of the platoon leader and platoon sergeant. The dump truck operator was given artillery simulators and smoke grenades that, once out of sight, were to be initiated to simulate the destruction of the truck. The evaluators were then to observe how long it took unit leaders to realize that they were missing a vehicle. Unfortunately, in this scenario, the dump truck operator, who was assumed to know how to

properly operate the artillery simulators, inadvertently pulled the fuses instead of lighting them—a mistake that I also made. It is critical to understand the safe and proper use of training aids before initiating an exercise.

Once training commenced, it was fairly easy to identify and address problems. We observed two common problems—the improper use of organic communications equipment and lack of dedicated standard operating procedures/tactics, techniques, and procedures. Performing engineering tasks require periodic review, and these tasks should be incorporated into training whenever possible. Unsurprisingly, we found that platoons with noncommissioned officers who possess strong leadership skills performed better—especially in units with leaders who had bought into the need for tactical training. We also learned that tactics, techniques, and procedures for the various scenarios didn't change as much as we had initially anticipated. Whether initiated by an improvised explosive device or an anititank guided missile, ambushes on convoys progressed in a similar fashion, starting by moving rapidly out of the enemy kill zone. And whether indirect fire is from a single tube or massed artillery, reaction is similar, with differences being mostly a question of scale. Rehearsing how to react in various situations greatly reduced unit confusion and decreased the time required for the unit to maneuver away from the kill zone.

An OPFOR search

Buy-in from company leadership was important. One company commander tailored the script of the original scenario specifically for his platoon leader. His modified scenario was the most comprehensive and exhaustive of any used during the annual training. The company commander requested additional planning documents to allow deeper mission analysis by his platoon leader and greatly enhanced the realism of the STX lane by integrating his personal combat experience and his personal knowledge of the training audience.

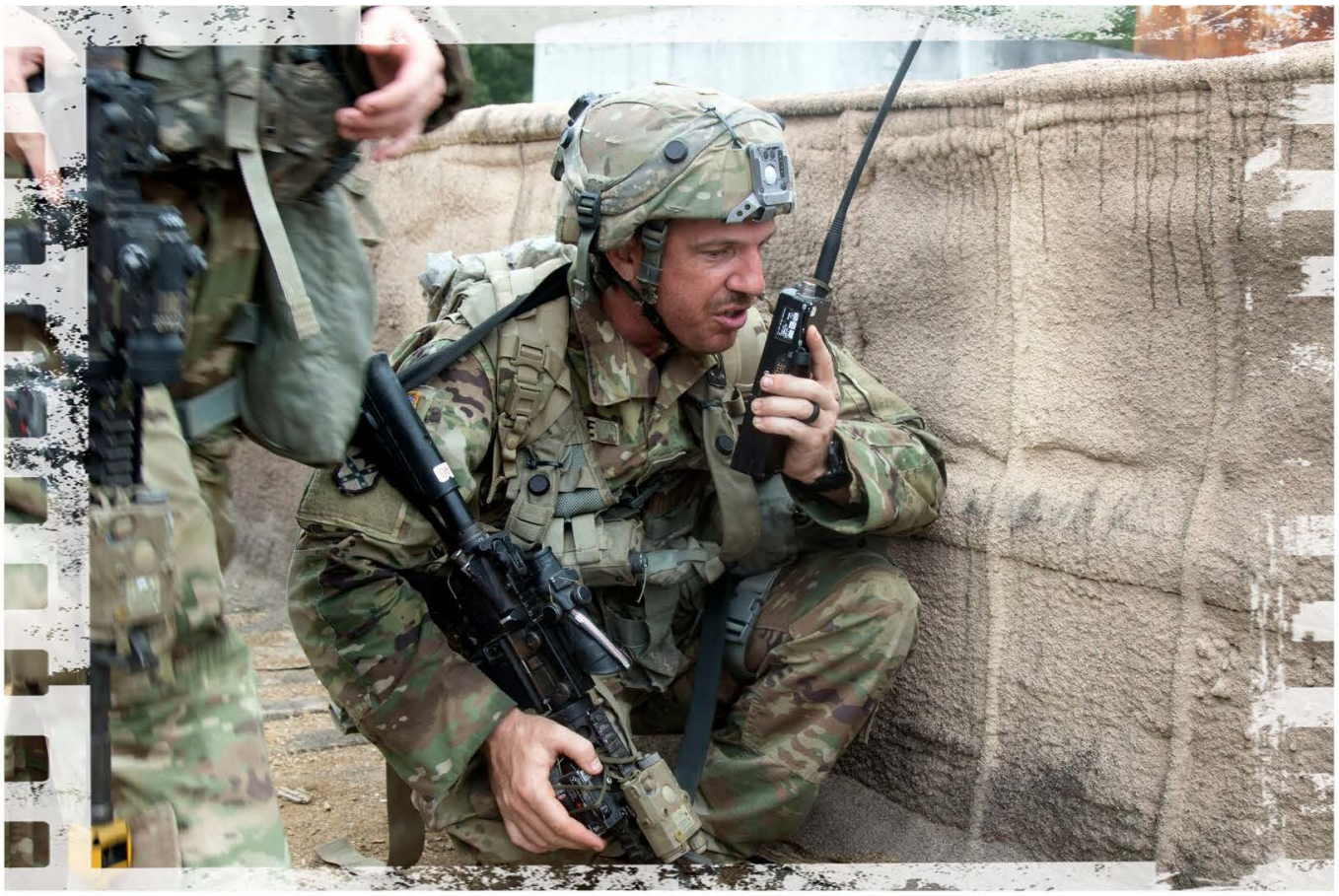
Junior enlisted and noncommissioned officers must be invested in the training. Many Soldiers were excited about trying to out-smart OPFOR. After presenting one platoon with a briefing on a possible attack, we warned the platoon members that the OPFOR planned to infiltrate their job site. We even told them when OPFOR would be on-site and made a wager that OPFOR would be successful. Unbeknownst to the training audience, OPFOR arrived an hour before we that said that they would, parking their trucks behind an adjacent hill to hide their arrival. Despite the deception, the alert platoon successfully defended its job site. During the after action review, OPFOR members realized their mistakes. First, the vegetation surrounding the job site was not as thick as originally perceived, allowing for easier detection. Second, the trained platoon correctly assessed the most likely avenue of approach and prepared the unit defense accordingly. Finally, the noise of the OPFOR trucks gave away their location. The Soldiers of the trained platoon, on high alert because of our wager, were eagerly listening for anything out of the ordinary and, thus, able to successfully defend their job site.

As the Army transitions from years of counterinsurgency and stability operations back to LSCO, units and leaders are dusting off old tactical skills and developing new ones to counter the emerging dangers of the modern battlefield. While the 877th Engineer Battalion may not have answered all of the questions about how an engineer unit will be integrated into LSCO, we did take a solid step forward. The efforts of the observer coach-trainer evaluators and their OPFOR team helped to demonstrate to our Soldiers (junior officers and noncommissioned officers) how it is possible to train for a more competent and deadly enemy using assets that are already available. The invaluable battalion STX lane training allowed us to develop and refine techniques that our platoons can use to counter new enemy threats so that we may be prepared for whatever the Army asks of us.

Endnote:

[1]Jakub Janovsky, "Seven Years of War—Documenting Syrian Rebel Use of Anti-Tank Guided Missiles," 4 May 2018, <https://www.bellingcat.com/news/mena/2018/05/04/seven-years-war-documenting-syrian-rebel-use-anti-tank-guided-missiles/>, accessed on 27 January 2022.

Captain Prinzinger is the battalion logistics officer for the 877th Engineer Battalion. He holds a bachelor's degree in mechanical engineering from the Virginia Military Institute, Lexington. He is a registered professional engineer in the State of Alabama.



Securing the Rear Area: The Brigade Engineer Battalion

By Major Jeremy C. Scanlon

The changing strategic environment requires that the U.S. Army focus on full-spectrum operations that cover multiple domains. The current threat environment includes state and nonstate actors, each possessing differing threat capabilities. To keep up with the changing operational environment and evolving threat, the brigade engineer battalion (BEB) must undergo a change in its current force structure to improve its capabilities. By examining this capability gap through a doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy lens, viable solutions can be developed.

Protection of the rear area has been a challenge for commanders on the battlefield for centuries. According to now-obsolete Field Manual (FM) 90-14, *Rear Battle*, "In the past, combat operations in the rear area have proven to be difficult to defend against and to be very disruptive to forward support."[1] An enemy force focusing on defeating a superior force will not focus an attack on the strength of that force, but instead will look to defeat the superior force by attacking subsystems or components.[2] This is what units face as they conduct rotations at the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana.

The return of peer powers requires the identification of methodologies to protect Soldiers, units, and critical infrastructure against future threats, particularly China and Russia, on increasingly lethal battlefields.[3] The shift in focus of the Army, from limited contingency operations to large-scale combat operations, has demonstrated to infantry brigade combat teams (IBCTs) that stability operations in the rear area in large-scale combat

"To keep up with the changing operational environment and evolving threat, the brigade engineer battalion (BEB) must undergo a change in its current force structure to improve its capabilities."

operations are anything but stable. A recent white paper written by the JRTC task force BEB cadre noted the following: "Since the loss of the brigade special troops battalion (BSTB) headquarters, IBCT commanders continue to face challenges in executing support area operations using the BEB. Over the course of fiscal year (FY) 2019 and first quarter FY 2020 rotations, IBCTs did not effectively control or secure their support areas at JRTC. As a result, all brigades experienced a consistent loss of sustainment, fires, radars, maneuver support assets, communication systems, and command and control nodes."[4]

As the IBCT enters the operational area and focuses on the close fight, it bypasses a large portion of the operational area, leaving the rear area wide open for exploitation by the enemy. IBCTs struggle to identify a solution during combat training center rotations. The BEB has become the answer. This necessitates a change in force structure, permanent or attached personnel, and equipment. It also requires that the Army address these changes within its doctrine.

The current force structure of the BEB[5] allows it to provide an array of BCT level support; however, BEB structural limitations require echelon-above-brigade (EAB) assets to accomplish the BEB mission set. When the BEB is fully engaged in the operational environment (all sapper platoons are task-organized to the maneuver battalions in accordance with the commander's plan; the equipment and route reconnaissance platoons are on mission; and the chemical, biological, radiological, and nuclear reconnaissance platoons are attached to brigade), only the headquarters company remains with minimal direct-fire systems. The bulk of these weapon systems reside within the company headquarters, which is comprised of seven personnel and the battalion staff sections that are responsible for the command and control of the battalion. The direct-fire weapon systems that reside within the BEB, are dedicated to the area security of the battalion tactical operations center; if taken to deter another threat, the survivability of the battalion would be significantly hindered, exposing the battalion to further threats. The BEB also becomes the manager for the EAB attachments, but it has limited ability to do anything other than track, as the EAB is a brigade asset. Recognizing that, for most missions, there is never enough combat power to go around, dedicating any portion of the IBCT combat power for rear-area security is generally not a feasible solution.

Commanders will never have the optimal center of forces available to accomplish the mission, so they must demonstrate an understanding of operational art when formulating their plan. Organizational domain solutions focus on tailoring how the BEB and its assigned EAB assets are organized into a force structure appropriate for accomplishing doctrinal tasks. During its transition from the BSTB, the BEB lost the assigned military police company, which served as its organic security element, contributing to the failures at JRTC.[6] Reassigning an organic military police company to the BEB would provide the combat power and expertise necessary to assist the BEB in securing the rear area.

Materiel domain solutions are inherent to any modernization. All maneuver battalions within the IBCT are issued the Advanced Field Artillery Tactical Data System, but the BEB is not. The ability to integrate fires empowers the BEB to address the rear area threat.

IBCT performance during JRTC rotations demonstrates a capability gap that correlates with the transition of the BSTB to the BEB. Currently, the BEB is not formally tasked with providing security to the IBCT and is not assigned as the rear-area security element for the IBCT. The mission of the BEB should be to provide organic engineer, military intelligence, signal, planning, security, and execution capabilities to the BCT. This capability gap solution will focus on the addition of security as a formal task in the BEB mission statement. Two recommended BEB organizational solutions are—

- Convert the BEB plans officer position to an effects coordinator position within the operations section.
- Assign an organic military police company to serve as the security element.

The first solution would involve converting the plans officer position to an effects coordinator position. The addition of the effects coordinator would benefit the BEB and IBCT in multiple areas. First, it would enable the BEB to synchronize fire planning to defeat Level II threats to the rear area. Secondly, it would add a subject matter expert to assist with engagement area development and obstacle planning.

The second solution would involve reorganizing the BEB by assigning a military police company. Regaining the military police company would strengthen the BEB capabilities, as area security is an inherent military police function. Military police would also complement the BEB core mission of mobility, with special emphasis on route reconnaissance and surveillance as well as breaching operations.

The BEB is a key enabler that assists the IBCT with mission accomplishment. By design, the defining capabilities of the BEB reside within its engineer companies and it provides additional sensors that the IBCT requires. The BEB must also be able to defend and secure these assets from enemy threats.

Doctrinal updates are necessary in order to address the changing role of the BEB in support of securing the rear area. Doctrinal changes should specifically break down the

components of the rear-area plan and identify who manages that plan when the brigade commander is focusing on the main effort.

The Army "train as we fight" concept is integral to the successful implementation of these capability gap solutions. The IBCT must integrate rear-area security into BEB training. Outside of a combat training center location, EAB units rarely conduct consolidated training alongside IBCTs; however, opportunities for this type of training are necessary. During mission analysis, the assistant brigade engineer is tasked with identifying shortfalls and requesting EAB units to assist in accomplishing the IBCT mission.[7] A partial solution might be to ensure that appropriate enablers are identified early on during planning. The early identification of these enablers would not only allow for focused training on the new capability but also improve the ability of the IBCT and BEB to synchronize and formulate the rear-area plan.

