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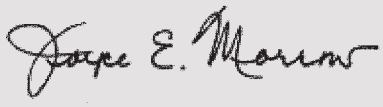
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ENGINEER

The Professional Bulletin of Army Engineers

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U.S. ARMY ENGINEER SCHOOL

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Front cover: U.S. Army photos. Clockwise from top: A Soldier seals gaps in sheet metal roofing during the Engineering Civic Action Program portion of Exercise Khaan Quest 2011 in Ulaanbaatar, Mongolia; A U.S. Army Reserve Soldier provides security and ground-guides his fellow engineer near the river where Soldiers are building a bridge in northeast Baghdad; Soldiers from the 19th Engineer Battalion react to simulated rocket-propelled grenade attacks at Zussman Urban Combat Training Center during their recent platoon certification exercise.

Back cover: U.S. Army photos. Clockwise from top: Sapper Soldiers board a mine-resistant, ambush-protected vehicle during a combat training exercise at Camp Atterbury, Joint Maneuver Training Center; an Army engineer diver prepares for a surface dive; Puerto Rico Army National Guard Citizen-Soldiers from the 190th Engineer Battalion prepare to clear heavy debris from local roads after Tropical Storm Irene passed over Puerto Rico; a Soldier uses a torch to free a section of improved rafting bridge on the Tigris River near Sharquat, Iraq.

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Clear the Way

Brigadier General Duke DeLuca
Commandant, U.S. Army Engineer School



It is not possible for me to briefly convey the honor, pride, excitement, and enthusiasm that I feel on being selected as the commandant of the U.S. Army Engineer School. I will work very hard every day to live up to this special trust and responsibility. This column is one way that I hope to communicate with the Engineer Regiment and the larger Army and joint engineer communities. There will be other mechanisms to make sure of this interaction so that the Engineer School is acting in real time on the most important engineer issues and challenges of the day. Let me emphasize that the views in this column are my own and do not necessarily express the official policy of the Army or Department of Defense. I am convinced that the health and vigor of our community require blunt and open talk, disciplined by careful thought and analysis. I hope to enable and encourage the wider joint engineer community to make *Engineer* a forum for lively debate on the possible solutions to our many challenges, welcoming ideas from all sources.

The demands of war have already put the Engineer Regiment through a period of tremendous transformation and transition, and this will continue due to the continuing conflicts we will wage and the need to adjust to a more affordable military strategy and posture. We have some extraordinary opportunities to influence the changes needed in our Army and its support to the joint and coalition forces that will remain in contact as far into the future as we can see, executing a unique blend of war-waging activities unlike any era in the past.

I believe that the primary strategic task is to prevent the emergence of any coalition of factions and nations that threaten our Nation's survival and prosperity. The primacy of that task and the global environment will cause us to wage continuous irregular wars in cyberspace and on the electromagnetic spectrum. These will be accompanied by global counterterrorism efforts and deep economic, political, and sociocultural competition. Periodic military expeditions will be mounted globally to shape conditions in a more favorable way for our Nation and its interests and to maintain our ability to use the global maritime and aerospace commons with total freedom and security.

This primary task, conditions around the world, and our actual and potential adversaries and competitors allow us to know several of the "Five Ws and One H" (who, what, when, where, why, and how) of our threats. While we do not know the *who*, *when,* and *why* with certainty, we can see the *what* and *how* of our threats. This allows us to focus better on the capabilities that we need in the Engineer Regiment, across all components in the Army. The tactics, techniques, and strategies that we have faced in our two most recent wars show us the direction. Our most powerful emerging peer competitor and other potential adversaries have developed strategies that do not involve fighting the United States in the open, which is a fool's errand guaranteeing massive destruction and defeat. Instead, they are fighting asymmetrically in real physical space and in cyberspace, comprising a hybrid threat. The conflicts we are fighting—and will fight over the next generation—share a number of characteristics that have significant meaning for how we must continue to change our Engineer Regiment. I call our persistent conflicts of the coming generation "these kinds of wars," for lack of a better name and in homage to former engineer platoon sergeant and author T.R. Fehrenbach.

These kinds of wars have certain characteristics in which engineers play a central role. There are many implications to our doctrine, organization, training, materiel, leadership and education, personnel, and facilities; I will expand on those implications in future *Clear the Way* columns and other articles.

First, our expeditions must win three important campaigns, or battles, simultaneously:

- The Battle for Roads and Bridges.
- The Battle for the Population.
- The Battle for Sovereignty.

Engineers are central to each of them. Second, we will be engaged in continuous contact in quasi war on the electromagnetic spectrum and in cyberspace. Third, we will conduct continuous global counterterrorism operations using special operations and other forces. Are our engineer forces adapted sufficiently to support these contingencies?

The concept of "full spectrum operations" began to approach the mind-set that we need, but it is still tied to the old, irredeemably incorrect idea of war as a spectrum—it isn't. Army Doctrine Publication (ADP) 3-0, *Unified Land Operations,*[1] now reflects the fact that operations are executed through decisive action—offense, defense, and stability and defense support to civil authorities—by means of the Army's core competencies of combined arms maneuver and wide-area security, guided by mission command. Decisive action does not mean continuing to plan, train, and develop a force to fight Krasnovians in the Whale Gap at the National Training Center at Fort Irwin, California.

There is one additional battle that is critical to victory in all wars—the reconnaissance-counterreconnaissance battle. Throughout history, the force that wins this battle wins the actual battle. Counter improvised explosive device operations—as well as geospatial information systems and intelligence, engineer preparation of the theater, and new skills in theater of operation base camp and combat outpost development—are part of the reconnaissance-counterreconnaissance battle.

(Continued on page 5)

Lead the Way

Command Sergeant Major Terrence W. Murphy
U.S. Army Engineer School



As the regiment makes adjustments based on lessons learned during the last 10 years, the backbone of our Army is rapidly adjusting to support these improvements. This requires engaged NCOs at all levels. Junior NCOs should continue to provide the lessons learned to leaders and develop their training with the latest doctrinal tools. Senior NCOs must stay engaged in the multiple forums available to collect, disseminate, and process information in order to give our commandant relevant and timely input as he makes decisions for the Engineer Regiment.

New MOS 12A

Recently, the Engineer Regiment determined that general engineering supervisors (military occupational specialty [MOS] 12X) and combat engineering senior sergeants (MOS 12Z) in pay grade E-9 should be able to compete for command sergeant major billets across all engineer battalions and brigades. As a result of this analysis, the Department of the Army is establishing the enlisted MOS 12A—engineer senior sergeant—in the pay grade of E-9. All MOS 12X and 12Z positions and personnel in that pay grade will be reclassified to MOS 12A. Command sergeants major and staff sergeants major will be identified by additional skill identifiers on all modified tables of organization and equipment.

Promotion Board Guidance

Beginning with fiscal year 2012, enlisted centralized selection board members will use the updated Department of the Army Pamphlet 600-25, *U.S. Army Noncommissioned Officer Professional Development Guide*,[1] and a formal memorandum of instruction for professional development guidance for the engineer career field. Now, NCOs assigned as instructors/writers will have the same consideration as NCOs assigned as drill sergeants and recruiters. This will attract the best and brightest NCOs from operational units to serve as instructors/writers for a minimum of 24 months. An additional change is key leadership time for staff sergeant and sergeant first class positions. NCOs who have acquired 18 months of successful key leadership time, coupled with one of the noted special assignments within their MOSs, will be considered exceptionally qualified for promotion.

Critical-Task/Site Selection Boards

The Army's peacetime mission is to prepare for war. This requires Army leaders to attain and sustain high standards of combat readiness through tough, combined arms training. It also requires that training to be task-based, performance-oriented, horizontally and vertically aligned, and as realistic as possible. One way to achieve this is through an effective critical-task/site selection board. The Army can't achieve proficiency on every task; therefore, those tasks that are essential to accomplishing the organization's wartime mission must be identified and trained. Any Soldier may be called on to serve as a critical-task selection board (CTSB) member for a particular MOS. CTSB membership is an opportunity to ensure that tasks identified as critical are actually critical for a particular MOS.

Evaluation and change impact and drive critical-task analysis throughout the life of training. External and internal evaluations ensure that training complies with regulations; and evaluations measure the ability of Soldiers, leaders, and units to perform against Army training standards. Soldiers have to live with the results of a CTSB, so it's imperative that they develop an accurate task inventory for their MOS. The CTSB process begins with job analysis by subject matter experts who recommend individual tasks to be approved as "critical." Convening a board is the culmination of the job analysis phase of training development. Job analysis is complete when critical tasks are identified and approved by the training proponent commandant, agency commander, or agency commander's designated representative.

Sapper Leader Additional Skill Identifier

In the 1980s, combat engineers—especially those associated with light forces—were referred to as *sappers*. Although the term was not reflected on tables of organization and equipment, it was consistently applied to combat engineers who performed the roles historically associated with sappers. The development of the Sapper Leader Course strengthened the use of the name. The Chief of Engineers, the commandant of the U.S. Army Engineer School, and the engineer regimental command sergeant major, in conjunction with U.S. Army Forces Command, recognized a need to track individuals who receive this valuable leadership training. Therefore, key positions such as platoon sergeants and platoon leaders in route clearance and mobility augmentation companies are being coded with a skill identifier for Sapper Leader Course attendance. Additional positions are squad leaders, platoon sergeants, and platoon leaders within the infantry, Stryker, and heavy brigade combat teams. Other positions that require the skill are those such as observer/controller and sapper leader instructor.