Reorganization of the BEB to include an effects coordinator and an organic military police company would provide BEB and IBCT commanders with additional capability. The military police company would have the capability necessary to defeat Level II threats. Teamed with the ability of the effects coordinator to plan emergency fires, this would enable the IBCT commander to focus on the close fight. The military police company would act as the initial response force to delay or defeat Level II threats in the BCT area of operations. The military police company would also possess the ability to leverage host nation police forces and their assets to maintain an economy of force, further enabling its ability to secure the rear area.

Aside from its area security function, the military police company would also support the commander through maneuver and mobility support, police intelligence operations, law and order, and internment and resettlement functions. These functions complement the BEB engineer function of mobility and military intelligence company intelligence collection, providing more assets to the commander and assisting in the consolidation of gains in the support area.

While the Army works on developing and integrating the solution to the capability gap, BCT commanders must seek opportunities to train with EAB units—in particular, military police companies—to gain an understanding of changes in doctrine and new training requirements.

Endnotes:

[1]FM 90-14, *Rear Battle*, 1984 (obsolete).

[2]Training Circular (TC) 7-100.2, *Opposing Force Tactics*, 9 December 2011.

[3]"Summary of the 2018 National Defense Strategy of the United States of America," Department of Defense, 19 January 2018, <https://www.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>, accessed on 1 February 2022.

[4]Kenneth Smith et al., *Support Area Security Operations,* Joint Readiness Training Center Task Force 5, Fort Polk, Louisiana, 2020.

[5]A BEB has a headquarters company; two engineer companies; a signal company; a military intellegence company; a tactical unmanned aircraft system platoon; and a chemical, biological, radiological, and nuclear reconnaissance platoon (located in the headquarters company).

[6]Haley S. Foo, *Transformation of Brigade Special Troops Battalions (BSTBs) to Brigade Engineer Battalions (BEBs): Lessons Learned and Best Practices*, June 2018.

[7]B*rigade Engineer Battalion and BCT Integration*, Center for Army Lessons Learned, Fort Leavenworth, Kansas, April 2017.

Major Scanlon, a member of the Florida Army National Guard, serves as the battalion operations officer for the 753d Brigade Engineer Battalion, 53d IBCT, Pinellas Park, Florida. He holds a bachelor's degree in political science from Florida State University, Tallahassee, and a master's degree in organizational leadership from Argosy University, Atlanta, Georgia.

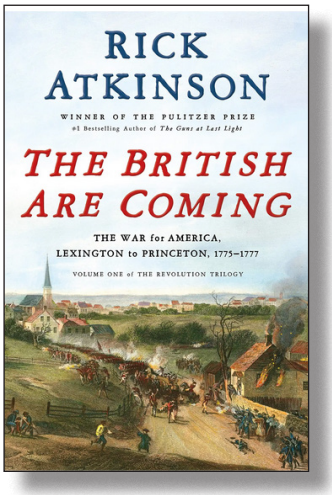
(Show the Way, continued from page 5)

and Advanced Individual Training. Both programs create an atmosphere of learning and manage expectations for what is on the horizon. The biggest difference between the two programs is likely in the "recruiting approach." According to Chief Warrant Officer Five Smith, the Warrant Officer Accession Program involves talking to Soldiers to learn about their civilian experiences and determine how they can be leveraged to help fill MS-ARNG warrant officer vacancies and *modernize the Regiment* through the acquisition of warrant officers in our formations. The overall Army Warrant Officer Accession Program is built around the use of "feeder MOSs," which works well for the Regular Army. There is a nearly untapped well of experience from which to draw in the Army National Guard and U.S. Army Reserve—especially when it comes to the civilian experience of traditional guard and reserve Soldiers, which may align with geospatial or construction skills. There is no list of these skills, experiences, and capabilities stored in a database; the best way to find potential warrant officer candidates is to circulate among the Soldiers and talk to them during their duty weekends. The MS-ARNG advertising campaign and recruiting and mentoring approach are credited with the greater-than 100 percent-fill rate of MS-ARNG engineer positions.

Finally, I would like to congratulate the warrant officers who were selected for promotion to the next grade, as the Army has recognized your potential to serve at a higher level/capacity. I encourage our engineer leaders to continue leveraging engineer warrant officer expertise to gain a marked advantage in the operational space. *Essayons!*

Book Review

Book reviews are a feature of *Engineer*. Authors of book reviews summarize the contents of books of interest and point out the key lessons to be learned from them. Readers who wish to submit book reviews may forward them to <usarmy.leonardwood.mscoe.mbx.engpb@army.mil>.



The British Are Coming by Lawrence Rush "Rick" Atkinson, Henry Holt and Co., 2019, ISBN: 1627790438.

Reviewed by Colonel Heather A. Levy

Rick Atkinson's most recent work, *The British Are Coming*, is overwhelmingly rife with stark details, both personal and martial, from both sides of the American Revolution. Atkinson's inclusion of gritty and intimate details provides new insight into the familiar chronicle of the American Revolution, with a depth of reporting that only a master researcher can bring to the task. His dedicated research is evident on every page of this sweeping record of the first 2 years of the conflict that would create the United States of America. Atkinson seamlessly integrates primary sources from public records, journals, letters, trials, manuscripts, and other papers to provide an intimate look at the realities of war in the late 18th century. His work covers topics as varied as the importance of logistics, the performance of Soldiers in critical battles, and the growth of key leaders as they developed into notable generals that fought in the American Revolution.

At a fundamental level, the stories of individual men and women are woven into every battle. For example, after having buried two children, the otherwise unremarkable rebel John Clark can only pray that the death of another will give him and his wife faith and meaning as they live separated by the war. And British Captain Glanville Evelyn, who spent 18 months fighting at the head of his company—far from his widowed mother in Ireland—earned only death as payment for his steadfast leadership. These quiet, yet compelling men share the psychological stage with historic leaders. Following the British capture of Fort Washington in Manhattan, for example, Atkinson highlights a scene in which General George Washington weeps over the consequences of his indecision that led him to defer to Major General Nathanael Greene's desire to hold the position rather than evacuate. Atkinson vividly describes Colonel Benedict Arnold's ability to inspire troops as they persisted through their starving and shoeless 6-week march to Quebec, Canada. Atkinson underscores how, once signed, the Declaration of Independence was read at every muster and how it aided and mobilized the fighting spirit of the rebels and their supporters. These details chronicle the waxing and waning of public opinion on both sides of the Atlantic Ocean, amid the growth and collapse of the tremendous characters that contributed to the forging of the United States. Though Atkinson never explicitly browbeats the reader with his conclusions, he provides historical insights that illuminate connections for his audience.

The psychological details of motivation and leadership that Atkinson highlights are of great interest to contemporary practitioners of strategic leadership, just as the entire history is valuable for its context. *The British Are Coming* could serve as a textbook for an Army War College course, addressing questions about how to command groups of near-peers, as General Washington did. The practitioner can look to the depths of this tome to learn how to inspire Soldiers, build their resilience, and convince them to commit to a cause for the long term—all topics of interest under the Army's "People First" initiatives. Equally as important is the question of how to write and speak to people and state leaders to motivate them to a cause. This remains so critically relevant that strategic narrative is an essential complement to the National Defense Strategy. Atkinson crafts his historical account in such a detailed manner that we can imagine Benjamin Franklin producing the narrative that would win the support of France and ultimately help America achieve victory. Again, the strength of Atkinson's research and the power of his storytelling provide an in-depth look at multiple topics within the context of the American Revolution. From lessons in the conduct of war to leadership and the production of a strategic narrative, this contemporary telling of a historic conflict brings lessons to a modern-day audience.

Colonel Levy is a student in the Carlisle Scholars Program at the U.S. Army War College, Carlisle Barracks, Pennsylvania. She holds a bachelor's degree in geology from the University of California–Berkeley and a master's degree in civil engineering from Missouri University of Science and Technology at Rolla.

Operation Allies Welcome

By Captain John M. Steingruby, Chief Warrant Officer Three Juanita J. Pimienta, and First Lieutenant Matthew A. Benjamin

The end of a 20-year-long conflict in Afghanistan brought a series of complex problem sets for military and civilian leaders to solve. The responsible relocation of vulnerable Afghans, especially those who supported the United States and coalition partners, was of paramount importance. The Department of Defense has an enormous capability to move personnel, assets, and materials around the world, including the organizational structure necessary to coordinate and integrate efforts across the whole of government to provide essential services to incoming personnel—even in a pandemic-affected environment.

A mission of U.S. Army North (Fifth Army), Fort Sam Houston, Texas, is to lead the Department of Defense response, in support of the Department of Homeland Security, for the temporary housing of Afghan refugees at various installations. One of the most basic requirements of any operation is the visualization of the problem. Rising to the challenge and implementing the latest technology and tools available, the 543d Geospatial Planning Cell (GPC), which is assigned to U.S. Army North, created decision support aids to enable such vision. The tools used include interactive Environmental Systems Research Institute dashboards, which enable commanders and various staff echelons to customize the data that they view in real time and to rapidly generate briefing aids to support objective decision making through access to the GPC interactive portal.

The 543d GPC maintains capabilities unique to the Army service combatant command level. It employs Soldiers with exceptional subject matter expertise in geospatial engineering; they generate, collect, and manage data and produce graphic products that effectively depict situations and problems. These skills enable the GPC to accomplish its mission of managing the theater geospatial database, mapping updates, providing tactical decision aids, and performing intelligence preparation of the operating environment in support of defense support of civil authorities, theater security cooperation, homeland defense, and other assigned mission sets.

The GPC provided planning and decision aids aimed at further understanding the diaspora of Afghan refugees and the response of the lead federal agency across the eight installations participating in relocation and integration. Data from a variety of interagency partners, such as the Department of Homeland Security, the National Geospatial-Intelligence Agency, the U.S. Census Bureau, and the Department of State, was compiled in the Hummingbird™ database. Hummingbird is a collaborative database that amasses basic information (age, gender, religion) for individual Afghan refugees. One of the many challenges associated with the data compilation was that the information had not been adequately processed and geocoded. Geocoding involves providing geographical coordinates corresponding to a location in order to tie something or someone to a point in space and time.

Once each individual Afghan had been geocoded, the process of displaying the data could begin. This visual information painted a picture for governmental and nongovernmental organizations that oversee immigration in the United States, including the Department of State, the Department of Justice, and the United Nations International Organization for Immigration as well as more than 200 civic organizations throughout the country. These organizations assist in ensuring that Afghan refugees have places to live, places to work, and schools for their children so that they can earn a living and become self-sustaining.

The geospatial products that were created enabled decision makers to determine operational requirements based upon identified hot spots for the settlement of Afghan refugees and to assist with the allocation of assets to best support the continued mission. The authors of this article took the opportunity to develop their skills and employ their expertise as members of a small team in support of an extremely important national objective and noble cause.

Captain Steingruby is the officer in charge of the 543d GPC. He is a recent graduate of the Royal School of Military Survey in the United Kingdom. He holds a bachelor's degree in history from Lindenwood University, St. Charles, Missouri, and a master's degree in geological engineering from the Missouri University of Science and Technology at Rolla.

Chief Warrant Officer Three Pimienta is the senior geospatial technician for the 543d GPC. She holds a bachelor's degree in geosciences with a concentration in geospatial technology from the University of New Hampshire, Durham.

First Lieutenant Benjamin is the executive officer of the 543d GPC. He holds a bachelor's degree in geospatial information science from the U.S. Military Academy–West Point, New York.

ENGINEERS WELCOME ALLIES

By First Lieutenant George K. Dreiszus

On 15 August 2021, the Taliban officially took control of Afghanistan by seizing the capital city of Kabul. This initiated the largest refugee evacuation by the United States in recent history, with the United States eventually housing upwards of 70,000 Afghans.[1] An influx of this size requires infrastructure sufficient to support everyone, and multiple installations were activated to act as in-processing and living centers for the refugees. The expertise and manpower of U.S. Army engineers were critical to this standup of operations. These engineers demonstrated the capability and versatility to accomplish any mission.

The United States was required to rapidly determine the need for engineers, as Afghan refugees began arriving in the Nation less than 1 week after the initial evacuation. Units assigned to the Defense Chemical, Biological, Radiological, and Nuclear (CBRN) Response Force are postured to deploy domestically within 48 hours to assist local authorities and limit human suffering in the event of a CBRN attack. To support the Defense CBRN Response Force mission, the Department of Defense designated three separate task forces. Task Force Pacemaker, one of the three task forces assigned to the Defense CBRN Response Force mission, was led by the 864th Engineer Battalion, Joint Base Lewis–McChord, Washington. As the general-purpose force under Task Force Pacemaker, the 610th Engineer Support Company supported a diverse mission set, including missions such as troop construction and logistical and administrative support and possessed the skills necessary for Operation Allies Welcome.

The 610th was 10 days into a brigade field training exercise, training on wartime construction tasks, when it received the mission to support Operation Allies Welcome. This presented the first of many challenges, as troops and equipment needed to be recovered overnight and deployed to Fort McCoy, Wisconsin, within 48 hours. Fort McCoy is a training base used for force generation and projection and

A ramp allows disabled guests ease of access.

A Soldier drills holes for a clothesline.

is not intended to serve as a temporary housing solution for civilians. The installation required a multitude of improvements in order to be suitable for the influx of 13,000 men, women, and children of all ages. Additionally, a new command structure needed to be established in order to ensure that Operation Allies Welcome could be accomplished. This resulted in the creation of Task Force McCoy. A new and separate command, Task Force McCoy oversaw all Operation Allies Welcome operations and maintained control of the units deployed to support the mission, including the 610th.[2]

As the only construction company deployed to Fort McCoy, the 610th was initially tasked to construct many of the improvements needed as refugees arrived at the installation. These projects ranged from constructing walkways at the reception centers to installing baby gates on the stairs of barracks buildings. Soldiers installed 6,000 meters of fencing, built clotheslines, and constructed sign stands and map boards to meet the new demands of the refugees. These troop construction projects were vital in the initial rapid transformation of Fort McCoy from a mobilization force generation installation to a safe and welcoming environment for the Afghan guests.

As Afghan guests continued to arrive at the installation, Task Force McCoy identified many new requirements and the 610th was able to quickly respond to each new mission. The largest overhaul involved transforming Improved Tactical Training Base (ITTB) Liberty into a quarantine and isolation camp for the guests. Task Force McCoy identified this requirement as a result of global health challenges, including the Novel Coronavirus (COVID-19), tuberculosis, measles, chicken pox, and influenza. ITTB Liberty was managed as a transition area that provided screening, testing, and medical treatment for COVID-19 to prevent its further spread. This completely shifted the company mission from one of troop construction and installation improvement to base camp administration and logistics support.

For Army engineers, base camp planning, construction, and operation is a critical capability. Army Techniques Publication (ATP) 3-37.10, *Base Camps*, defines a base camp as "an evolving military facility that supports the military operations of a deployed unit and provides the necessary support and services for sustained operations."[3] Although it was not the purpose of ITTB Liberty to support deployed Soldiers, it served a function similar to that in that it provided safety and sustainment for the refugees.

Prior to the occupation of ITTB Liberty, the leadership of the 610th went through the base camp planning process to determine the requirements for, and suitability of, the camp. As a preestablished forward operating base for training, the construction of all living and sustainment facilities had already been completed. However, the specific purpose of the camp was now to be quarantine and isolation. As with all base camp planning, determining the optimal layout was critical. In order to keep the refugees from spreading COVID-19, most of the planning focused on allocating areas and facilities for each illness. Camp sections were designated for each cohort, and a nongovernmental organization resourced a medical team to provide necessary medical services. In order to minimize contact between refugees, a meal delivery plan which ensured that each plate was brought directly to the family living quarters was established. During the initial days of ITTB Liberty, less than

100 guests stayed at the camp. However, during the following days, the principles of base camp operations were truly put to the test.

As the guests were arriving, a positive measles case was identified on an incoming flight from Germany. This brought the widespread realization that the majority of refugees had not received the measles, mumps, and rubella vaccine, meaning that a robust contact trace needed to be conducted and that more than 400 identified guests needed to be isolated from the main population at Fort McCoy. Over the next 24 hours, Task Force Pacemaker moved these guests to ITTB Liberty as the operation was scaled upward in size. Many new requirements were identified with the influx, including the need for additional showers and significantly more supplies. This mass movement could not have been predicted, but the detailed planning that took place during the initial stages of the operation allowed the 610th to react without failure. Accounting for the need for scalability of the camp early on allowed guests to immediately move into places without the need to relocate any refugees who were already present. This practice became standard throughout the operation, as groups of houses were designated for specific illnesses, meaning that all arrivals immediately had safe places to live. Despite efforts to improve ITTB Liberty, the mission was temporary. During its final days of support to Operation Allies Welcome, the 610th Engineer Support Company facilitated a more permanent solution for the quarantine and isolation of guests.

A Soldier delivers meals to Afghan guests at ITTB Liberty.

The final 610th mission was critical to the reintegration of guests at ITTB Liberty into the greater population on Fort McCoy. The company worked directly with task force medical teams, the Centers for Disease Control and Prevention, the State Department of Public Health, and Task Force Pacemaker to vaccinate more than 700 guests at ITTB Liberty and more than 12,000 guests at Fort McCoy against some of the most common global illnesses. This facilitated a seamless transition from quarantine lockdown to continued visa processing and onward assimilation into U.S. society.

When the country called for engineer support, the 610th Engineer Support Company rapidly redeployed and was on the ground in less than 48 hours, supporting the Nation's humanitarian mission. The work conducted during Operation Allies Welcome demonstrated the tenacity and flexibility of not just the company, but also the Engineer Regiment as a whole. The unit arrived with no preparation for the mission and no specific training for the task at hand. In true engineer fashion, the 610th demonstrated its capability to solve problems and accomplish every assigned task. The Soldiers of the 610th embody the mindset of "*Essayons*" because, as engineers, they succeed in areas where others may fail. Ride or Die!

Endnotes:

[1]Jim Garamone, "Military Phase of Evacuation Ends, As Does America," *DOD News*, 30 August 2021, <https://www.defense.gov/News/News-Stories/Article/Article/2759031/military-phase-of-evacuation-ends-as-does-americas-longest-war/>, accessed on 13 January 2022.

[2]Tom Bowman and Marisa Penaloza, "Wisconsin Military Base Turns Into a Small City As Afghans Await Resettlement," *National Public Radio*, 6 October 2021, <https://www.npr.org/2021/10/06/1043695194/wisconsin-military-base-turns-into-a-small-city-as-afghans-await-resettlement>, accessed on 13 January 2022.

[3]ATP 3-37.10, *Base Camps*, 27 January 2017, p. 1-1.

First Lieutenant Dreiszus is a platoon leader for the 610th Engineer Support Company. He holds a bachelor's degree in biology from Central Washington University, Ellensburg.

Military Engineers Provide Aid After Hurricane Ida

By Staff Sergeant Garrett L. Dipuma

Editor's note: *Interviews for this article were conducted by various Louisiana National Guard (LANG) personnel over the course of Hurricane Ida emergency response operations, August–September 2021.*

After Hurricane Ida devastated the Louisiana Gulf Coast on 29 August 2021, LANG activated all available troops in its ranks. In addition, military personnel from around the country came to the aid of the state of Louisiana.

Following major disasters in Louisiana, the 225th Engineer Brigade, Camp Beauregard, Louisiana, assesses and clears roads so that recovery operations can occur as safely as possible. The 225th is one of the largest engineer formations in the U.S. Army National Guard. It typically conducts mobility, countermobility, survivability, and civil engineering support missions.

Colonel John (Greg) G. St. Romain, commander of the 225th, stressed that it is critical to get engineers on the ground as soon as possible after a major hurricane. "We need to assess and clear routes for emergency access and to allow power companies to start working," he said. To provide that access after the storm, the engineers of the 225th used their skills to perform a variety of missions including flood diversion, waterway hazard recovery, route clearance, and debris removal.

Because Hurricane Ida was a huge storm that left a massive radius of damage in its wake, additional personnel from the 202d Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers (RED HORSE), Camp Blanding, Florida; the 46th Engineer Battalion, Fort Polk Louisiana; and Naval Mobile Construction Battalion (NMCB) 133 (Seabees), Gulfport, Mississippi, came to Louisiana to lend a hand to the 225th.

"RED HORSE is a heavily mobile, rapid-engineering group that is here to help aid in recovery and route clearing," said Staff Sergeant James D. Bishop, who is a heavy-equipment operator with the 202d. "Any time we have downed trees, we want our [personnel] to come in as quickly as possible, take care of the folks that are here, and make sure they have access in and out of their areas so they can get the help they need," he added. The approximately 30 RED HORSE Soldiers and Airmen from Florida came to Louisiana through the Emergency Management Assistance Compact. Together, they used equipment such as chainsaws, axes, and front-end loaders to remove fallen trees and debris from the Greater New Orleans, Louisiana, area.

The 46th Engineer Battalion deployed to Southeast Louisiana with more than 150 Soldiers and 70 pieces of equipment. The 46th conducted route clearance in Grand Isle,

A U.S. Navy Seaman assigned to NMCB 133 operates a skid loader to move sand and debris after Hurricane Ida.

Guardsmen with the 2225th MRBC ferry emergency responders and equipment from Jean Lafitte to assist the locals with recovery efforts.

levee clearance in Terrebonne and Lafourche Parishes, and canal clearance in Terrebonne Parish. The 46th cleared 78 miles of land and removed 20,602 cubic yards of debris for the local population.

The mission of NMCB 133 is to provide an adaptive and scalable naval construction force that serves as a vital component of the U.S. maritime strategy in executing quality construction in combat, humanitarian assistance, or disaster recovery operations. After Ida pummeled the small island of Grand Isle, Louisiana, an NMCB 133 team was sent there. "Our mission in Grand Isle was road-clearing operations alongside LANG," said Utilitiesman First Class Jedediah P. Jones, NMCB 133 Grand Isle element officer-in-charge, "We removed 13,219 cubic yards of debris from the road and strategically placed them at different drop-off points." Jones said that the amount of debris his team removed from the roads in Grand Isle could fill up 4.5 Olympic size swimming pools.

"The RED HORSE and NMCB 133 elements were eager to hit the ground running," said Captain Michael B. Switzer, assistant operations officer for the 225th Engineer Brigade. According to Captain Switzer, flawless synchronization and communication between the organizations made the operation run smoothly.

In addition to clearing roads on solid land, the 2225th Multirole Bridge Company (MRBC), 225th Engineer Brigade, needed to find a way to get residents of Jean Lafitte, Louisiana, back to their homes after two shrimp boats took out the only bridge that provided access to the town. Fortunately, the 2225th trains to deploy the improved ribbon bridge (IRB), a portable, floating bridge typically used for military convoys to cross waterways. The 2225th has also found ways to use the IRB during emergency responses dating back to the Deepwater Horizon oil spill in 2010. The Puerto Rico National Guard also sent 43 Soldiers from the 190th Engineer Battalion, Caguas, Puerto Rico, to assist with the bridging operations.

Staff Sergeant Jose F. Flores, a supply sergeant with the 2225th, has participated in every emergency response in Louisiana since 2010; while standing on a temporary bridge constructed in Jean Lafitte, he stated, "The unit's improved ribbon bridge is used in these responses to transport necessary equipment and supplies to areas that would have been otherwise inaccessible. I take pride every time we've had the opportunity to assemble a bridge, knowing the enormous impact it would make on that community."

Before the temporary bridge was complete, the MRBC used sections of the IRB to ferry emergency response vehicles across the waterway. Within the first 3 weeks after the storm, as many as 1,200 vehicles had used the completed IRB in a single day. In all, more than 30,700 vehicles crossed the IRB before the Jean Lafitte Bridge was repaired.

"Getting to see the Soldiers do their jobs and for it to be impactful has gone from something that we train to do to something we're doing with an actual purpose in mind," said First Lieutenant Kyle R. Schmidt, commander of the 2225th, "To see that difference in motivation and to see that end goal get accomplished is really something quite impressive."

Staff Sergeant Dipuma is a writer/editor and photographer for the LANG Public Affairs Office, New Orleans, Louisiana.

Getting There Is Half the Battle: Engineer Companies in LSCO

By Captain Ann M. Dailey

In near-peer, large-scale combat operations (LSCO), the United States can no longer rely on the air and land superiority that it retained throughout decades of low-intensity conflict. Without air and land superiority, U.S. ground forces will face a deadlier battlefield. Engineers, in particular, will need to overcome sustainment and survivability challenges. The increased importance of survivability and maneuver will lead enemy forces to target engineering assets with improvised explosive devices and observed and unobserved fires. The enemy will maximize supply line disruptions and the ability of engineers to sustain their equipment. Engineers will be vulnerable everywhere within the theater.

In LSCO, getting to the fight in fighting shape will be half the battle. This places three challenges on company grade engineer leadership:

- Operating and transporting heavy equipment when fuel is constrained.
- Getting to the breach with breaching capabilities intact.
- Completing technically and tactically challenging tasks in the face of high casualty rates.

Solving these LSCO challenges will require shifting from the low-intensity conflict mindset of the past 2 decades to a decisive-action approach that will require planning and preparation in order to successfully execute.

The recent update of Field Manual (FM) 3-0, *Operations*, shifts the focus from low-intensity conflict to LSCO. It emphasizes the rise of near-peer threats like Russia, China, North Korea, and Iran. According to FM 3-0, these near-peer threats have four key capabilities that make LSCO a challenging environment—long-range precision fires, integrated air defense systems, robust conventional maneuver, and electronic warfare.[1] A near-peer enemy will be able to use long-range precision fires to effectively target and strike high-value targets while utilizing integrated air defense systems to deny the United States air superiority.

The United States must develop capabilities to meet these threats, but capabilities alone will not win in LSCO environments. In their article "Field Manual 3-0: Doctrine Addressing Today's Fight," Lieutenant Colonel Sam Fishburne et al. argue that the Army's shift to LSCO focuses too heavily on "flashy future concepts and modernization efforts."[2] As a result, they say that the Army is not focused enough on the cultural changes needed to prevail in LSCO. They argue that the Army must also focus on updating how it trains, plans, and deploys—not just on developing new capabilities to meet near-peer threats.

The argument is sound because near-peer conventional capabilities are not the only factor that makes LSCO more challenging. LSCO operational environments will include a spectrum of warfare, from conventional tactics to terror, criminal activity, and information warfare.[3] Malign actors may target engineers as soon as conflict begins and engineer assets as soon as they arrive in-theater. Terror, cyber, and criminal activity will impede lines of communication.

The nature of LSCO itself will create friction challenges for leadership. LSCO will require the short-notice, simultaneous projection of massive amounts of U.S. and allied combat power. This will overwhelm supply lines, cause confusion, and place an exponential increase in demand on key supplies (fuel, food, ammunition, water) at home ports and in theater.[4] To further complicate matters, all of this will occur in a degraded information environment. Forces will be unable to rely on unclassified, commercial systems to supply LSCO fights.

Thus, the first key point of friction that engineer companies will need to address is how to operate and transport heavy equipment in a fuel-constrained environment. During LSCO, there will be a higher concentration of forces, the forces will be more reliant on mechanization, and there will be significantly greater maneuver at higher speeds than during a low-intensity conflict. Depending on the theater, increased demand may meet with a supply crunch, as key

"Soldiers will need to know each other's roles, including equipment operation, mastery of weapons systems, utilization of increasingly complicated smart munitions, and fulfillment of different tasks in the breach."

oil- and gas-supplying nations (Russia, Iran) may withhold resources from the market to conserve them for their own operations.

To operate in a fuel-constrained environment, engineer company leaders will need to enforce stricter fuel consumption discipline. They will also need a strong grasp of fuel consumption rates on all platforms and under varying conditions in order to prioritize effort. Finally, they will need to proactively communicate fuel requirements and be able to recommend alternate, fuel-saving courses of action to higher echelons.