(Continued on page 5)

Show the Way

Chief Warrant Officer Five Scott R. Owens
Regimental Chief Warrant Officer



I am honored to be taking the helm from Chief Warrant Officer Five Robert K. Lamphear as he departs for his new assignment as the chief warrant officer advisor, Combined Arms Center, Center for Army Leadership, Fort Leavenworth, Kansas. I've been fortunate to have worked with him these past few years and can testify to the great job he did as the Regimental Chief Warrant Officer. He made it look easy, but that's just because he is a professional. As the first engineer Regimental Chief Warrant Officer, he established the standard for what that person should be. I owe him a debt of gratitude for leaving me a first-class operation, and I wish him success in his new assignment.

My biography is available on the U.S. Army Engineer School homepage at *<http://www.wood.army.mil/wood_cms/195.shtml>*, so I will forgo the details of my history. In summary, I've served as a geospatial engineering technician—military occupational specialty (MOS) 125D—in a variety of assignments at division, corps, U.S. Army Training and Doctrine Command, Army, joint, and combined levels. I must admit that in all those years in the field, I never ran across a construction engineering technician—MOS 120A—and had no idea that the MOS even existed before attending the Warrant Officer Advanced Course here at Fort Leonard Wood in 1999. That's when I met Chief Warrant Officer Five (then Chief Warrant Officer Three) Tom Black and discovered that the engineer warrant officer family was larger than I thought. I attribute my lack of knowledge of construction engineering technicians to two things:

- Geospatial engineering technicians work in the headquarters of brigade combat teams and above, while construction engineering technicians work in a variety of units and installations. The two MOSs rarely cross paths.
- Geospatial engineer training has been segregated from the rest of the Regiment because it's conducted by the National Geospatial-Intelligence Agency at Fort Belvoir, Virginia.

At least one of those things is about to change. As of January 2012, the warrant officer basic course for geospatial engineering technicians will be conducted here at Fort Leonard Wood, with geospatial engineer (MOS 12Y) training for enlisted Soldiers and noncommissioned officers and the rest of the MOS 125D warrant officer courses to follow throughout fiscal years 2012 and 2013. The U.S. Army Engineer School Directorate of Training and Leader Development, the 1st Engineer Brigade, the Maneuver Support Center of Excellence Noncommissioned Officer Academy, and the National Geospatial-Intelligence Agency are working together to make this transition as smooth as possible. Nevertheless, it will be challenging and stressful since courses will be conducted at both locations until the move is complete. Relocating geospatial engineer training will provide opportunities for construction engineering technicians and geospatial engineering technicians to foster lasting relationships, enabling us to better understand each other's role in the Regiment and the services we provide the Army. Just as importantly, it will reinforce the U.S. Army Engineer School campaign plan of having combat, general, and geospatial engineering overlap and support each other—three disciplines in one Regiment focused on delivering capabilities that enable the Army mission.

I've had a few weeks to settle into this position, and I am having a great time. I especially enjoy the opportunity to expand my breadth of contacts, not just in the Regular Army but in the U.S. Army National Guard and U.S. Army Reserves as well; and I am honored to serve and represent the warrant officers of the Regiment. I have met and corresponded with several senior reserve component leaders and many Soldiers about opportunities for becoming an engineer warrant officer. The enthusiasm of these people and the people I work with at the U.S. Army Engineer School is contagious, and that enthusiasm is one of the things that makes this such a rewarding experience.

As I ponder the challenges we have ahead as an Army and as a profession, I'd like to share my personal philosophy. First, I love being an Army engineer! As an engineer, I view physical, bureaucratic, or any other challenge to the mission as something to assess, overcome, or mitigate by going through, over, under, or around. Second, teamwork is crucial. I've been blessed to have worked with great Soldiers and Civilians over the years. The same holds true here. We have a great team; and to paraphrase Lieutenant General Robert L. Van Antwerp, 52d Chief of Engineers, I get to work with them.

Finally, do what's right. Most people follow that mantra; but at times, conflict can arise when what appears right for one isn't necessarily right for the whole. We must never forget that we exist to serve the Army, and sometimes that means making decisions which may be perceived as negative for the Regiment. This will become even more evident as the Army continues to draw down.

Until we meet again, stay safe. Essayons et Faissons!

For information about how to become an engineer warrant officer, log on to the U.S. Army Recruiting Web site at *<http://www.usarec.army.mil/hq/warrant>*.

(Clear the Way, continued from page 2)

The Army has grappled with this challenge in a less-than-focused way over the past decade. The concepts of "network-centric warfare" and "information dominance" were incomplete and disorganized attempts to deal with this challenge. Other things reflecting a widespread need to address this (but in an uncoordinated and unsynchronized effort) are seen in—

- The migration of signal intelligence, measurement and signatures intelligence, human intelligence, and geospatial intelligence capabilities from their previous perch at the strategic level into the tactical force.
- The new capabilities of Task Force ODIN (observe, detect, identify, and neutralize), still inappropriately organized and embedded in the force.
- The migration of command, control, communications, computers, intelligence, surveillance, and reconnaissance capabilities from strategic control to tactical formations.
- The introduction of biometric collection and databases available to tactical units for querying and analysis.
- The migration of electronic warfare into the most basic tactical units and operations.
- The introduction of new tools for tactical access to strategic intelligence and operations databases.

Have we adapted the Engineer Regiment adequately to win this battle?

Obviously, I have some strong views on the nature of war and our threats; but everyone must know up front that I am open-minded and enjoy debate. Out of debate comes increased understanding and more comprehensive and disciplined analysis. I look forward to the interaction, creativity, and debate within the team at the Engineer School and in the Engineer Regiment.

I am forever grateful to join the talented Engineer School team and grateful that I follow Brigadier General Bryan G. Watson into the commandant's role. He completed a difficult task and set the conditions to move the Engineer Regiment to meet the demands of the Army of 2020. I commend his phenomenal leadership and strategic outlook. I'll aggressively work to meet our objectives and will build on the excellent plan and momentum that he and the team have established.

A word on one of these achievements—the brigade engineer battalion: Many of you have seen the effects of modularity on our force: command and control issues, insufficient engineer forces at the brigade combat team level, the wrong mix of capabilities. Brigadier General Watson kept this as his Number 1 priority and worked it for more than 2 years through the force design update process. This issue has been worked at the Department of the Army level, and it is embedded in the Army Campaign Plan. The brigade engineer battalion is heavily endorsed by Army senior leaders, who have felt the absence of the right engineers, organized and embedded correctly in their deployed forces. I expect a favorable final decision at the conclusion of the Total Army Analysis 14-18 process.

My last thought for this article is that the training audience we have in the Engineer School has changed dramatically over the past decade. This is due to the slightly different learning styles of the first truly digital generation and to the tremendous experience in the current force as a result of a decade of war. Have we changed our methods enough in the Engineer School and the Army to exploit and address these changes? In recognition of this need to adapt, we will make changes in how we operate. The U.S. Army Training and Doctrine Command is also embarking on a process called The Army Learning Concept 2015, a learnercentric, university approach to initial military training such as the Engineer Basic Officer Leader Course, Warrant Officer Basic Course, and professional military education, such as the Engineer Captains Career Course and Warrant Officer Advanced Course. More on this in the future.

Recently, Brigadier General (Promotable) Mark W. Yenter assumed command of the Maneuver Support Center of Excellence here at Fort Leonard Wood. He has returned from Afghanistan, where he served as our senior engineer. He has my congratulations and will have my dedicated support as he shapes the future of the combat enablers. I'm humbled and extremely proud to be your new commandant. I look forward to serving all three components of our "One Army" and offering the best engineer support to our forces, particularly those forces that will remain in contact for the next generation. Together we will add to the greatness and rich history of the Engineer Regiment that has led the way in war and peace for this Nation.

Essayons!

Endnote:

[1]ADP 3-0, *Unified Land Operation*, 10 October 2011.

(Lead the Way, continued from page 3)

Command Sergeant Major–Objective Rally Point

The Engineer Regiment is vast and diverse, with thousands of engineer leaders who have years of experience conducting combat, combat support, sustainment, and nation-building operations across the globe. Social networking allows us to pool knowledge resources as a regiment. The CSM-ORP at <*https://www.milsuite.mil/book/groups/csms-orp*> is filled with active duty and retired NCOs who mentor, share experiences, voice opinions, and stay current on changes that affect the Engineer Regiment and the Army. The CSM-ORP is a valuable asset for the engineer leader who seeks to network, provide feedback, or get an answer to a question. When challenged with a daunting task, check the CSM-ORP. Perhaps fellow engineers have encountered a similar situation and can point out resources or information that can help. I value your input and will often solicit opinions from the field. This is our Engineer Regiment, and together we can accomplish any task. Do not stay silent. I invite you to sign in and join the CSM-ORP.

Lead to Serve! Essayons!