The second key challenge that engineer company leaders will face is how to get to the breach with breaching capabilities intact. The enemy will target breaching assets with all available means from the moment conflict begins. It will use improvised explosive devices, indirect fires, and long-range precision fires. Because near-peer artillery and precision fires at least match (if not outmatch) our own, engineers will need to protect critical assets. To do so, company leaders will need to understand how the enemy will detect their forces (noise, heat, light, electronic signature), devise appropriate methods of cover and concealment, and strictly train and enforce appropriate methods of cover and concealment.[5]

Even the best cover and concealment will not fool the enemy every time. The enemy will eventually damage engineer equipment as it moves toward the breach. When this happens, the evacuation of equipment for repairs might not be an option. This means that engineers will need to identify, procure, keep on-hand, rapidly pack, and retain key repair supplies and parts in their load plans. From a company training perspective, engineers will need to be better versed in expedient equipment maintenance in order to keep damaged equipment functioning.

These efforts will help get engineer equipment to the front. However, the third key challenge will be completing technically and tactically challenging tasks with attrited forces. As high-value targets, engineers will face high casualty rates. Companies will not be able to rely on one individual to master a task because that individual may not survive to perform the task. Soldiers will need to know each other's roles, including equipment operation, mastery of weapons systems, utilization of increasingly complicated smart munitions, and accomplishment of different tasks in the breach. Not only will company grade leaders need to train Soldiers on their tasks, but they will also need to allow enough repetitions in enough variations to ensure that as many Soldiers as possible are proficient on key tasks.

LSCO poses challenges for all Services and all branches at all levels of warfare. Perhaps the greatest challenge in LSCO will be getting combat power to the fight in fighting condition. This will be especially true for engineers. Engineer formations contain gas-guzzling equipment that will be targeted the moment it arrives in-theater (if not before). Engineer companies include Soldiers with a wide variety of military occupational specialties trained on diverse tasks, but not all of these Soldiers will be on hand to complete their assigned tasks.

Engineer companies will need to diligently plan and prepare just to have a chance of making it to the fight in fighting shape. Leaders must cross-train Soldiers; develop organic equipment maintenance capabilities; and enforce noise, light, heat, fuel consumption, and electronic signature discipline. To succeed in LSCO, engineer company leaders will need to change how they plan, train, and deploy their formations. As Lieutenant Colonel Fishburne et al. argue, engineers will need to change their culture to meet the LSCO challenge.[6]

Endnotes:

[1]FM 3-0, *Operations*, 6 October 2017, p. 1-2.

[2]Sam Fishburne et al., "Field Manual 3-0: Doctrine Addressing Today's Fight," *Military Review*, January–February 2019.

[3]FM 3-0, p. 1-2.

[4]Ibid, p. 2-48.

[5]Fishburne et al., p. 8.

[6]Ibid.

Captain Dailey is currently attending the Engineer Captains Career Course, Fort Leonard Wood, Missouri. She holds a bachelor's degree in political science, international studies, and Russian and Eastern European and Eurasian studies from the University of Illinois, Urbana–Champaign, and a master's degree in international economics from the Johns Hopkins School of Advanced International Studies, Washington, D.C.

Russian Defense of a Water Barrier

By Dr. Charles K. Bartles and Dr. Lester W. Grau

Russian military equipment, like its Soviet predecessor, is designed for use in large expanses of woodland and tundra intersected by large bodies of water such as broad rivers and massive swamps. Sizeable rivers, canals, and lakes dominate Eurasia and serve as major arteries of commerce and industry, defensive barriers, lines of communication, and avenues of advance.[1] In central and eastern Europe, on the average, an advancing or withdrawing force will encounter a 6-meter-wide water obstacle every 20 kilometers, up to a 100-meter-wide water obstacle every 35–60 kilometers, a 100- to 300-meter-wide obstacle every 100–150 kilometers, and a water obstacle greater than 300 meters wide every 250–300 kilometers.[2] During the Great Patriotic War (the battle between the Soviet Union and Germany during World War II), the Soviets integrated large rivers into their defenses. During the defensive phase of World War II (1941–1942), they defended along the Don, Northern Donets, Volga, and Neva Rivers as well as other, smaller rivers.[3]

Present-day Russians do not envision future conventional-maneuver war under nuclear-threatened conditions as a repeat of the Soviet Union's experience during World War II. Battlefields will not be made up of thousands of miles of connected trenches and will not be occupied by millions of soldiers. Fragmented battlefields will be fought upon with open flanks protected by fires, shaping obstacles, strongpoints, counterattacks, and maneuver. When faced with a strong peer enemy, Russians foresee the possibility of trading ground for time, drawing an enemy into the depths of Russia, where its supply lines will be overextended and where it will reach its culminating point. At that point, a strong operational counterstroke will bring about enemy defeat.[4]

Theory of Water Barrier Defense

Russians generally consider water barriers to be rivers, canals, reservoirs, or lakes typically characterized by width, depth, speed of currents, nature of the soil bed, shores and adjacent areas, presence of fords, and hydraulic structures. They define the defense of a water barrier as a defensive action, organized and conducted with the goal of retaining a water line and preventing the enemy from prematurely forcing a crossing or bypassing it. A water barrier is considered a serious obstacle to an advance while in the offense and an advantageous line of defense for defenders. In the Russian view, a river is often the determining factor in selecting the forward line of defense when establishing a durable and stable defense.[5] When defending a water barrier, the main effort of a company or battalion is concentrated on holding the territory that an enemy would try to occupy during a forced crossing. In order to hold bridges and fording areas, defenders typically begin organizing the defense on the opposite shore with a forward position. To increase the stability of the defense, the forward position open flank(s) must be adjacent to the water barrier and concealed behind obstacles. When organizing a defense of a water barrier, special attention should be paid to the choice of the forward edge of the shore. Both banks of the water barrier are usually prepared for the defense. In the case of a broad expanse of water, the defense may be conducted from the near bank only. The condition of the area adjacent to the shore and the possibility of receiving engineer support will determine whether the defense is established along the edge of the water or if it is set back from the shore. If the defense is established along the edge of the water, it is necessary to prepare a combat security outpost position and deploy obstacles.[6]

In addition to his or her usual organizational duties, when organizing the defense of a water barrier, the company or battalion commander takes into account the condition of the shores; water barrier width, depth, and rate of flow; nature of the bottom of the water barrier; and presence of fording areas where the enemy may attempt to cross. The defense of the company or battalion is typically organized as one or two echelons. If organized as a single echelon, a combined arms reserve is formed. If organized as two echelons, the second echelon (a smaller reserve) is located where it can quickly and stealthily maneuver to possible forced crossing areas and threatened axes; conduct counter-attacks against crossing enemy units; protect high-speed avenues of approach; and attempt to recapture any bridgeheads or fording areas, if necessary.[7]

When organizing the defense of a water barrier, the company or battalion commander must be especially careful about organizing the system of fire. Engineer preparation of the battlefield in front of the forward line is critical, as is a well-organized and integrated system of fire. The system of fire is organized so that as the enemy approaches the water barrier, it not only takes fire from the front, but also from the flanks. When this occurs, tanks, infantry fighting vehicles, armored personnel carriers, and antitank and other weapons can be moved closer to the shore. Antitank ambushes are situated on the areas of the shore where fording may occur, especially areas where tanks may ford across or under the water. In addition, defensive fires are prepared on the

"Fragmented battlefields will be fought upon with open flanks protected by fires, shaping obstacles, strongpoints, counterattacks, and maneuver."

shoreline to repel any enemy that has crossed. Along the edge of the shore, the emplacement of mines and other obstacles that make it difficult for enemy ferries and amphibious vehicles to cross is sometimes advisable.[8]

Defense planning includes methods of destroying the enemy when on the opposite shore or while crossing the water barrier and defeating any vehicle, equipment, or personnel that ford or float across the water barrier. The actions of the first and second echelons (or combined arms reserve) must be coordinated. This coordination must include the actions of supporting artillery batteries or battalions, automatic grenade launcher platoons, and antitank units at potential crossing sites and be directed against any elements in forward positions on the opposite shore. In all situations, all civilian ferries in the vicinity are secured and, if could possibly be captured by the enemy, destroyed. The company or battalion must organize a continuous scheme of observation, especially for high-speed avenues of approach. If enemy activity is not readily apparent, a combat security patrol or reinforced combat outposts are constituted.[9]

Direct-fire weapons should not be revealed before the start of the enemy effort to force the water barrier. Enemy reconnaissance subunits that are deployed ahead of the main effort to force the water barrier are destroyed by specially allocated weapons located in temporary positions. Any enemy elements that cross the water before the main effort are captured or destroyed. When the enemy main effort begins, fire is concentrated on enemy ferries and other means of crossing. In the event that the enemy lands on shore, it is immediately destroyed by concentrated fire from all available weapons or a decisive counterattack. The counterattack must be carried out before the enemy is well-entrenched so that the enemy does not have the opportunity to gain a foothold on the captured shore.[10]

Terrain helps determine the layout of a river defense. If the near-bank terrain is more dominate than the far-bank terrain through height or observation, then there are marked advantages to defending forward along the near bank. If the far-bank terrain is more dominate than the near-bank terrain (particularly if the near bank is a flood plain), then it might be more advantageous to hold the near bank with minimal essential friendly forces and withhold the bulk of the maneuver force for a counterattack while the enemy is split by the river and exposed to heavy artillery fire. While defending a river line, most of the defense is usually weighted forward on the river line. Even if the camouflage and engineering efforts are good, enemy artillery will probably still concentrate fires on the river line.

During World War II, when the Russians defended prominent near-bank terrain (such as high ground), they often dug in their defenses on that terrain, but lightly manned them during enemy artillery preparation and kept the bulk of the force back. After the enemy artillery preparation, they moved the forces forward, into the just-shelled defensive positions, to fight the enemy. This tactic is still valid.[11]

Defense of a Bridgehead

Bridges attract attention and draw forces. They can be used to draw attacking enemy forces into a kill zone. Bridgeheads are defensive positions that are situated to retain bridges and other crossing means and create advantageous conditions for the actions of friendly forces on both banks of the water barrier.[12] Bridgeheads allow an advancing force to pursue a retreating force into its depths or a retreating force to withdraw into the depths of its defense. Bridgeheads can be used to control one or both banks. The forward edge of the Russian bridgehead is located where it can provide direct fire on the enemy and support the deployment of counterattacking forces. When establishing a bridgehead, particular attention is paid to antitank and air defense positions, flank security, and fire support from units and subunits; artillery firing positions; and aviation paths of ingress and egress. Direct fire and a counterattack are planned in support of a bridgehead. Upriver and downriver booms and nets are hung to defeat enemy saboteurs, river mines, and floating debris. Additional stores of ammunition, food, and medical supplies are positioned with the bridgehead and in the brigade supply points.[13] Determining prevailing winds is necessary for planning particulate smoke coverage of the bridgehead and supporting systems before and during the battle.

Figure 1, page 36, shows a modernized enemy force attacking a Russian bridgehead and river defense. A Russian motorized rifle brigade is defending forward on the near bank, with the 2d Motorized Rifle Battalion to the north, the 1st Motorized Rifle Battalion in the center (supporting the bridgehead), and the 3d Motorized Rifle Brigade in the south.[14] The tank battalion—minus one company—is held in a counterattack role in a position not shown on the map. A Russian reconnaissance detachment is concealed on the far bank, directing artillery fires. The Russians have dug in a motorized rifle platoon on the far bank of the bridgehead and protected the position with frontal and flanking minefields. They have also dug in a motorized rifle platoon on a river island in the 1st Battalion sector.[15] Due to the location of the bridgehead, the 1st Motorized Rifle Battalion defense is critical. A tank company, a howitzer battalion, an electronic warfare company, an AGS-17 Plamya automatic grenade launcher platoon, and an air defense platoon are attached to the battalion. The organic battalion mortar battery is in direct support of the defending bridgehead platoon. The attached 2d Howitzer Battalion is located where it can provide indirect and direct fires on the bridge and the road

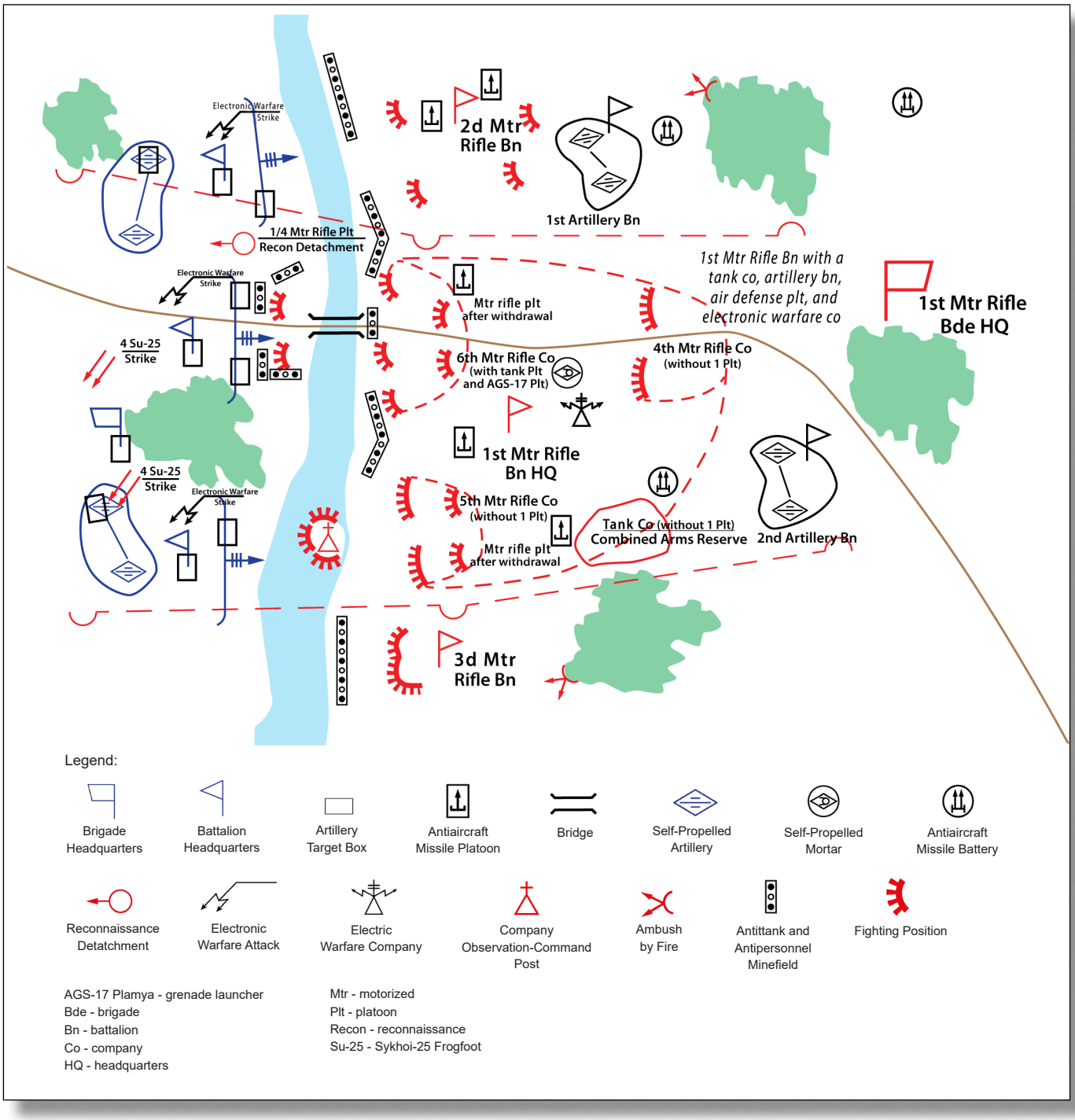


Figure 1. Battalion defending against enemy water crossing (variant)

that crosses the bridge and runs through the 1st Motorized Rifle Battalion sector. The 1st Howitzer Battalion, located in the 2d Motorized Rifle Battalion sector, can also provide direct and indirect fires on the bridge and road. One tank platoon, along with the automatic grenade launched platoon, is positioned forward, covering the bridge approach. The other two tank platoons constitute part of a combined arms reserve.[16] It is assumed that the bridge is already prepared for on-order demolition should the bridgehead be withdrawn and the enemy gain a foothold on the near bank.

Russian aviation supports the river defense and bridgehead, as shown by the Sykhoi-25 Frogfoot strikes on the enemy. Russian artillery attacks enemy artillery, pounding forces and command posts. The electronic warfare company concentrates on enemy command and control targets. The 122-millimeter multiple-launch rocket system battalion and antitank battalion are not shown on the diagram of Figure 1. The multiple-launch rocket system has plenty of range, and the antitank battalion is apparently constituted as a powerful antitank reserve. In addition to obstacle

creation, camouflage, route construction, and field fortification work, the engineers are prepared to lay a new bridge should the old one be destroyed.

Should the attacking force succeed in capturing the bridgehead and crossing the river, the Russian force would probably counterattack to regain the river line and reconstitute the river defense. Should this fail, the Russian force could conduct a maneuver defense, possibly back to the next river line. Should the enemy attack fail, the Russians could launch a hasty river assault.[17] If the defense is significant, the Russians could launch a deliberate river crossing.[18]

Russia is a northern country, where severe winter weather conditions are normal training and combat conditions. The Russians are well-equipped and well-trained for river crossings. But, Russians consider rivers to be a temporary ally in the defense. In the Russian spring and fall, off-road maneuver comes to a standstill unless the soldiers are equipped with vehicles specially designed to drive in mud and marshy terrain. In deep winter, rivers freeze and are not much of an obstacle. In summer, the ground is hard and the rivers are low. The advantages of bridgeheads and river defenses are seasonal.

Although this example addresses a small bridgehead, bridgeheads can be larger. However, since bridgeheads attract hostile fires, too much combat power should not be deployed into the bridgehead until the command is ready to break out and advance.

Endnotes:

[1]Lester W. Grau and Charles K. Bartles, *The Russian Way of War: Force Structure, Tactics, and Modernization of the Ground Forces*, Foreign Military Studies Office, Fort Leavenworth, Kansas, 2017, p. 309.

[2]Ibid, p. 311.

[3]D. K. Slepenkov, *Армейские операции* (*Army Operations*), Voyenizdat, Moscow, 1977, p. 211. This article uses "Soviet" as a designation for the period 1922–1991 and "Russian" for the period 1992 to present day. Many of the Soviet tactics and much of the military legacy remain; however, Russia is smaller and less-populated and has devised military tactics and equipment that derive from Soviet experience but have been updated to meet current circumstances.

[4]Lester W. Grau, "Defense of a River Line: The Soviet World War II Experience," *Journal of Slavic Military Studies*, Vol. 34, 2021, p. 81.

[5]"Оборона водной преграды" ("Defense of a Water Barrier"), *Военная Энциклопедия* (*Military Encyclopedia*), Ministry of Defense of the Russian Federation, Vol. 5, Voyenizdat, Moscow, 2001, p. 535.

[6]V. A. Degtyareva et al., *Общая Тактика* (*General Tactics*), Kovrov State Technological Academy, 2006.

[7]Ibid.

[8]Ibid.

[9]Ibid.

[10]Ibid.

[11]Grau, "Defense of a River Line: The Soviet World War II Experience," p. 81.

[12]"Предмостное Укрепление" ("Bridgehead"), *Военная Энциклопедия* (*Military Encyclopedia*), Ministry of Defense of the Russian Federation, Vol. 6, Voyenizdat, Moscow, 2002, p. 577.

[13]Ibid.

[14]A. P. Makarov et al., *Общая Тактика: Батальон, Рота, Взвод, Отделение* (*General Tactics: Battalion, Company, Platoon, Squad*), Konkurs, Moscow, 2021, p. 197.

[15]River islands frequently block vision on the near bank, and the platoon provides observation. Most river attacks are conducted under smoke; however, smoke normally hangs over water and the platoon could observe the enemy crossing under the smoke and direct artillery fire against it.

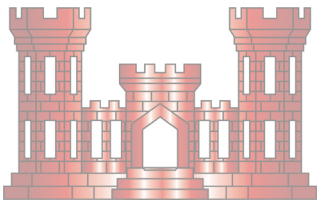
[16]Russian tank platoons have additional armored backup. During the Afghanistan War, the Soviets introduced the armored group concept. U.S. infantry commanders integrate tanks into the forward defense. The Russian commander often pulls the infantry fighting vehicles back to form a mobile armored reserve. Occasionally, infantry fighting vehicles are supplemented with any spare tanks or antitank or reconnaissance vehicles. Under the command of a deputy, the armored group is a potent, rapid, fast-firing, armored reserve.

[17]Charles K. Bartles, "A Russian Approach to a Battalion Hasty River-Crossing Assault," *Engineer*, May–August 2018, pp. 57–61.

[18]Lester W. Grau, "Russian Deliberate River Crossings: Choreographing a Water Ballet," *Engineer*, September–December 2019, pp. 28-32.

Dr. Bartles is an analyst and Russian linguist at the Foreign Military Studies Office, Fort Leavenworth, Kansas. He is a lieutenant colonel in the U.S. Army Reserve, serving as an imagery officer at the Joint Functional Component Command for Integrated Missile Defense. He holds a bachelor's degree in Russian from the University of Nebraska–Lincoln; master's degrees in Russian and Eastern European studies from the University of Kansas, Lawrence; and a doctorate degree from the University of Missouri, Kansas City.

Dr. Grau is the research coordinator for the Foreign Military Studies Office, Fort Leavenworth, Kansas. He holds a bachelor's degree in international relations from the University of Texas, El Paso; a master's degree in international relations from Kent State University, Ohio; and a doctorate degree in Russian and central Asian military history from the University of Kansas, Lawrence.



554th ECC Utilizes New Techniques for Port Repair and Construction

By First Lieutenant Jenny L. Bridges and First Lieutenant DeAdre A. Harvey

The use of engineer construction companies (ECCs) to hastily establish ports of entry for logistical support during large-scale combat operations has been a forgotten mission-essential task since the Vietnam War. With an uncertain future theatre of operations, the 554th ECC, 92d Engineer Battalion, Fort Stewart, Georgia, accepted the challenge of revamping port repair mission-essential tasks by using organic engineer assets to execute a proof of concept for building a wharf.

The planning began in the spring of 2021, when the company identified the lack of a pile driver and the skill necessary to execute port repair and construction operations. Several wharf designs were drawn, and the unit conducted multiple leader professional development tasks with civilian companies; the U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi; and the U.S. Navy. The company identified and developed a plan to use the organic hydraulic excavator (HYEX) in lieu of a pile driver to emplace the piles upon which the superstructure rests. In November 2021, one horizontal-construction platoon and one vertical-construction platoon maneuvered to Pond 28 at the Fort Stewart training area to test the ability to use the HYEX pavement breaker attachment to install piles in the event that a pile driver is not available.

Soldiers installing the base of the wharf superstructure onto the piles.

Horizontal-construction engineers conducted multiple experiments using a HYEX and pavement breaker attachment, finally identifying a method of installling piles that works almost as efficiently as a pile driver, with minimal damage to the piles themselves. While the horizontal-construction engineers conducted the trials, the vertical-construction engineers constructed the wharf superstructure.

The lessons learned from this proof-of-concept exercise allowed the two platoons to identify major shortfalls and to set the foundation for a joint pier construction exercise with the U.S. Army Corps of Engineers, Savannah, Georgia, District and the 74th Engineer Dive Detachment, 92d Engineer Battalion, Fort Eustis, Virginia, which will occur in open water over the Atlantic intercostal waterway near Savannah. The conducive soil composition found in Georgia allows the use of the HYEX with the pavement breaker attachment to emplace piles at a rate of one pile every 6–7 minutes. (A pile driver can be used to emplace piles at a rate of one pile every 3–5 minutes.) It took roughly 25 man hours to construct a 10-foot by 20-foot timber wharf capable of supporting a skid steer. However, the HYEX reaches out only 20–25 feet from the shoreline, limiting the scope of work without additional resources.

The 554th ECC continues to develop new methods of installing piles deeper and with more accuracy. This includes welding metal plates together to build a pile cap that can be placed on top of the pile for easier installation and adding braces to prevent the piles from settling after initial emplacement. Several piles were initially damaged and rendered unusable when the HYEX attachment was not centered—a problem that should be solved with a pile cap. The 554th ECC ultimately hopes to bring a fresh perspective to port repair mission-essential tasks in preparation for future large-scale combat team operations. With this in mind, the 554th ECC identified the HYEX pavement breaker attachment as a reliable substitute for a pile driver; it works almost as efficiently as a pile driver if a pile driver is unavailable.

The final wharf

First Lieutenant Bridges is a horizontal-construction platoon leader for the 554th ECC. She holds a bachelor's degree in exercise science from the University of North Georgia, Gainesville.

First Lieutenant Harvey is a vertical-construction platoon leader for the 554th ECC. She holds a bachelor's degree in geospatial information sciences from the U.S. Military Academy–West Point, New York.

LESSONS LEARNED WHILE BECOMING A COMBAT ENGINEER COMPANY–ARMORED

By Captain Derek R. Schwartz, First Lieutenant Catherine X. Lynch, and First Sergeant Jason R. Marquez

The conversion of echelons-above-brigade (EAB) units to combat engineer company–armored (CEC-A) units has been anxiously anticipated for many years. From May of 2021 to October of 2021, the 59th Mobility Augmentation Company (MAC), Fort Hood, Texas, transitioned to the 59th CEC-A, becoming the first EAB engineer company to convert to a CEC-A. Over the course of 4 months in 2021, the 59th MAC/CEC-A ("Bushwacker" company) was also the first EAB company to field the M2A3 Bradley fighting vehicle and the joint assault bridge (JAB). As a MAC, the conversion to a CEC-A was a fairly easy transition because many of the key components for the conversion were already in place. However, the unit faced many challenges during the transition.

59th CEC-A BFVs arrive at the motor pool.

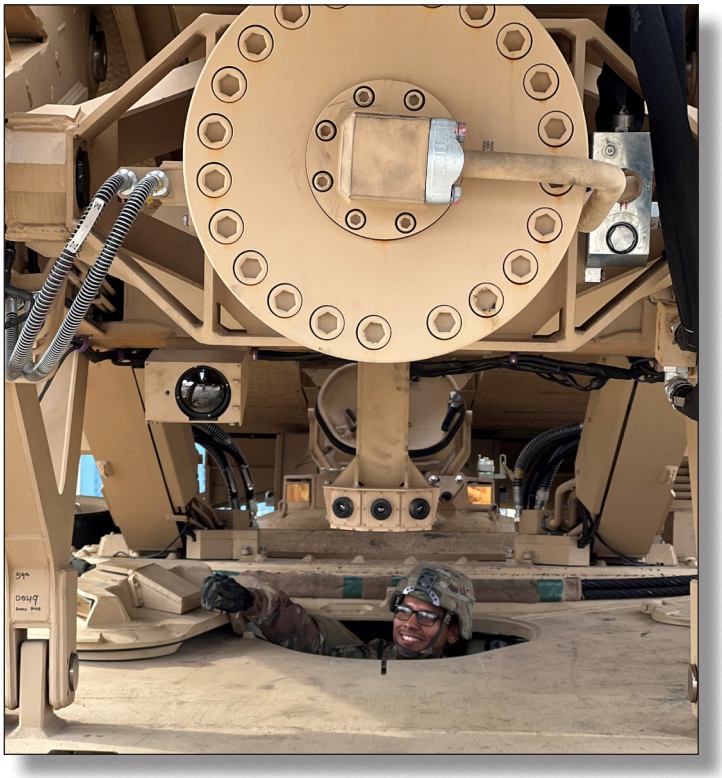
Rationale for Conversion

There are a few deficiencies in the current organizational structure of engineer companies within EAB engineer battalions, which the Engineer Regiment alleviates by converting engineer companies to CEC-A units. The main shortfall is the focused mission sets of engineer companies within an EAB battalion. For example, a sapper company can breach mine and wire obstacles but is not equipped to breach dry gaps or conduct survivability operations. MACs are equipped to execute breaches, dry gap crossings, and countermobility operations but are minimally capable of executing survivability operations. These shortfalls consistently lead to task organization changes in support of EAB companies in order to meet mission requirements. With the creation of the CEC-A, units are supported by an EAB engineer company that is equipped to execute all combat engineer tasks with fewer task organization changes. CEC-A units are resourced for survivability (D7R bulldozers with rippers and winches and high-mobility engineer excavators), mobility (mobility platoons with mine-clearing line charge trailers and JABs), and counter-mobility (Volcano mine systems and D7Rs).