Endnote:

[1]Department of the Army Pamphlet 600-25, *U.S. Army Noncommissioned Officer Professional Development Guide*, 28 July 2008.

PROFESSIONAL CERTIFICATION OF ARMY ENGINEER OFFICERS

By Major Kelcey R. Shaw

You are going to make sure that our own troops move ahead against all opposition, and you are going to see to it that enemy obstacles do not interfere with our advance. . . . You will build, tear down, and fight better than any other soldier in the world because you will be an American engineer.

—Field Manual (FM) 21-105, *Engineer Soldier's Handbook*
2 June 1943

Sixty-eight years ago, FM 21-105 used these words to describe the skills that Army engineers were expected to bring to battle and the obligations they needed to fulfill when serving maneuver commanders at all echelons. Now Army engineers are faced with the challenge of applying the same skills on a modern battlefield, after 10 years of conflict. These challenges require answers to three questions:

- What changes to the Officer Education System must be made to develop future leaders?
- What is the role of professional certification for the Army engineer officer?
- How does the Army engineer officer remain relevant in the joint, interagency, intergovernmental, multinational, industrial, and academic environment?

ENFORCE 2011 addressed these questions and engaged in the hard debates to ensure that the Engineer Regiment leads innovation and that Army engineers remain relevant in all formations.

- ***What changes to the Officer Education System must be made to develop future leaders?*** Never before has the need for engineers on the battlefield been greater. The demand that engineer leaders—especially at junior levels (company and below)—be able to plan and think in combination is constantly increasing. Platoon leaders and platoon sergeants are being asked to be as adept at route clearance as they are at vertical construction. The demand for a diverse set of knowledge, skills, and abilities is driving a departure from the "one size fits all" education system that many engineers are accustomed to and comfortable with from past experience.

The Engineer Captains Career Course is leading the exodus away from the familiar to meet the needs of the force. The Army Learning Concept 2015 and its implementation process for the Officer Education System—the Midgrade Learning Continuum 2015—is how it is being done. This is a new approach that will require a paradigm shift in the way that the Army community views professional development. The days of attending brick-and-mortar schools for a predetermined period are gone. Learning must now be seen as an iterative, lifelong process that is customized to individual needs but grounded in basic principles and presented with sufficient rigor to provide engineer officers with the tools required to serve the maneuver force.

The U.S. Army Engineer School's approach to this new education model is called *Engineer University*. This redesigned approach follows a university model, using "tracks" and "elective specialization" and, like a university, providing a tailored learning experience. This gives the student and the Regiment greater input to training and education outcomes and supports the objectives of the Army Learning Concept 2015.

The ultimate goal of Engineer University—to borrow the model of the Army engineer profession propounded by Brigadier General Bryan G. Watson (former commandant of the U.S. Army Engineer School)—is to train, educate, and certify experts with the right skills. This enables the development of leaders adept in applied engineering. *Leaders, applied engineering,* and *certify experts* are key terms. The Regiment has always counted remarkable leaders among its ranks. The balance between sound design and the expediency required by combat to meet the maneuver commander's intent is the hallmark of military engineering and describes how engineering has been applied to serve the Nation through all its conflicts. Certifying experts through professional registration and certification is where new efforts must be focused.

- ***What is the role of professional certification for the Army engineer officer?*** Now that we are willing and able to challenge the status quo on ***how*** to teach, the next step is to ask ***what*** to teach. The professional engineer (PE) license has long been the mark of excellence and competence for military and civilian engineers. In addition to the PE license, Engineer University will offer several certification options, enabling engineer officers to gain and show competences and validating them in the joint community. Officers can and should pursue options such as attendance at the Joint Engineer Operations Course and certification as project management professional (PMP), certified facilities manager, or certified contract manager.

There are challenges to the widespread acceptance of a new approach to engineer officer certification. There are few certifications tied to skill identifiers and even fewer assignments coded for officers possessing a particular

skill identifier. This breeds an attitude that professional registration is not required and that the lack of it will not hinder progression or promotion. This must change if the Regiment wants junior leaders to continually seek broad, relevant professional development. At a minimum, professional certifications allow for the instant recognition of skills that add value to an organization. Professional certifications also show tangible evidence of an officer's willingness to invest intellectual capital in self-development. The Regiment wants officers who are willing to invest in themselves and in the profession and those who are willing to seek out the hard jobs. The best jobs should be linked to certifications in order to attract the best officers.

- ***How does the Army engineer officer remain relevant in today's joint, interagency, intergovernmental, multinational, industrial, and academic environment?*** In an era of increasing partnership with sister Services, government agencies, and allied partners, there is a need to demonstrate the Army engineer's relevance. The U.S. Navy and U.S. Air Force require their engineer officers, including architects, to hold engineering degrees. They tie advancement, promotions, and assignments to requirements for professional registration. Therefore, when a Navy or Air Force engineer officer walks into a joint billet, it is assured that the officer is a degreed engineer and a registered professional engineer. It is entirely possible that the officer will also be warranted as a contracting officer or have extensive facilities management experience. These traits, found throughout the engineer ranks in those Services, cultivate recognition of their technical competence. What does the Army offer?

It is well known and accepted in the joint engineer community that Army engineers are experts at planning and the military decisionmaking process and that they are the best engineer officers to plan, lead, command, and organize chaos. This is where the Army truly adds value to joint organizations. The Army has engineer officers who are adaptive, broadly educated masters of project management. They are the portland cement that allows aggregate and water to form concrete. Army engineer officers provide the leadership and management required to leverage technical competencies against problems.

Leadership and technical competence are required for success as an engineer officer. The Army has perfected its craft in producing the world's greatest leaders, and its sister Services are proficient at developing technical expertise. In the joint environment, the marriage of these skills defines the joint professional military engineer. Many ENFORCE 2011 participants believed that this blending should become the new and preeminent certification for which all military engineers should strive.

In order for it to work, each Service would have to use its core competencies as the baseline for the certification. The Army would probably rely heavily on its officers receiving PMP certification. This would be instant recognition of the management skills that Army engineers are already known to have. Combined with the Joint Engineer Operations Course and other experiences such as facilities management or contracting, the certification might be sufficient for qualification as a joint professional military engineer. A PE certification would always be a path to that qualification and would be the preferred path for Navy and Air Force engineers. Since the Army does not require all engineer officers to hold engineer degrees, it can't rely solely on the PE certification as an expression of engineer officer quality. It is expressly this diversity of backgrounds that makes Army engineers the generalists needed to coordinate efforts and solve complex problems. Using several paths (such as PE, PMP, or certified contract manager certification) leverages the broad nature of the Regiment and gives all Army engineer officers the ability to contribute to the joint fight.

The Department of Instruction at the U.S. Army Engineer School, in coordination with the U.S. Army Corps of Engineers (USACE) Kansas City District, has already started to make this happen. Department of Instruction personnel attended a PMP examination preparation course hosted by the Kansas City District office. This put Soldiers in a learning environment with USACE civilian employees, building a bridge between the Regiment and USACE. The training was extremely successful and led to Soldiers receiving the PMP certification. This proof of principle was repeated at Fort Leonard Wood, Missouri, with a combination of U.S. Army Engineer School, Department of Instruction, and USACE personnel training together to strengthen the bond between the Regiment and USACE.

Engineers are asked to build, tear down, and fight; this will not change. But the way leaders are educated to meet these demands will change. New educational philosophies and technologies—experiential learning, webinars, social media, social networks—must be paired with tailored curricula to produce the broad, adaptive engineer leaders of the future. Army engineer officers must lead the charge toward increased professional certification to maintain the confidence of the joint force as its finest leaders, planners, and managers. The Regiment and USACE will need each other more than ever to meet the demands of the force. The drive toward certification must ultimately lead to a new joint professional military engineer certification that garners instant recognition as the "total package" engineer for the officer possessing it. This total package engineer officer will be the one expected to plan operations, leverage joint engineer resources, and command diverse formations to support the maneuver commander at any echelon.

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Endnote:

[1]FM 21-105, *Engineer Soldier's Handbook,* 2 June 1943.



ACTIVATING THE 42D CLEARANCE COMPANY

By Captain Michael C. Bradwick

On 6 January 2010 at Warner Barracks in Bamberg, Germany, a platoon sergeant and an assistant operations officer received assignments as the initial first sergeant and commander of the newest company in the U.S. Army Engineer Regiment—the 42d Clearance Company. With an activation date of 16 February 2010, the race began to gather as much information as possible and establish the company footprint at the Warner Barracks garrison.

What Should Have Happened

While still maintaining jobs in their respective companies, the two leaders found time to plan the establishment of the 42d Clearance Company within the 54th Engineer Battalion. Without the unit's official modified table of organization and equipment, the leaders used a standard clearance company table to determine what resources the unit would need. To help plan and control the activation, the leaders used numerous key documents and tracking mechanisms that all activating units should create or obtain and revise from other activating units.

The first document created, the "Company Milestones Tracker," contained the key tasks and goals required to become a fully functioning company. It included corresponding task suspense dates for all staff sections within the battalion headquarters. Examples included—

- Activating the company's unit identification code.
- Determining a location for the unit's arms room, barracks, office space, motor park, and motor pool.
- Fielding the Property Book Unit Supply Enhanced System and Standard Army Maintenance System–Enhanced.
- Establishing supply and maintenance accounts.
- Procuring the unit guidon.

Other documents created to expedite and track the activation process included forward-thinking flowcharts, decision point models, and the initial long-term training calendar.

To meet the key tasks for activating the unit, senior leaders in the battalion advocated "leaders before Soldiers" through video teleconferences with higher-unit personnel sections. The interim commander and first sergeant advocated taking a conditions-based approach and establishing a focal group of eight leaders before the company's arrival. A conditions-based approach allowed the leaders to manage the fight without worrying about the overwhelming problems that could ensue if numerous Soldiers and equipment arrived en masse. Emplacing eight leaders before the arrival of the unit's junior Soldiers would allow a smooth transition. The command team insisted on having these eight initial leaders:

- Company commander.
- Executive officer.
- First sergeant.
- Operations sergeant.
- Motor sergeant.
- Supply sergeant.
- Armorer.
- Maintenance clerk.

If these eight leaders arrived before the remainder of the company's Soldiers, the company could theoretically

build from the company's garrison footprint, establish internal systems, and create an initial training plan based on the arrival of platoon leaders, platoon sergeants, squad leaders, and Soldiers.

The window of opportunity to establish the company's systems, garrison footprint, and training plan required 2 to 3 months. For example, the motor sergeant, supply sergeant, and maintenance clerk needed time to establish their maintenance and supply systems to allow the company to receive equipment. Ideally, the company would then receive the platoon leaders, platoon sergeants, and midlevel leaders, along with a moderate number of Soldiers to receive equipment and perform the various work details that arise in building a new company. Once equipment arrived, the supply sergeant would sign the equipment down to sub-hand receipt holders or band, seal, and store the equipment until those leaders arrived. Having sub-hand receipt holders on site would allow the company to set up its command supply discipline program earlier rather than later. Most supply sergeants and leaders would argue that this option is preferable.

What Actually Happened

General George S. Patton said, "A good plan violently executed now is better than a perfect plan executed next week." As in most military operations, time was a vital asset during the activation and an 80 percent solution executed sooner was better than a 100 percent solution executed later. Events transpired differently than the interim command team envisioned. On its activation date, the 42d Clearance Company's leadership team included just five of the eight leaders identified as critical. From that date, the team had only about 20 days before the Department of the Army's Human Resources Command began sending Soldiers to the company. Most of them were recent graduates of advanced individual training (AIT). Along with the influx of new Soldiers, they also sent reclassified noncommissioned officers who had graduated from the same AIT course as the Soldiers they would eventually lead. During their window of opportunity, the interim commander, first sergeant, and motor sergeant effectively emplaced plans for the company's barracks, office space, motor pool, motor park, initial long-term training plan, and training calendar.

As Soldiers arrived over the next 2 months, the company became established and the command gave it additional barracks and office space. The company's housing situation became a delicate balancing act as the installation found Family housing and barracks space for the new Soldiers. In the end, everyone had a place to live and work. Just 6 weeks after the company's activation, its numbers increased to more than 110 of the 190 Soldiers authorized, with only eight leaders in the rank of sergeant or higher. Cohort manning such as this, coupled with a high Soldier-to-leader ratio, dramatically affected the quality of initial training and the integration of the Soldiers' Families. The first two staff sergeants in the 42d Clearance Company each led platoons of 40 to 50 Soldiers during the first



A medic in the 42d Clearance Company plays the role of prisoner during 54th Engineer Battalion training.

2 months after activation. The command normally assigns staff sergeants as squad leaders, in charge of eight-Soldier squads. The unit's sponsorship program quickly eroded as Soldiers arrived to the unit too quickly for the Soldiers already in-processed to sponsor them. For a new company to effectively integrate and sponsor incoming Soldiers and Families, numerous knowledgeable leaders must arrive and in-process first. The Human Resources Command should assign Soldiers to the new unit slowly enough that the command can establish a core of personnel to sponsor new arrivals. Without these necessary steps, the unit will experience poor integration of the Army's most valuable resource—its Soldiers and their Families.

Despite the initial lack of key leaders, the 42d Clearance Company pressed forward with its initial goals and individual training timeline. Field Manual 7-0, *Training for Full Spectrum Operations,*[1] outlines the Army Force Generation force pools of "RESET," "train/ready," and "available." Because the company's mission in combat is route and area clearance, its leaders felt pressure to activate, train, and deploy as quickly as possible. An activating company would thus fall into a modified path toward deployment. RESET—limited to 6 months for redeploying units—must be adjusted accordingly for newly formed units to receive personnel and equipment and conduct individual training.

During the first few months of activation, the 42d Clearance Company received few vehicles to begin driver



A team leader in the 42d Clearance Company trains Soldiers on the Husky vehicle–mounted mine detector during a situational training exercise.

training, but did receive some individual and protective equipment, such as weapons, night vision devices, optics, and protective masks. This equipment is vital to the initial individual training phase that a unit presses through upon return from a deployed theater of operations. The company received much of its equipment in the latter stages of activation, and the early lack of equipment created training challenges. The company's final training difficulties stemmed from the Army's failure to field route and area clearance companies with the equipment they require. To train on this equipment, clearance company Soldiers must deploy to training centers (such as the National Training Center at Fort Irwin, California, or the Joint Multinational Readiness Center at Hohenfels, Germany) or attend training (such as the route reconnaissance and clearance courses at Fort Leonard Wood, Missouri). Commanders must develop plans to overcome this training obstacle.

By summer 2010, the 42d Clearance Company finally looked like a company in RESET. The unit still struggled with several key personnel issues, but was moving toward "train/ready." The company's Soldier-to-leader ratio remained imbalanced; but in the first 4 months of activation, the unit, leaders, and Soldiers learned many new aspects of team building, along with the difficulties and benefits of activating a unit.

Difficulties in Unit Activation

Several difficulties come with activating a new company. While every new unit is different, many similarities exist. First, all activating units must conduct Family and Soldier integration. Great units have systems in place for the reception and integration of new Soldiers. Without a Family readiness group, this task is the responsibility of the few unit leaders. Managing an effective sponsorship program should remain a top priority in terms of integration. Second, all new units must build and maintain systems. Creating systems from the ground up is a challenging task, but does not necessarily need to be accomplished alone. For example, all units should forge and maintain bonds with sister units. These relationships can result in quid pro quo arrangements that benefit everyone. Bonds with sister companies within the battalion helped the 42d Clearance Company establish administrative and operational tracking systems. Once the 42d had matured, it would return the favor to those companies in the form of weapons ranges, shared training events, and assistance in work details.

Other difficulties the 42d Clearance Company experienced included the arrival of new and relatively inexperienced Soldiers, the late arrival of key leaders and experienced noncommissioned officers, and the late arrival of equipment for individual training. These problems affected the first few months of initial training. Sending leaders before Soldiers should remain a priority for activating units.

Benefits of Unit Activation

There are positive aspects of activating a new unit. Most Soldiers will attest that building a company and leaving behind a legacy remains a highlight of their careers. The ability to positively affect and take ownership of the work environment is an experience unavailable in other rigid, existing organizations.

This leads right into the next benefit with activating a new unit—unique developmental opportunities. While

rigid, existing organizations sometimes operate with a very top-down approach, an activating unit can foster bottom-up feedback, as witnessed by the Soldiers in the 42d Clearance Company. Because senior leaders arrived later in the activation process, midlevel and junior leaders had more input than normal. These same midlevel leaders acquired a hidden benefit in receiving an abundance of new Soldiers at one time—the ability to train inexperienced, new Soldiers. Because inexperienced Soldiers are more likely to be attentive to new ideas and training, leaders taught and enforced new fundamentals without the burden of bad habits from previous units. The 42d Clearance Company ensured that key leaders understood and executed proper training management as they developed training plans. For example, the first sergeant ensured that all noncommissioned officers established standardized counseling packets and performed monthly performance counseling to standard.

Additionally, all leaders enforced troop leading procedures during the training events. The first sergeant established precombat checks and inspection standards for individuals, equipment, teams, and specific mission requirements. An initial company objective was to ensure that leaders and Soldiers knew the proper way to run training meetings, conduct counseling, and perform mission preparation. In all of these areas, the new company reaped the benefits of having Soldiers who lacked bad habits from earlier assignments.

Finally, the increased responsibility and stress placed on junior leaders produced a long-term benefit in increased operational knowledge and a strengthened support structure within the company. Because every leader in the 42d Clearance Company understood and served in positions one to two pay grades above their true grades, support channels were in place by the time the actual leadership arrived. As leaders arrived, the situation simply improved because junior leaders already understood the stresses and responsibilities that leaders experience daily. The result was a support network capable of accomplishing complex missions without constant guidance and oversight.

Conclusions and Recommendations

A new unit requires the fielding of an initial core or nucleus of critical leaders. The interim command team initially believed that a group of eight key leaders should be in place before the arrival of Soldiers. Immediately after the interim command team assumed their permanent roles as executive officer and platoon sergeant, they added the recommendation that platoon leaders and platoon sergeants be in place before the arrival of Soldiers. The addition of four platoon leaders and four platoon sergeants, for an initial key group of sixteen leaders, would have lessened the burden on the initial eight leaders. Based on this revised proposal of 16 key leaders, the 42d Clearance Company received only five—or 31 percent—of them. A lesson learned from the experiences of the first two squad leaders—who were each in charge of 40 to 50 Soldiers—was that having sufficient platoon leaders and platoon sergeants would have been a great help. New Soldiers from AIT need structure, and since Soldier in-processing is best handled by platoon leaders, platoon sergeants, and squad leaders, these leaders should be in place before Soldiers arrive at the unit.