Fielding of the M2A3 Bradley Fighting Vehicle

As the first CEC-A to field M2A3 Bradley fighting vehicles, the 59th CEC-A executed field level maintenance new-equipment training (FLMNET) and operator new-equipment training (OPNET). The key to the successful preparation of the FLMNET was direct coordination between the company maintenance technician and the senior FLMNET trainer to make sure that all training requirements were understood and properly resourced. Important coordination elements included discussions of shop stock and bench stock for the M2A3 Bradley fighting vehicles to ensure that the company was prepared to effectively maintain the new equipment.

Prior to the execution of OPNET, several in-progress reviews were conducted with the trainers to ensure that all the necessary resourcing was coordinated and that any prerequisites were completed before training began. This mitigated the challenge of having no master gunners at the company level. The 59th CEC-A allocated three jump crews to "build the bench" and identify more talent in order to increase the number of master gunners in the company and battalion. According to First Sergeant Jason E. Marquez, first sergeant of the 59th CEC-A, "Establishing crews was initially a challenge; but at the end of the day, the company wanted to put the right people in the right positions for the best possible outcome."



A JAB operator conducts preventive maintenance checks and services during OPNET.

Fielding of the Joint Assault Bridge

While the fielding of the M2A3 Bradley fighting vehicle was in progress, the 59th CEC-A also executed the fielding of the JAB. This process was similar in that FLMNET and OPNET required constant communication and coordination with the trainers and company leadership. Unlike with the fielding of the Bradley fighting vehicle, operators were not officially licensed; however, many of the skills required for licensing operators were taught. The 59th CEC-A company master driver observed the skills instruction and issued licenses to all of the operators at a later date.

The main lesson learned from the FLMNET for the JAB involved special tools for the chassis. The 59th CEC-A conducted the JAB fielding in conjunction with the 91st Brigade Engineer Battalion, which already had the assault breacher vehicle. Since the chassis of the two vehicles are the same, the special tools for the assault breacher vehicle work for

M2A3 crew training

The 59th MAC/CEC-A builds a terrain model for a gunnery table.

both. Because the 59th CEC-A did not have the assault breacher vehicle, it did not have the necessary special tools on hand. This problem was resolved before FLMNET because the 59th CEC-A made early requests for the specialized assault breacher vehicle tools to enable the mechanics to maintain the chassis of the joint assault bridge.

Gunnery

Overall, the 59th CEC-A had limited resident experience on the M2A3 Bradley fighting vehicle. This was mitigated by an exceptional training methodology orchestrated by the OPNET team. The M2A3 Bradley fighting vehicle gunnery began with gunnery skills testing and the conduct of fire trainer situational awareness over the course of a few weeks. Crews conducted their crew drills and began finding their rhythm through the crew commands. As crews qualified on the conduct of fire trainer situational awareness, they began shifting focus to Table III, which is the first table of the gunnery and consists of dry runs. Table III was conducted on a scaled range, while Tables IV–VI (live-fire tables) were conducted on a fully digital range. The Bradley OPNET team provided vehicle crew evaluators and created the scenarios for the tables. While the tables started slowly, the Bushwackers quickly picked up the pace as they became more comfortable firing live rounds. Crews became increasingly proficient. Seven crews earned a distinguished rating during Table VI by successfully completing nine out of 10 engagements with one or more targets, achieving an overall score of more than 900.

The main lesson learned from gunnery was the importance of the presence of small-arms repair personnel, a full maintenance team, a battalion master gunner with M2A3 Bradley fighting vehicle experience, and rehearsals for the equipment. Having small-arms repair personnel and a maintenance team with an M88A2 heavy recovery vehicle, contact truck, and forward repair system on-site helped expedite troubleshooting faults that occurred with the weapon systems and platform. The maintenance team also conducted a reconnaissance of the range to determine if the emplacement of assets was effective. The availability of parts ensured that vehicles could be fixed quickly. A master gunner with M2A3 Bradley fighting vehicle experience helps supplement the knowledge of small-arms repair personnel and ensures that issues are troubleshot and fixed more quickly. Conducting rehearsals with the support and range facility equipment available during gunnery also made range operations efficient.

Summary

Building the first CEC-A required deliberate coordination and effective teamwork. The 59th CEC-A fielded two new pieces of equipment. Without the assistance of the M2A3 Bradley fighting vehicle and JAB OPNET teams and the U.S. Army Engineer School, the company would not have effectively modernized to lead the way for future engineer company-to-CEC-A transformations. The Bushwackers have officially converted to a CEC-A and qualified all crews on Bradley gunnery; they now eagerly await the next challenge—an upcoming National Training Center rotation. Show no mercy!

Captain Schwartz commanded the 59th MAC from July 2020 to November 2021. He is currently working for the U.S. Army Corps of Engineers at Fort Irwin, California. Captain Schwartz 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 the University of Missouri Science and Technology at Rolla.

First Lieutenant Lynch previously served as a platoon leader in the 59th MAC and became the executive officer of 59th CEC-A in May 2021. She holds a bachelor's degree in mathematics from Mount St. Mary's University, Emmitsburg, Maryland.

First Sergeant Marquez is the first sergeant of the 59th MAC. He holds a bachelor's degree in business administration from Post University, Waterbury, Connecticut, and is pursuing a master's degree in business administration from Baylor University, Waco, Texas.

ENGINEER WRITER'S GUIDE

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, appropriate endnotes should be provided. 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 photographs (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photographs in the text; instead, send each of them as a separate file. Do not embed photographs 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/Illustration Guide at <https://home.army.mil/wood/application/files/1716/3889/7702/Engineer_Writers_Photo_Guide_new.pdf> for more information.

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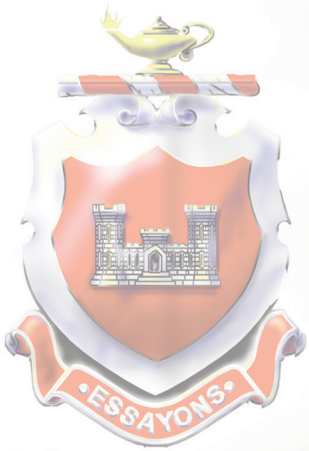


Problem Solving in a Joint Task Force

By First Lieutenant Alexis A. Fitzgerald

Every combatant command area of responsibility offers a series of challenges that require unique solutions in order to maintain lethality and accomplish the mission. Engineers are a critical component of these solutions, as we constitute a direct force multiplier that facilitates freedom of action, enabling commanders to reach desired mission end states. As a task force engineer, I have witnessed this firsthand. In this article, I describe impediments, discuss solutions, and share lessons learned to better equip engineers with insight into the area of operations and better prepare them for an ever-changing battlefield.

Engineers assigned to a joint special operations task force are focused on shaping, deterring, and seizing the battlefield.[1] Meeting these objectives requires assisting foreign allies with project management and execution. By combining technical expertise with skills learned from project management, engineer Soldiers attached to a joint task force can bridge gaps by creating viable solutions to pave the way forward. As a task force engineer, I assist the commander in finding creative solutions to help bridge the gaps between national electric codes, environmental constraints, and budgeting consolidation to help achieve the desired mission end state.

Service members review and analyze single-line diagrams in conjunction with circuit breakers.

Mission

I practiced and honed my project management skills on a power study project conducted on a base site within the Arabian Peninsula. The objective of this project was to assess the capacity of the current power grid for an upgrade to support additional intelligence for missions within the area of responsibility. A contractor was hired to conduct the electrical assessment, the host nation provided construction labor, and I made technical decisions regarding upgrading the power grid. The project focused on the load flow, fault analysis, contingency analysis, and stability aspects of the current power grid. Based on the data collected, we determined that a new generator—separate from the existing electrical grid—was needed in order to meet the mission requirements. This new generator would also require additional isolation transformers to increase the power distribution to the new equipment. The secondary windings of each transformer would introduce a separately derived source to the circuit, thereby requiring a grounding grid. My role was to serve as the contracting officer representative; I acted as a liaison between the unit, the hired contractor, and the host nation to ensure completion of the project.

One technical challenge that was unique to this project involved adequately conducting earth grounding to install the transformers. Earth grounding establishes the zero voltage reference for the electrical circuit. Grounding the circuit to the earth ensures that, in the event of a fault, the path of least resistance flows through the earthing grid. Without grounding, circuit voltage would not be referenced to a common baseline; therefore, voltages could "float independently," thereby producing life safety concerns and compromising equipment functionality. Grounding conductors provide electrons with a low-resistance medium to the ground in order to protect the electrical system. If a ground fault occurs, the grounding wire ensures that the unwanted current gets to the ground, where it will not harm the rest of the system. Electrically grounding a circuit keeps people and equipment safe.

Another technical challenge that was unique to this project involved adequately sizing and installing the earth-grounding conductors for the transformer. Earth pits for transformers are typically dug 3–4 feet into the ground to allow electrons optimal contact with the soil. Plans for these

First Lieutenant Fitzgerald reviews power distribution maps and conducts safety checks for a sewage system.

particular earth pits called for them to be dug 4 feet into the ground. However, as host nation personnel dug the earth pits for the transformers, I discovered the presence of bedrock approximately 2 feet below the surface. The bedrock and soil type made it difficult to emplace the grounding rods to the depths necessary to properly discharge any leakages in the current. Furthermore, bedrock and rocky soil types typically have higher soil resistivity due to low moisture content.

To combat these issues, I requested that multiple earth pits be dug parallel to one another to achieve the proper soil resistance, as multiple parallel earth pits increase the soil volume for discharging the electrons. In addition, bentonite, a soil enhancement material, was used to better absorb the moisture from the surrounding soils and provide an expedient pathway for the grounding rod to direct electrons into the ground. The moisture absorbed by the bentonite contains metallic ions from the soil, enabling more electrons to pass through. Ultimately, the goal was to increase the horizontal surface area to compensate for the loss of penetration depth.

Impediments and obstacles occur with every project; however, as task force engineers, we must be the impetus for finding solutions to these issues. Balancing the wants and needs of each stakeholder can be challenging, given their tiers of influence. However, agreeing to a mutually beneficial solution and relaying that we want what's best for the mission are essential. My experiences with the installation of transformers best prepared me to negotiate future discrepancies during my deployment and made me a more knowledgeable engineer in a contingency environment.

The Way Forward

Moving forward, we, as Army engineers, are constantly expected to adapt to an ever-changing battlespace. Therefore, junior engineers should focus on developing project management skills and maintaining a solid initiative to be the best asset possible to any organization. My experience on the Arabian Peninsula showed me that exterior aspects influence the outcomes of projects and that we need to be privy to these influences in order to best navigate them. Two examples of such navigation include working with foreign contractors to bridge the gaps between national and international electrical code standards and working with contracting teams to provide the funds necessary to drive projects forward and avoid stalemates. Creating solutions to these constraints helped me develop budgeting, acquisition, and soft skills that are key to moving forward. Army engineers are the problem solvers who help push past unexpected issues to accomplish the mission in any environment.

Endnote:

[1]Joint Publication 3-34, *Joint Engineer Operations*, 6 January 2016.

First Lieutenant Fitzgerald is assigned to the 84th Engineer Battalion, Schofield Barracks, Hawaii. He holds a bachelor's degree in political science with a minor in engineering design from the College of New Jersey, Ewing. He is a certified project management professional and a candidate for a master's degree in public administration at the University of Southern California, Los Angeles.

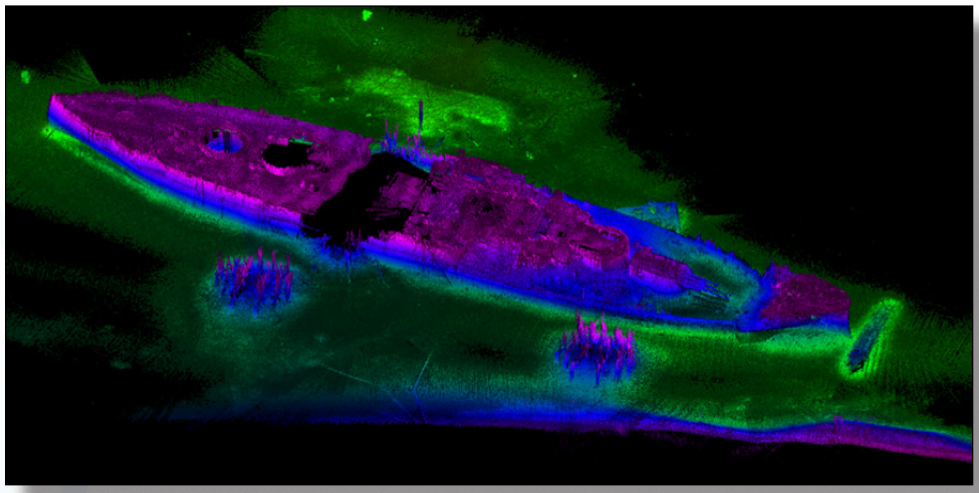
Assessing Seaports in the Pacific Theater:

MARV Provides New Capability for U.S. Army Pacific

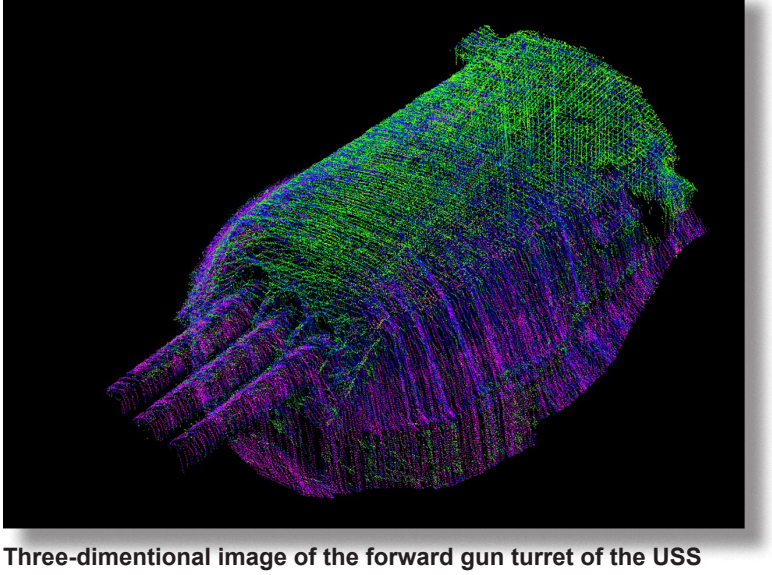
By Captain Kyle P. Underwood

In the last decade, the Department of Defense has pivoted to the Pacific theater of operations and has placed greater emphasis on the 130th Engineer Brigade, Schofield Barracks, Hawaii, mission to provide combat- and general-engineering support to the 8th Theater Sustainment Command, Fort Shafter, Hawaii, and U.S. Army Pacific theater opening and sustainment requirements. Seaport opening is a critical task for theater opening and sustainment operations in the Pacific. The 130th Engineer Brigade provides the 8th Theater Sustainment Command with engineer support to execute three types of seaport-opening activities: developing a bare beach, improving existing facilities, and augmenting fixed ports. Each seaport of debarkation (SPOD) must be capable of receiving equipment, cargo, and supplies into the theater through degraded or austere facilities. The recent 130th Engineer Brigade fielding of the Multiassessment Reconnaissance Vehicle (MARV) exponentially increased the brigade capability to gather the geospatial and technical data required to perform rapid SPOD assessments, thereby facilitating operational sustainment and mobility.