If the activating unit cannot realistically expect such leaders to be assigned in a timely manner, then cross-leveling skills and leaders with higher headquarters should be at the forefront of the plan. Cross-leveling leaders eases many of the problems associated with building the team, integrating new Soldiers, and establishing the unit's footprint on an installation. Incorporating leaders from higher or adjacent units into the activating unit smoothes the initial learning curve associated with specific standing operating procedures within the headquarters and in the community. Also, integrating experienced specialists into an activating unit should remain a consideration, since they can provide guidance for Soldiers fresh from AIT.

Also, the Army should field equipment during the second to third month of activation. Thus, in the 42d Clearance Company's situation, equipment would have arrived after the initial 16 leaders arrived and established the garrison footprint, which included the motor pool, motor park, and supply and maintenance systems. Sending equipment to the leaders of an activating unit before the arrival of junior Soldiers allows the supply sergeant time to sign equipment down to sub-hand receipt holders. It also allows individual training to begin when the Soldiers newly arrived from AIT complete in-processing. After the unit footprint, leadership, and equipment are either established or emplaced, then the Soldiers should arrive.

Finally, a schedule based on conditions, rather than time, should decide the way forward for an activating unit. If the command cannot meet certain conditions, the activation should be delayed to avoid overburdening the leaders on the ground. The fielding of the 42d Clearance Company occurred in a cohort manner with Soldiers arriving from AIT lacking some basic skills and training. Driver training should be incorporated into basic or AIT, since it would relieve the gaining unit of responsibility for standing up a driver training program before the arrival of vehicles and qualified trainers. If units only needed to conduct Soldier road tests on vehicles, Soldiers could contribute to the company's overall mission much sooner.



Captain Bradwick graduated from the U.S. Military Academy at West Point in 2007. He was tasked with temporarily commanding and standing up the 42d Clearance Company before taking over as company executive officer. Captain Bradwick then served in Afghanistan as a liaison officer in Regional Command–East. He is currently at Fort Leonard Wood, Missouri, attending the Engineer Captains Career Course.

18th Engineer Brigade Validated for Afghanistan Deployment

By Captain Kathryn A. Werback

The 18th Engineer Brigade headquarters in Schwetzingen, Germany, completed its validation exercise in February 2011 for deployment to Afghanistan later in the year. The headquarters would deploy off-cycle from its subordinate units, requiring additional coordination throughout the staff to prepare and execute training for the various levels within the brigade. When the brigade arrived in theater, it would be responsible for supporting Regional Commands–East, –North, and –Capital with engineering efforts.

To become validated for deployment, the brigade developed an aim point model to lay out the exercise objectives for each crawl-walk-run-validate phase of training, with deployment as the end state. Although the initial objectives were based on the mission-essential task list, the staff learned to use the Combined Arms Training Strategy and Battle Command Knowledge System to identify tasks and subtasks for each objective. Staff sections also identified section-focused tasks based on the initial training objectives. At the after action review for training events, each subtask training level was identified as *trained*, *needs practice*, or *untrained* and the way ahead was noted, giving a consistent and logical approach to planning future training.

Crawl Phase

In September 2010, the staff participated in a battle command seminar (BCS) for the crawl phase of deployment preparation. Members of the Battle Command Training Program (BCTP) Operations Group Foxtrot went to Schwetzingen to lead a series of workshops for the brigade staff. In preparing for the BCTP, the brigade developed a list of topics that the staff would initially conduct as internal professional development workshops, then interact with various staff sections during the BCTP seminar, and carry that knowledge into theater. Remaining on course with the aim point would keep the brigade on its glide path to deploy fully trained and on time.

Discussion topics led by BCTP included the operational environment and battle command from Field Manual (FM) 3-0, *Operations*; knowledge management from FM 6-0, *Mission Command: Command and Control of Army Forces*; battle staff synchronization, the military decisionmaking process, rapid decisionmaking, and the synchronization process from FM 5-0, *The Operations Process*; and targeting from FM 3-60, *The Targeting Process*.

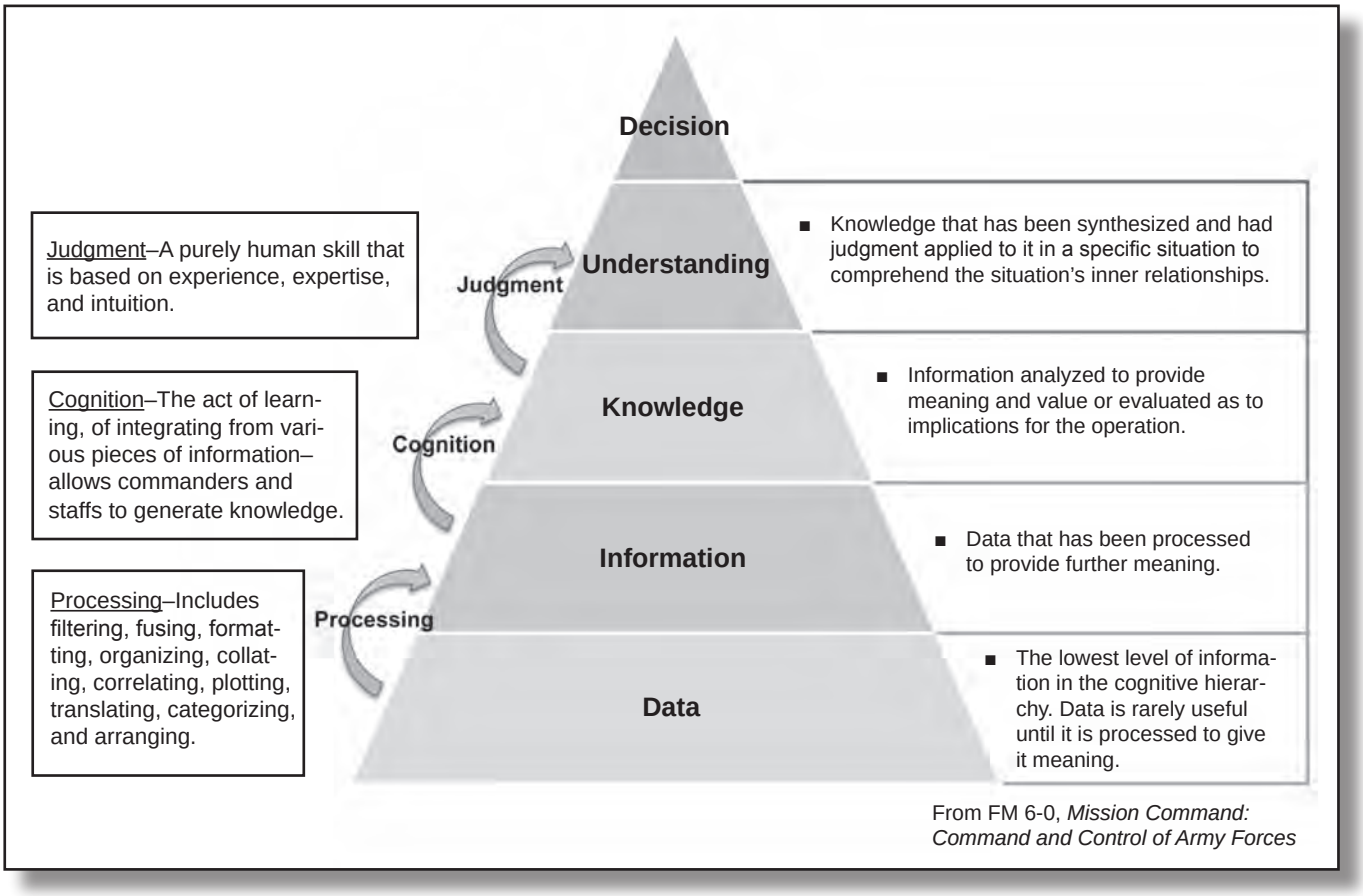
In discussing knowledge management, the staff interacted with the commander to understand the best way to transfer the knowledge the commander would need to make decisions. This was based on the cognitive hierarchy, which became a focal point for brigade briefings to the commander throughout the trainup. While having data and trackers is essential, data must be transformed into information and later into knowledge so that the brigade can maintain a holistic picture of operations.

Several members of the 372d Engineer Brigade who were redeploying from Afghanistan also attended the BCS. Their knowledge of the battlefield and current practices tied into the seminars and brought the first glimpse of the deployment to the BCS. At the brigade level, they suggested having a budget section and as many personnel trained as contracting officer representatives as possible. This amounted to the need for additional personnel and training. Another advantage for the staff was the BCTP's continued involvement in the deployment process, as instructors continued to teach and mentor the staff to the completion of the validation exercise. At the validation exercise, the BCTP drew from the original aim point to tailor training events specifically to the brigade.