The 7th Engineer Dive Detachment (7th DIVE), which is assigned to the 84th Engineer Battalion, 130th Engineer Brigade, is uniquely qualified to support port-opening operations. The adept 7th DIVE organization is qualified to perform a myriad of combat-, general-, and geospatial-engineering tasks. The unit is trained and equipped to perform rapid assessments of potential SPODs throughout the theater. Performing quick, comprehensive technical assessments of potential SPODs is the first step in choosing a site that is utilized, repaired, or constructed to support mission requirements.



A rendering of the USS Arizona using data collected by MARV.



Three-dimentional image of the forward gun turret of the USS Arizona.

Developed by the U.S. Army Geospatial Center, Alexandria, Virginia, and the Coastal and Hydraulics Laboratory at the U.S. Army Corps of Engineers Research and Development Center, Vicksburg, Mississippi, MARV is a versatile platform that enables the simultaneous collection of georeferenced multibeam sonar, side-scan sonar, light detection and ranging, and optical imagery. With this single, compact piece of equipment, 7th DIVE engineers can capture, process, and transmit underwater geospatial information in ports, channels, and shorelines; locate and identify obstacles in the water column; and generate detailed, three-dimensional imagery of waterfront facilities above and below the water line. Three-dimensional points collected during the survey are plotted and rendered using postprocessing software that is familiar to most public and private engineering institutions. The data collected and rendered by Soldiers can also be securely shared with engineering organizations such as the U.S. Army Corps of Engineers Reachback Operations Center, Vicksburg, Mississippi, U.S. Army Engineer Research and Development Center, which can provide technical analyses and engineering recommendations beyond the capability of 7th DIVE.

For 20 years prior to the fielding of MARV, 7th DIVE performed bathymetric surveys (mapping of underwater terrain) using single-beam sonar. Single-beam sonar is a functional but less-efficient, less-effective means of gathering geospatial data compared to the multibeam sonar of MARV. Single-beam sonar captures data by recording individual points along a single line at varying depths. The MARV employs a commercial, off-the-shelf, multibeam sonar that is capable of collecting swaths of data points with a cross-section-to-depth ratio of 10:1 at a frequency of 60 hertz. It would take the single-beam sonar 60 minutes to survey an area the size of a football field with depths typical of a beach landing site, port, or channel; in contrast, MARV could complete the same survey in 5 minutes, with more clarity at greater depth. The resolution of MARV multibeam sonar is also an immense improvement over the single-beam sonar and provides the detail that military engineers require to begin establishing a SPOD.

Training on equipment operation, data rendering, and standardized reporting has been a key focus of 7th DIVE since MARV was fielded in the fall of 2020. Training on each of these areas is necessary to enable the rapid deployment, data collection, rendering, and reporting that is expected of the detachment. It is particularly important that the training pervade each level of the organization because surveying is a skill developed at a Soldier's duty location. To increase operator proficiency and develop techniques specific to MARV, 7th DIVE constantly seeks opportunities to replicate operational requirements through engineering assessments and surveys of waterfront facilities within Joint Base Pearl Harbor-Hickam and around the island of Oahu, Hawaii, in support of installation managers, joint maneuver units, and logistic organizations.

7th DIVE works with the Naval Facilities Engineering Systems Command Hawaii and the U.S. National Park Service to train operators on MARV capabilities to remotely locate underwater obstacles, perform bathymetric surveys of channels, and record side scan imagery of waterfront facilities at Joint Base Pearl Harbor-Hickam. Work taking place on the U.S.S. Arizona Memorial has challenged the detachment to develop techniques for conducting surveys using the multibeam sonar on its 28-foot, rigid-hull inflatable boat. 7th DIVE has also used this system around Marine Corps Base Hawaii in Honolulu and in Palau, where it has traveled dozens of nautical miles and surveyed potential beach landing sites.

These surveys have supported multiple organizations and have been immensely valuable for 7th DIVE. The surveys have improved equipment operation, resulted in standardized products, and promoted customer engagement throughout the survey lifecycle. Following the fielding of MARV, 7th DIVE has continued its relationship with the Coastal Hydraulics Laboratory, providing further training and additional quality control of the rendered products. This continual improvement has prepared 7th DIVE to deploy a small, effective survey team capable of collecting underwater geospatial and engineer data that supports theater opening and operational requirements.

Providing engineering support for seaport opening is a critical mission of the 84th Engineer Battalion and the 130th Engineer Brigade. Geospatial and technical data collected by Army engineers sets the groundwork for providing engineer support to theater distribution systems, operational sustainment, and mobility for the U.S. Army Pacific. The fielding of MARV to 7th DIVE exponentially increases the capability and capacity of the 130th Engineer Brigade to provide effective geospatial and technical information required by commanders to support theater opening requirements.

Captain Underwood is the commander of 7th DIVE. 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 engineering management from the Missouri University of Science and Technology at Rolla.

An Auspicious Moment:

Bridging the Rappahannock at the Battle of Fredericksburg

By First Lieutenant Andrew J. Wilhelm and First Lieutenant William E. Wilson

The challenge of projecting combat power across water obstacles has tested maneuver commanders since ancient times. It has been the arduous task of the engineer to effectively overcome these obstacles, seize the initiative, maintain tempo, and ensure the mobility of maneuver forces. Assured mobility often defines the difference between a decisive victory and defeat. A successful gap crossing requires surprise, extensive preparation, flexible planning, traffic management, organization, and speed. A deficiency in these gap-crossing fundamentals can contribute to a failure to realize strategic objectives. The trouble that the Union Army had crossing the Rappahannock River, Virginia, in December 1862 and the failure of Major General Ambrose E. Burnside to secure a route to Richmond serves as an example of the outsized importance of understanding gap-crossing fundamentals and realizing their significance to operational and strategic success.

Despite the execution of countless river crossings since the American Revolution, neither the Union Army nor any other American force had ever attempted an opposed, deliberate gap-crossing operation before December 1862.[1] The operational precedent, primarily derived from the experiences of European armies, was to act with surprise and speed and cross in an area absent of the enemy to deny the opportunity to interrupt the river crossing and inflict significant casualties.[2] Indeed, this was Major General Burnside's plan—to swiftly march his army south from Washington, D.C., secure the most direct route to Richmond, and capture the capital of the Confederacy before General Robert E. Lee could assemble the Army of Northern Virginia and mount a credible defense.[3] Unfortunately, Burnside's scheme of maneuver failed to recognize the codependent fundamentals of gap-crossing operations.

Road to Fredericksburg

As a man with a reputation for action, Major General Burnside was appointed to his position by President Abraham Lincoln. Burnside developed a plan to march the Union Army southeastward, toward the lower Rappahannock River. Burnside intended to move his Army across the river at Fredricksburg, and position himself between the Confederate Army and its capitol in Richmond. With the Confederate Army cut off, the Confederate government in Richmond would be vulnerable to invasion. The military operation hinged on quickly moving the Union Army across the Rappahannock. In his focus on the rapid movement of his Army and decisive actions around Richmond, Burnside did not prioritize gap-crossings along the route.[4] Burnside and his staff assumed that the necessary bridging equipment would travel on pace with the infantry and artillery formations. This assumption led to strict timetables to coordinate fire support from naval gunboats and support efforts from federal forces along the coast.

"Despite the execution of countless river crossings . . . neither the Union Army nor any other American force had ever attempted an opposed, deliberate gap-crossing operation before December 1862.[1]"

The carefully calibrated timetable began to fall apart almost immediately. Despite being written and dispatched 10 days earlier, orders did not reach the 50th New York Volunteer Engineers until 16 November.[5] The 50th was instructed to move its pontoon bridging equipment over land as soon as possible. Equipment readiness, a timeless struggle for an industrialized army, proved to be a severe constraint. The engineers of the 50th spent three sleepless nights readying new harnesses and shoeing draft mules. Then, after fighting the mules, they fought the weather. The wet winter weather turned roads into streams and caused a reduction in speed to just 8 miles per day. "It rained a dull, heavy, sleeting rain, just enough to make us all feel lonely, cheerless, [and] desolate," mentions Colonel Wesley Brainerd, "The situation was extremely unpleasant."[6] Meanwhile, Major General Burnside and his army waited along the northern bank of the Rappahannock, while General

"While Union forces originally had the advantage, the element of surprise was lost due to the time that it took to move the pontoon bridging equipment from Maryland down to the crossing site.[16]"

Lee, alerted to the federal presence, used the opportunity to reinforce his position from barely 500 men to more than 72,000 men in improved and fortified positions.[7] Strategic and operational surprises were lost, and the Union Army of the Potomac now faced a more prepared enemy force.

The Battle

At 3:00 a.m. on 11 December, shrouded in darkness and silence, Union Army engineers in three locations along the northern bank of the Rappahannock began to slide their pontoon bridging equipment down to the river. Their efforts were hampered by ice along the edge of the river, and the engineers of the 15th and 50th New York Volunteer Engineer Regiments found themselves covered by thick fog as the sun rose. During construction, as the northern pontoon bridges opposite Fredericksburg reached the halfway point across the Rappahannock, Confederate sharpshooters fired upon the exposed bridge builders.[8] Suppressive fire from supporting federal infantry failed to achieve the desired results against the sharpshooters, who were in prepared positions in basements and cellars. Brigadier General Henry Jackson Hunt, Burnside's chief of artillery, retaliated with a 4-hour-long bombardment from the nearly 150 Union guns positioned on Stafford Heights.[9] However, this effort also failed to dislodge the southern riflemen. Finally, a landing party of volunteers detached from Colonel Norman J. Hall's Second Corps was rowed across the Rappahannock in spare pontoons to secure the far side. Their quick dash across the river and subsequent outflanking of the defenders resulted in the capture of several prisoners and the establishment of a bridgehead. After the bridgehead was established, bridge construction resumed; construction was completed later that afternoon, at the cost of 57 engineers' lives.[10] The assaulting units began moving across the bridges shortly thereafter.

With the rest of its forces across the Rappahannock, the Union Army began its main assault against the entrenched Confederate forces on 13 December. Burnside's plan was to use the Left Grand Division to attack Lee's southern flank while the Center and Right Grand Divisions prevented Confederate reinforcements from moving into the battle from their position on Marye's Heights.[11] The result was catastrophic for Union forces. The initial Union assault met a well-prepared Confederate Army, which had used the delay to strengthen its position at the foot of Marye's Heights. Waves of Union soldiers advanced across an open field in an attempt to take the position; however, each wave was met with a devastating volley of fire from the well-entrenched rebels. By the end of 14 December, it was clear that the Union forces would be unable to complete their march to Richmond.[12] On 15 December, the Union Army executed an orderly march back across the bridges over the Rappahannock.[13]

Actions and Consequences

In order to better comprehend Major General Burnside's decision-making process, his operation can be viewed based on the U.S. Army gap-crossing fundamentals, as defined in Army Techniques Publication (ATP) 3-90.4, *Combined Arms Mobility*.[14] While this publication was not established as doctrine until the 20th Century, many of its principles were included in Burnside's planning process. When analyzed through this prism, the shortfalls of Burnside's operation become apparent.

Surprise

The use of the element of surprise prevents the enemy from massing forces or fire at crossing sites.[15] While Union forces originally had the advantage, the element of surprise was lost due to the time that it took to move the pontoon bridging equipment to the crossing site.[16] While this delay was primarily due to the bad weather, poor roads, and inadequate coordination, Union forces failed to use any deception plans, such as site preparation or force buildup, at locations other than the intended crossing area. Meanwhile, Confederate forces evacuated civilian populations from the town, prepared fortified positions, and even conducted engineer reconnaissance of the Rappahannock River to determine potential crossing sites.[17]

Extensive Preparation

As with any operation, commanders must understand the enemy force, crossing-area terrain, and status of their available forces.[18] In intelligence preparation of the battlefield, Burnside utilized balloon observers to spot the movement of Lee's Army.[19] This critical bit of intelligence allowed Burnside to have a better understanding of the Confederate Army composition and disposition. Knowing that Lee had anticipated his plan, Burnside adjusted to attack the weakened parts of the Confederate line, located in the center and to the south of the city. His chief of engineers was further able to conduct an extensive reconnaissance of potential gap-crossing sites, complete with terrain sketches and velocity measurements.

Flexible Planning

Flexible planning enables the crossing force to rapidly adapt to changes during execution. It allows the force to salvage the loss of a crossing site or exploit a sudden opportunity.[20] While Major General Burnside chose to utilize multiple crossing sites, he failed to plan for alternate gap-crossing means or locations. However, his

subordinate commanders were able to adapt to the battle. When the engineers came under effective fire, nearby maneuver commanders took personal initiative and ordered their regiments to mount the unused bridging equipment and cross the river to secure the far side.[21] The improvised measure helped suppress the enemy and allowed the engineers to continue assembling the bridges.

Traffic Management

Traffic management is essential for crossing units at the proper locations, in the sequence desired, and as quickly and efficiently as possible to maintain momentum.[22] Six bridges were constructed across the 400-foot width of the Rappahannock in locations more than 2 miles apart.[23] While the initial push across the Rappahannock was successful, the withdrawal was complicated by the preemptive removal of two of the bridges. Despite these complications, the entirety of Burnside's assaulting force crossed the river in less than 24 hours.[24]

Organization

Commanders use the same organic command and control nodes for gap crossings as they do for other types of missions.[25] However, these nodes take on additional functions in deliberate gap crossings. Burnside chose to retain personal control over the numerically strong federal force.[26] The decision to task individual units rather than appoint a subordinate crossing commander inhibited the development of a common operating picture. Burnside's decision effectively siloed his maneuver and support commanders, limiting coordination between adjacent units.

Speed

A gap crossing in support of maneuver typically results in a race between the crossing force and the enemy to mass combat power on the far side.[27] The longer the crossing force takes to cross, the less likely it is to succeed. While Union forces completed the gap crossing at a tactical level, the delay resulted in Lee's Confederate Army strengthening its defense and ultimately repelling the assaulting force. Unable to circumvent the Confederate forces, the objective of capturing Richmond became unattainable.[28]

Conclusion

Gap crossings are tactical efforts that define an operation and achieve strategic results. Major General Burnside's plan to capture Richmond before the Confederates could mount a response met a most unfortunate end. This result is attributed to the failure to account for and maintain the advantage over all gap-crossing fundamentals—especially speed. In the end, the disaster of Fredericksburg was an operational failure that denied the Union a strategic victory despite the tactical success of the engineers and the efforts to secure the crossing of the Rappahannock River.

Endnotes:

[1]Jay Luvaas and Harold W. Nelson, *The U.S. Army War College Guide to the Battles of Chancellorsville and Fredericksburg*, New York, 1989.

[2]Carl von Clausewitz (translated by J. J. Graham), *On War*, Wordsworth Classics of World Literature, 1997.

[3]Francis Augustin O'Reilly, *The Fredericksburg Campaign: Winter War on the Rappahannock*, Louisiana State University, 1 April 2006.

[4]Ibid.

[5]Luvaas and Nelson.

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[7]Bruce Canton, *The Army of the Potomac: Glory Road*, Double Day and Company, 1952.

[8]Malles.

[9]Canton.

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[11]George William Redway, *Fredericksburg: A Study in War*, Swan Sonnenschein and Company, London, 1906.

[12]John Matteson, *A Place Worse Than Hell: How the Civil War Battle of Fredericksburg Changed a Nation*, W. W. Norton and Company, 2021.

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[14]ATP 3-90.4, *Combined Arms Mobility*, 8 March 2016.

[15]Ibid.

[16]Edward J. Stackpole, *Drama on the Rappahanock: The Fredericksburg Campaign*, Bonanza Books, New York, 1957.

[17]Canton.

[18]ATP 3-90.4.

[19]O'Reilly.

[20]ATP 3-90.4.

[21]O'Reilly.

[22]Field Manual (FM) 31-60, *River-Crossing Operations*, March 1972 (obsolete).

[23]Canton.

[24]Redway.

[25]ATP 3-90.4.

[26]O'Reilly.

[27]FM 31-60.

[28]Luvaas and Nelson.

First Lieutenant Wilhelm is the executive officer for the Headquarters and Headquarters Company, 92d Engineer Battalion, Fort Stewart, Georgia. He holds a bachelor's degree in international public policy and political science from St. Mary's College of Maryland, St. Mary's City.

First Lieutenant Wilson is the executive action officer for the 92d Engineer Battalion. He holds a bachelor's degree in geography from Appalachian State University, Boone, North Carolina.

Process-Based Decision Making Drives Efficient, Engaged Units

By Major Joel W. Busboom

To truly understand leadership, one must understand the power of following a process, as opposed to a person. When a process is followed, egos have a hard time justifying their existence, solutions have a hard time showing up before the problem statement, and members of a team have a much better chance of showing each other trust and respect. Conversely, when using command directives in place of a process, the opposite becomes true. The person with the highest rank or the loudest voice is oftentimes the person who delivers the solution; input from others is minimized, and trust for the leader and among team members is reduced. In short, failure to show respect for the process reduces respect for the team. Furthermore, the results of the consistent use of an expedited methodology do not favorably compare to those obtained using the proper process. One example is the use of the rapid decision-making and synchronization process, as opposed to the military decision-making process (MDMP). While using the rapid decision-making and synchronization process is better than using no process at all, it decreases respect for the process, which reduces respect for the team. Such expedited methods may be necessary in time-constrained situations, but they need not happen all the time. Army Doctrine Publication (ADP) 6-22, *Army Leadership and the Profession*, addresses this issue: "All leaders are susceptible to displaying counterproductive leadership behaviors in times of stress, high operational tempo, or other chaotic conditions to achieve short-term results. Counterproductive leadership decreases followers' well-being, engagement, and undermines the organization's readiness and ability to accomplish the mission in the long term. It can have an adverse effect on the unit with cascading results, such as lowering morale, commitment, cohesion, effectiveness, readiness, and productivity. Counterproductive leadership behaviors prevent establishing a positive organizational climate and interfere with mission accomplishment, especially in highly complex operational settings. Prolonged use of counterproductive leadership destroys unit morale, trust, and undermines the followers' commitment to the mission. Counterproductive leadership can also decrease task performance, physical and psychological well-being, and increase negative outcomes such as depression or burnout."[1]

As current and future leaders, officers must have the personal courage, sense of duty, and desire to show respect throughout the chain of command necessary to ask the sometimes difficult question, "What process are we using to solve this problem?" Every officer should understand that simple question and know what the answer should be. "What step are we on?" is another question that officers should be able to ask and answer. Officers must understand the second- and third-order effects of failing to use doctrinal, process-based decision making and speak up when they believe that there is a problem.

Process Drives Engagement

ADP 5-0, *The Operations Process*, discusses five Army planning methodologies; they are—

- MDMP.
- Army design methodology.
- Troop leading procedures.
- Rapid decision-making and synchronization process.
- Army problem solving.[2]

". . . the commander must not lose sight of command climate and the importance of synchronizing the team. This is especially true for commanders at higher levels, due to the trickle-down effects of reactive decision making."

MDMP is the foundation for all Army decision-making processes. Troop leading procedures, the rapid decision-making and synchronization process, and the Army problem-solving model were all derived from MDMP. And Army design methodology is designed to help develop the problem statement for MDMP. The main benefit of all of these methodologies is that they drive engagement and collaboration. Chapter 9 of Field Manual (FM) 6-0, *Commander and Staff Organization and Operations*, addresses this concept and explains how MDMP facilitates it: "The higher headquarters solicits input and continuously shares information concerning future operations through planning meetings, warning orders, and other means. It shares information with subordinate and adjacent units, supporting and supported units, and unified action partners. Commanders encourage active collaboration among all organizations affected by pending operations to build a shared understanding of the situation, participate in course-of-action [COA] development and decision making, and resolve conflicts before publishing the plan or order."[3]

If performed correctly, MDMP, or any doctrinal process, does a great job of driving engagement and input from the team. This is extremely important when it comes to the areas of critical and creative thinking. The conversation systematically includes diverse viewpoints. Engagement allows Soldiers to make their views heard. The first opportunity to really drive engagement and unity of effort is when determining the problem statement. When team members work together to ensure that they are all on the same page with respect to the problem they are solving, they become greatly aligned throughout the rest of the process. The importance of obtaining group consensus on the problem statement cannot be overstated.

Engagement also plays a role in COA approval. It is very easy for the "unheard" to disengage when they feel that a COA is not their idea. However, encouraging people to speak and listening to them when they do will engage them in the plan because that gives them a chance to provide input. The commander will then have a team that has collaborated and is engaged with the approved COA.

Engagement Drives Trust and Respect

According to ADP 6-22, "Trust is the foundation of the Army's relationship with the American people, who rely on the Army to ethically, effectively, and efficiently serve the Nation. Within the Army profession, trust is shared confidence among commanders, subordinates, and partners in that all can be relied on and all are competent in performing their assigned tasks."[4] For those in charge, putting the process ahead of emotions is an outstanding way to show everyone that they are important and that you trust their input. Furthermore, it aligns the team with regard to the process in use and the current step. While Sections 9-11 of FM 6-0 discusses the staff's efforts during MDMP, it illustrates the true power of a process in uniting a team: "The staff's effort during the MDMP focuses on helping the commander understand the situation, make decisions, and synchronize those decisions into a fully developed plan or order. Staff activities during planning initially focus on mission analysis. The products the staff develops during mission analysis help commanders understand the situation and develop the commander's visualization. During COA development and COA comparison, the staff provides recommendations to support the commander in selecting a COA. After the commander makes a decision, the staff prepares the plan or order that reflects the commander's intent, coordinating all necessary details."[5]

One of the great powers of the process is that it synchronizes team members and helps facilitate teamwork. It engages people in the process and with each other. Synchronization of a team drives trust and respect amongst team members. Conversely, when people are not synchronized and are not working as a team, a breakdown in trust and respect for one another occurs. This is a precipice for more and more significant issues, until a leader—any leader—can steer the team back into doctrinal, process-based decision making.

It is important that commanders understand that process clarity is extremely important in gaining the trust of the team. Command direction can be a great tool in a very time-constrained environment, and subordinates often understand that. But when it is overused, trust starts to break down. Commanders are under great pressure most of the time; that's the nature of the Army and the command position. However, the commander must not lose sight of command climate and the importance of synchronizing the team. This is especially true for commanders at higher levels, due to the trickle-down effects of reactive decision making. Most people are aware of the 1/3–2/3 rule, where higher units use 1/3 of the time for planning and leave 2/3 of the time for lower units to plan. When higher units do not respect this rule, it is difficult for lower units to respect it because they are not given as much planning time as needed. Lower units also observe that it is "acceptable" to command-direct and not use the approved planning timeline. This leads many units to be reactive and many

units to lose the engagement and the trust of their subordinates because the appropriate process cannot (or will not) be used.

When the process to be used is discussed, everyone realizes that process-based decision making is important. This sets the command climate as calm and efficient versus reactive and panicked. All officers know that a process should be used. When the process is not used by higher units, lower units get a pass. This is how a lack of trust and respect at higher levels gets propagated down the chain of command, and this is why counterproductive leadership can result in devastating situations.

Trust and Respect Drive Efficiency

Efficiency is defined "the ability to do something or produce something without wasting materials, time, or energy."[6] You'll notice that this definition has more to do with not wasting resources as opposed to getting more out of the resources that are being used. When people are not shown the proper trust and respect when giving their input into a decision, they will disengage. Most of us have been in that situation or have seen it happen. This directly leads to wasting the time and energy of those individuals and immediately reduces the efficiency of the team—and it doesn't stop there. When people are disengaged, they don't just stop contributing—they find other things to do. Oftentimes, these activities are counterproductive and detrimental to the mission. As the saying goes, "Idle hands are the devil's playground."[7]

Page 1-7 of ADP 6-0, *Mission Command: Command and Control of Army Forces*, states, "Mutual trust is essential to successful mission command, and it must flow throughout the chain of command. Subordinates are more willing to exercise initiative when they believe their commander trusts them. They will also be more willing to exercise initiative if they believe their commander will accept and support the outcome of their decisions. Likewise, commanders delegate greater authority to subordinates who have demonstrated tactical and technical competency and whose judgment they trust."[8]

If leaders have a go-to question when it comes to problem-solving (for example: What process are we using to solve this problem?), they will immediately boost the trust of those around them and the efficiency of the team. This can be counterintuitive; however, the second- and third-order effects of failing to follow a process will lead to a much more inefficient team in the long term. Leaders cannot miss this point.

Conclusion

It is incumbent upon every officer to learn about process-based decision making and to demand the use of the most appropriate methodology in a situation. In this way, today's leader can help drive trust, respect, and efficiency in the Army and help avoid the issues that come with choosing "readiness over respect." The opportunity to learn about these processes in great detail is available in the Basic Officers Leadership Course (troop leading procedures) and the Captains Career Course (troop leading procedures), MDMP, and rapid decision-making and synchronization process. Fort Leonard Wood, Missouri. Future Army leaders need to take full advantage of these opportunities because the benefits of these processes are not trivial. After leaving the Captains Career Course, leaders also need to capitalize on the use of doctrine to drive self-development. There will be many opportunities for an officer to ask, "What process are we using to solve this problem?" and "What step are we on?" The leader who has the personal courage to ask these questions is the one who is going to help a team make great strides toward developing mutual trust and respect and becoming more efficient.

Endnotes:

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

[2]ADP 5-0, *The Operations Process*, 31 July 2019.

[3]FM 6-0, *Commander and Staff Organization and Operations*, 5 May 2014.

[4]ADP 6-22.

[5]FM 6-0.

[6]Efficiency, *Merriam-Webster Dictionary*, <https://www.merriam-webster.com/dictionary/efficiency>, accessed on 6 January 2022.

[7]Geoffrey Chaucer, *Canterbury Tales: The Tale of Melibee*, 1386.

[8]ADP 6-0, *Mission Command: Command and Control of Army Forces*, 31 July 2019.

Major Busboom is in the U.S. Army Reserve and is a small-group leader for the Command and General Staff College, Fort Leavenworth, Kansas. As a civilian, he is a financial advisor and uses MDMP to help teams agree on a problem statement in order to drive unity of effort. He holds a bachelor's degree in industrial engineering and a master's degree in business from the University of Illinois, Champaign.

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