Walk Phase

In October 2010, the unit set up a deployable rapid assembly shelter to simulate a deployed environment and give the staff the opportunity to execute a staff exercise. In addition to the topics addressed in the BCS, the staff added skills, including—

- Army Battle Command Systems.
- Decisionmaking.
- Common operational picture (COP) management.
- Significant activity (SIGACT) management.
- Battle rhythm management.
- Battle drills.



Cognitive hierarchy

During this exercise, the staff moved from PowerPoint®-based briefings to Command Post of the Future (CPOF) to centralize information and generate the brigade commander's update brief. Having the information for that brief on the CPOF was the first step in generating the COP. Because units would be located throughout northeastern Afghanistan, and because it was a necessary tool for staff planning, the COP had to be accessible from any location. As the COP was developed further in the training, it would become a tool for mission analysis. During the walk phase, creating overlays, understanding the system, and populating it with data were the first steps toward a comprehensive COP. Soldiers and leaders alike received training on the CPOF to create initial products for the COP.

With the transition from PowerPoint to CPOF, the staff experienced growing difficulties with transforming their data into knowledge for the COP and the commander's update brief. By the end of the exercise, data was refined so that information was being briefed. This met the goal set in the aim point model of teaching the staff to acquire and process data so that it could be transformed into information and knowledge before being briefed to the commander, enabling the commander to make informed decisions. The ultimate goal of transferring knowledge—one step up from information—would be refined after the exercise so that the brigade could easily move into tracking combat operations when deployed.

Run Phase

The final training event before the validation exercise was a tactical operations center exercise in November 2010 at Grafenwoehr Training Area. New exercise objectives included—

- Operational environment.
- Theater command and control structure.
- Request for information management.
- Commander's critical information requirement management.

Although the staff had previously generated CPOF material, returning to daily operations had also caused a return to PowerPoint. By the close of the exercise, the staff had created a living document in CPOF, which could be updated by any staff section as information arrived. In this manner, the COP had up-to-date information for any recent SIGACT, projected for all to view in the tactical operations center.

This exercise was the first opportunity for the staff to react to events on the battlefield. All training "injects"—reality-based scenarios designed to force the staff to adapt to new situations—were initiated by a designated "white cell" of exercise controllers, giving staff members a chance to interact with very limited outside units. This required

staff members to manage SIGACTs and requests for information and to set the stage for other staff activities, such as fragmentary order management. The standing operating procedure at the brigade tactical operations center was put to use in response to SIGACTs. Walking through the battle drills in response to SIGACTs required the staff to begin exercising cohesively. Different sections realized the need to overlap in order to cover all requirements. Later, during the validation exercise, the staff would not only execute the battle drills, but would also refine them toward current operations.

Although the rapid decisionmaking and synchronization process had been discussed at the BCS, this event was the first opportunity to practice it during an operational event. The process gave the staff a tool to make a quick and informed decision versus the military decisionmaking process, which produces optimal decisions but is a much deeper and longer process. When time is important, producing a good decision and enabling troops on the ground to execute in a timely manner becomes more important than finding the perfect solution but allowing no time to execute it. As the staff became aware of the value of time, rapid decisionmaking gained in importance to produce an order and initiate movement.

The staff also focused on developing the initial commander's critical information requirement. This requirement would develop throughout the remainder of the exercises as the brigade pulled data from existing commander and theater critical information requirements, following the basic concept of keeping only those things that the commander would need for decisionmaking. During the exercise, staff sections in various locations worked to improve communication with each other. This trend would continue through the validation exercise as the staff trained on CPOF with different types of group communications software.

Validate Phase

The validation exercise—Unified Endeavor (UE) 11-2—took place in January and February 2011 at Fort Hood, Texas, alongside the future Regional Command–East team, the 1st Cavalry Division. During the exercise, relationships grew between the brigade and the cavalry, the future members of Task Force Lafayette (which would operate in several provinces of Regional Command–East). Creating the link between the staffs would allow smoother transitions once arriving in theater because dialogue was already open.

Additional training objectives for UE included—

- Force protection.
- Information operations.
- Fragmentary order management.
- Boards, bureaus, centers, cells, and working groups.
- Information management.

The initial push of the exercise was to generate the engineer campaign support plan through the military decisionmaking process. Although this facet of the exercise trained the staff on that process, the real success occurred once the campaign plan was disseminated throughout the staff. The final product enabled Soldiers to quickly grasp the brigade's downrange focus. Additional value was gained from learning how to use the Central Command Regional Intelligence Exchange System (CENTRIX)—a network separate from the U.S.-only secret platform, which was designed to transfer sensitive information between North Atlantic Treaty Organization allies—and from understanding the community stabilization programs for the current engineer brigade and regional commands.

From the stabilization program, a "Commander's Card" was developed. This one-page slide showed the task organization and the brigade's mission, intent, lines of effort, and shaping and sustaining operations. Not only did this give a quick reference to the staff, but anyone briefing outside units could do so in a comprehensive and understandable manner. This training exercise was the first that had CENTRIX access and worked with units that the brigade would work with in theater. The coordination required by the training established a firm base for all levels to communicate and learn from one another. The systems at UE, including the CENTRIX network with CPOFs, allowed the staff to use SharePoint™ (a Web site that allows files to be posted, checked out, and modified and allows information to be managed more effectively across the brigade). Staff sections based away from the main body could access up-to-date information via CPOF, tie in to working groups, and update their information for the main body to see. The transfer of information using SharePoint and CPOF expanded to the point that it was knowledge management instead of simply data and information saved on individual computers.

CENTRIX accessibility was augmented with the arrival from Afghanistan of the 176th Engineer Brigade, which the 18th Engineer Brigade would replace. The addition of the operations officer and International Security Assistance Force Joint Command liaison officer helped the brigade understand current operations and the systems that staff members could now link with online. Access to CENTRIX allowed research into various portals and gave personnel a firm grasp of current operations during training. Seeing and working with real-world data helped the staff grasp what the brigade would be doing in theater.

By the end of the exercise, the brigade could display a COP with pertinent overlays and running estimates that would allow operations to be executed in a leader's absence. In its progress from crawl to validate, the brigade had steadily developed its targeting process as a means to direct operations. Although the result might not have been direct fire, the decide-detect-deliver-assess concept had been applied to the brigade's method of deciding which projects or route clearance routes would have priority and what support would be needed. As the brigade reassesses its campaign plan, this process will allocate Soldier effort

in construction and combat, resulting in a comprehensive engineer plan for northeastern Afghanistan.

At the close of the exercise, sections exported their products and processes. Some will be used in Germany, while others—such as the COP—will be trained on and taken to Afghanistan.

Conclusions and Recommendations

Returning to doctrine is the key for success. This ranges from such basics as ensuring the proper use of doctrinal terms and graphics all the way to embracing targeting as a means of prioritizing brigade operations. Using an aim point model and fleshing out training objectives allowed the staff to gain knowledge and experience to the point of validation. Using and building on the original training objectives enabled a comprehensive approach to validation. Also, the brigade can look back and see all the steps required for deployment. After the primary training exercises were complete, the staff continued to train on areas highlighted in after action reviews. As the brigade learned during validation, not everyone had developed the same base of information, and information is a perishable commodity. The staff had to amend its operations to ensure that lessons learned from UE were integrated into their daily operations in preparation for deployment. Because CENTRIX connectivity in Germany is limited, daily operations there will not be based on that program. And although there will not be a CPOF in every section, the use of SharePoint and other products developed at UE will make the transition to theater much smoother.

Captain Werback is the 18th Engineer Brigade public affairs officer, currently deployed in support of Operation Enduring Freedom. A graduate of the Engineer Captains Career Course, she holds a bachelor's degree in civil engineering from the University of California, Davis, and a master's degree in engineering management from Missouri University of Science and Technology at Rolla.

References:

FM 3-0, *Operations,* 27 February 2008. (Editor's note: Army Doctrine Publications (ADP) 3-0, *Unified Land Operations*, 10 October 2011 supercedes FM 3-0.)

FM 3-60, *The Targeting Process,* 26 November 2010.

FM 5-0, *The Operations Process,* 26 March 2010.

FM 6-0, *Mission Command: Command and Control of Army Forces,* 11 August 2003.

THE 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, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after action type articles and reviews of books on engineer topics are also welcome.

Include 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 PowerPoint®. If illustrations are in PowerPoint, avoid the excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a Web site must be accompanied by copyright permission.

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

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By Major Christopher I. Eastburg

It seems that mobile device applications exist for nearly everything now. The genius behind application development is in reducing a complex action to essential information. Geospatial terrain reasoning for military operations will transfer into mobile devices down to the platform level via a National Geospatial-Intelligence Agency program known as the *Commercial Joint Mapping Toolkit (CJMTK)*.

The Army Geospatial Center at Alexandria, Virginia, is the technical manager for a joint capabilities technology demonstration called *Common Ground* (*CG*). A joint technology demonstration is a program that the Office of the Secretary of Defense uses to manage technological solutions and concepts within a 2- to 3-year time frame. Participants in CG include representatives from government, academia, industry, and the military.

The CJMTK integrates the best geospatial tools of government, academia, industry, and the military into a single architecture that is made available for programs of record. Geospatial tools continue to evolve at a breakneck pace. The National Geospatial-Intelligence Agency absorbs about 500 terabytes of data monthly. Computer processing times keep improving; the volume of data keeps increasing; software keeps growing in capability and complexity; the Army keeps getting more networked; and military organizations keep becoming more joint and multinational, involving more Department of Defense and other federal agencies.

Management of the common operational picture continues to evolve with technology. First, there was the analog common operational picture, consisting of hard copy maps mounted on a standard tactical operations center board. Next, stand-alone computers were added to augment the tactical operations center board. The state of the art today consists of stand-alone systems connected to a local area network. As network capabilities increase, mission command systems will continue to move toward a more service-oriented architecture. CJMTK facilitates the ability of algorithms to uncover relevant geospatial products "hidden" in terabytes of data and transfer the necessary information to the platform level.

Early in Operation Iraqi Freedom, the Army did not have geospatial technicians below the division level in the legacy divisions (although the Force XXI divisions did). Resourced only with the Digital Topographic Support System, a chief warrant officer two, and several well-trained Soldiers, it was not possible for the division terrain team to leverage its capabilities across the entire division. As with the Force XXI model, terrain teams were pushed to the brigade combat team level. The best tools for terrain analysis and collaboration should not stop with a headquarters staff. Company commanders and battalion staffs should be able to bring the best tools to their fight since intelligence gathering is predominately a bottom-up endeavor in counterinsurgency operations. Many company commanders, particularly of maneuver units, create a company intelligence support team that is not on the modified table of organization and equipment so that it can generate, manage, and analyze human and geospatial information.

Common Ground and Advanced Geospatial Analytics

CG seeks to move geospatial capabilities further into the realm of command and control. The objective of the architecture and resulting software is a shared understanding (doctrine; geospatial information; and tactics, techniques, and procedures) among American, North Atlantic Treaty Organization, and coalition nation forces. To understand CG, the architecture must be divided into four dimensions:

- ***Tactical spatial objects (TSOs).*** Analytical, geospatial objects extracted from terrain feature data and described in tactical terms that directly support the planning and execution of military operations.
- ***Engineered knowledge.*** A database of tasks and capabilities by unit, echelon, service, and nation. It can be seen as the intersection of an Army Training and Evaluation Program exercise, doctrine, and a Wikipedia®-like database.
- ***Digital orders.*** The Army performs a lot of analog planning using digital systems. Although collaborative techniques are improving with the use of SharePoint™ and formal knowledge management programs, Army systems will increasingly communicate with digital planning objects instead of e-mail.
- ***CJMTK.*** This tool facilitates a discovery and dissemination service that will find the appropriate geospatial data and then push the relevant tools to the user. For example, a Soldier using a smartphone application would be able to search through 100 terabytes of data, but only receive the information needed for the problem at hand.

Each of the four dimensions is relevant to increasing the efficiency of the military decisionmaking process and current operations, particularly in joint and coalition environments. The rest of this article focuses primarily on TSOs and their utility for mission command in geospatially complex environments such as Afghanistan. One might also think of TSOs as a combination of automated feature extraction algorithms and advanced geospatial decision support tools.

Battlespace Training Reasoning and Awareness–Battle Command is a project that focuses on developing software algorithms that capture integrated terrain and weather effects to provide predictive analysis tools. These tools are essentially automated geospatial "staff estimates." Their ultimate objective is to empower commanders, staffs, and Soldiers by providing them with processed information that allows them to understand and incorporate quicker geospatial reasoning into all processes. The purpose of the TSO is not to replace humans with automation in regard to the geospatial dimension of mission command, but to allow commanders to evaluate geospatial variables more quickly.

TSOs are extracted from vector terrain feature data such as the U.S. Army's theater geospatial databases, from digital elevation models such as digital terrain elevation data, and from digital surface models derived from light detection and ranging technology. The terrain features are grouped, optimized, and analyzed to provide commanders and staffs with responsive terrain information, expressed in warfighter terms tailored to the mission and tasks. While TSOs may be produced by a variety of means, the general idea is to develop automated algorithms and request processes. These algorithms are capable of processing large amounts of terrain data in a rapid, consistent, and standardized manner.

Geospatial data exists in huge quantities that require well-designed processes and tools to give the end user not only data, but also the ability to convert the data to information, to knowledge and, finally, to understanding. Contextual knowledge of geospatial products is essential for human or automated analysis. With the rapid production and dissemination of such tailored knowledge products, commanders and staffs can apply judgment much more quickly throughout all phases of the decisionmaking process and develop a thorough understanding of their operational situation.

"Foundational" TSOs are computed where there is a topographic expert with the massive data storage and analysis power to do comprehensive geospatial processing. Precursor products accomplish extensive computation up front to save time during the decisionmaking and execution processes. Traditional military aspects of terrain products are those commonly associated with the military aspects of terrain, or OAKOC (observation and fields of fire, avenues of approach, key terrain, obstacles, and cover and concealment). These products include, but are not limited to—

- Area obstacles.
- Choke points.
- Concealment.
- Cross-country mobility.
- Fields of fire.
- Linear water obstacles.
- Linear land obstacles.
- Mobility corridors.
- Road networks.

An example of output for area obstacles is shown in Figure 1, page 18. Terrain is categorized as water, forest, steep slope, built-up area, marsh, or depression. It is important to note here that some TSOs (such as cross-country mobility, mobility corridors, and choke points) contain vehicle type and unit size as parameters in their legends. They are still classified as foundational since computation does not require additional mission-specific information.

Mission-specific TSOs include additional tactical information and the foundational terrain data. They are products suitable for a specific force or for multiple force types to perform well-defined military tasks consistent with a mission or objective. For example, routing algorithms require vehicle type and sector sketches require maximum effective ranges. Mission-specific TSOs can be further refined by the current situation through association to command, control, and intelligence information or by evaluation in the context of operational overlays. These products include, but are not limited to—

- Attack positions.
- Command post selection.

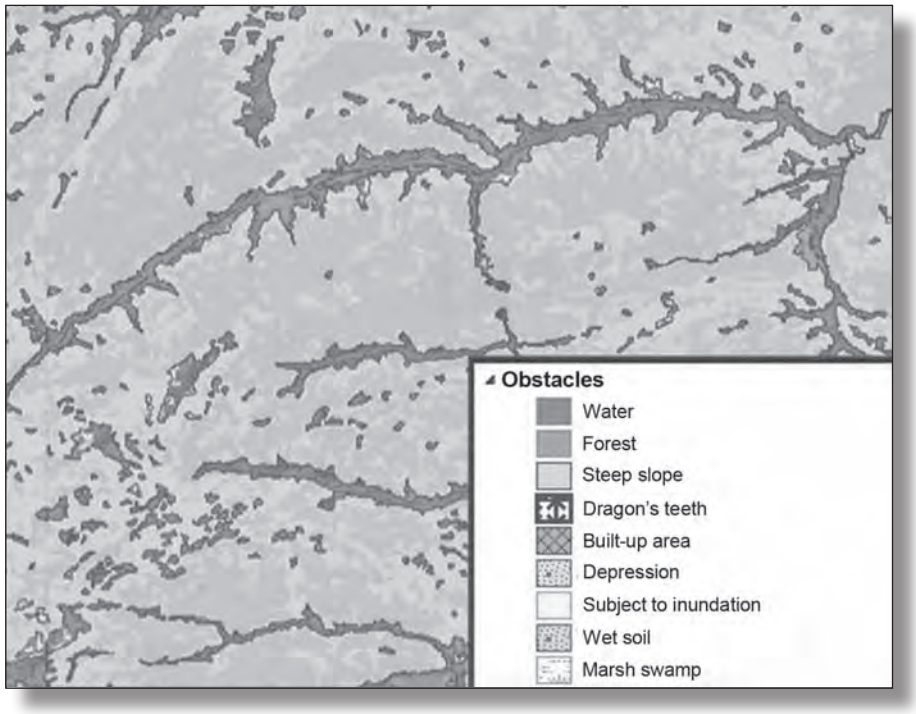


Figure 1. Area obstacles

- Direct fire (battle) positions.
- Helicopter landing zones (HLZs).
- Indirect fire positions.
- Line-of-sight analysis.
- Maneuver route vulnerability.
- River crossing.
- Route analysis—omnidirectional and point to point.

An example of output for two TSOs is shown in Figures 2 and 3. Omnidirectional route analysis defines regions that a vehicle could reach in time intervals such as 5, 10, or 15 minutes. The HLZ function screens terrain for feasible landing zones and returns the size of the landing zone as well as the upslope. There are three types of output for foundational and mission-specific TSOs:

- Graphic control measure (route).
- Traditional overlay (linear obstacles or cross-country mobility).
- Tactical decision aid (sector sketch, maneuver route vulnerability, HLZ).

Potential Applications

Terrain analysis is not simply a geospatial engineer team responsibility. Basic geospatial tools should be pushed down to the lowest useful level. Every Soldier should be able to perform basic terrain analysis, which is simply an updated definition of map reading, but with digital tools and data. As increased technology enables general access to geospatial understanding, geospatial engineer teams will naturally shift to more effort on data quality, software, hardware, data storage, and training, as well as terrain analysis for niche products to support command priorities. Staff sections and subordinate commands should not have to task the geospatial engineer to leverage basic terrain analysis products.

It follows that advanced geospatial analytics should be included in software used in the engineer basic and career courses and other branches. Placing TSOs relevant to the Army Battle Command System software would also improve geospatial decisionmaking. Although it is the standard for real-time collaboration and common operational picture management, Command Post of the Future is geospatially deficient. Command Post of the Future is now CJMTK-compliant, which means that better geospatial analytics are within reach. These tool kits would facilitate real-time geospatial problem solving and improved deliberate planning. Although not very useful in Iraq, the HLZ screening algorithms could help identify potential landing zones for casualty evacuation in real time in remote Afghanistan. The omnidirectional route analysis could tell the Command Post of the Future operator how far insurgents could move a captured U.S. Soldier within 30 minutes, which would be very useful for the identification of traffic control points while forming a hasty cordon. The Tactical Ground Reporting System is the primary system used for patrol planning at the platoon and company level. Company level leaders should have geospatial intelligence in the same software used for patrol planning. The route planning tools available within CJMTK are particularly applicable to the Tactical Ground Reporting System. Route planners should be able to see historical threat information, such as improvised explosive device blast sites and geospatial analysis, with the same software.

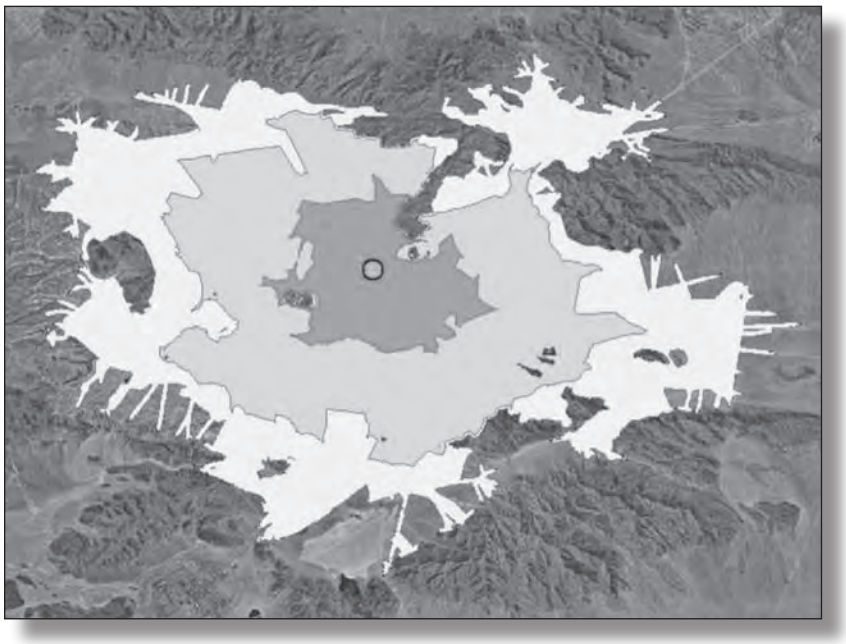


Figure 2. Omnidirectional route analysis

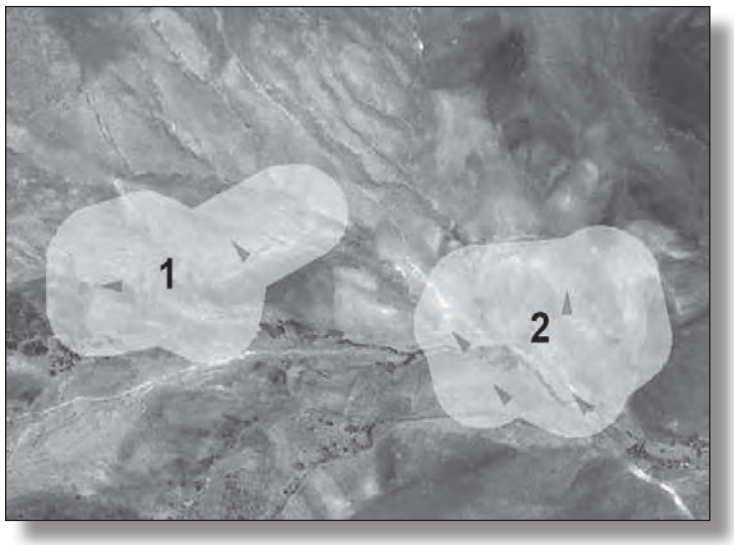


Figure 3. HLZ screening

Conclusion

The combination of networks with high data storage and computational capabilities has opened the door for greater access to geospatial tools for all Soldiers. The Common Ground Joint Capability Technology Demonstration is bigger than just improved geospatial reasoning, but seeks to improve interoperability vertically and horizontally across the Department of Defense, supporting government agencies, and allies. By using the best of government and industry architecture, the CJMTK program will provide the necessary linkage to transition geospatial information into user platforms. Through thoughtful analysis, high-value TSOs should be selected for inclusion into geospatial platforms and selected software applications across the Army.

Geospatial analytics support the military planning and intelligence processes by providing context to the visualization and understanding of the battlefield and conducting mission analysis and course-of-action development. No level of automation can replace human judgment. These geospatial tools simply allow commanders and staffs to understand the battlefield faster and, therefore, will increase decision space.

Major Eastburg is an analyst in the Operations Research Center at the U.S. Military Academy at West Point, New York, and recently crossed over from the Engineer Branch to operations research/systems analysis. He holds master's degrees from the University of Missouri–Rolla (now Missouri University of Science and Technology) and the Georgia Institute of Technology.

Gem of a Beach Sparkles After Restoration

By Dr. JoAnne Castagna



Anthony Ciorra has many fond memories from his childhood in the 1970s of spending warm days at Orchard Beach in the Bronx, New York, with his parents. Today, he is a professional engineer and chief of the Civil Works Branch for the U.S. Army Corps of Engineers (USACE), New York District. Ciorra has been involved in the shoreline restoration project of Orchard Beach, one of several civil works projects performed by the district, and is proud to say he has played an important role in the restoration project.

"Today, when I drive on the roads leading into the beach, I get a sense of nostalgia," said Ciorra. "I start thinking back to when I was a child, but I also feel a sense of pride that I helped make this beach enjoyable."

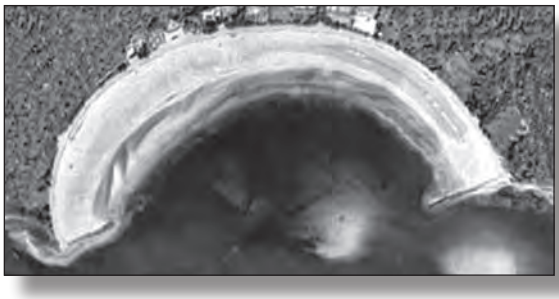
The popular recreational beach is in a heavily populated urban area and serves approximately 2.5 million visitors annually. Orchard Beach is located along the northeast shore of the Borough of the Bronx, at the western end of the Long Island Sound, a body of water between New York and Connecticut. The crescent-shaped beach is a mile long and 400 feet wide and considered the "gem" of Pelham Bay Park, New York City's largest city park. There was a safety issue with overcrowding that prompted USACE to get the project completed expeditiously and safely for public use. The year 2011 marked the 75th anniversary of this historic beach, and its shoreline was eroding, reducing the size of the beach and resulting in overcrowding.

Ciorra said, "The elevation of the beach was so low that when the Long Island Sound moved in, you couldn't keep



Area map





Aerial photos of Orchard Beach before (top) and after (bottom) the restoration project show USACE improvements.



The local community enjoys the newly restored Orchard Beach.

your blanket on the beach anymore. You had to move into other crowded areas. In addition, there were some steep drop-off or slope areas just off the shore that caused a few drownings."

USACE was asked by the New York City Department of Parks and Recreation to restore the beach. In October 2010, the organization began working 24-hour days to restore the beach for the 2011 season. It used a hopper dredge to get sand from a nearby channel and pump it onto the beach. The sand was then graded and smoothed out to extend the shoreline. Dredged sand was also used to fill in the dangerous drop-off area. In addition, USACE used 4,000 tons of rock to repair a 200-foot section of the south groin, which was important because the groin aids in slowing down further beach erosion. The work was completed in 2 months—ahead of schedule and under budget.

More visitors were expected to visit the beach this year due to its increase in popularity. The beach includes a sandy beach area; a hexagonal-block promenade; a central pavilion with food stores and specialty shops; two playgrounds; two picnic areas; a large parking lot; and 26 courts for basketball, volleyball, and handball. It is easily accessible by public transportation, with plenty of parking for out-of-state visitors.

More people were expected to use their community beaches instead of going away on costly vacations this year. Once called the "Riviera of New York," the artificial beach was constructed by the Works Progress Administration during the Great Depression. Under the direction of the New York City Department of Parks Commissioner, unemployed residents were hired to construct the beach to bolster the economy.



Engineers work to repair the beach.

Ciorra said, "I'm certain that visitors are showing up at Orchard Beach for the first time since last summer and are seeing a significant change for the better. It feels good to be part of something where you know you made a difference, and it's a project that is important to people because it's being used by the public."

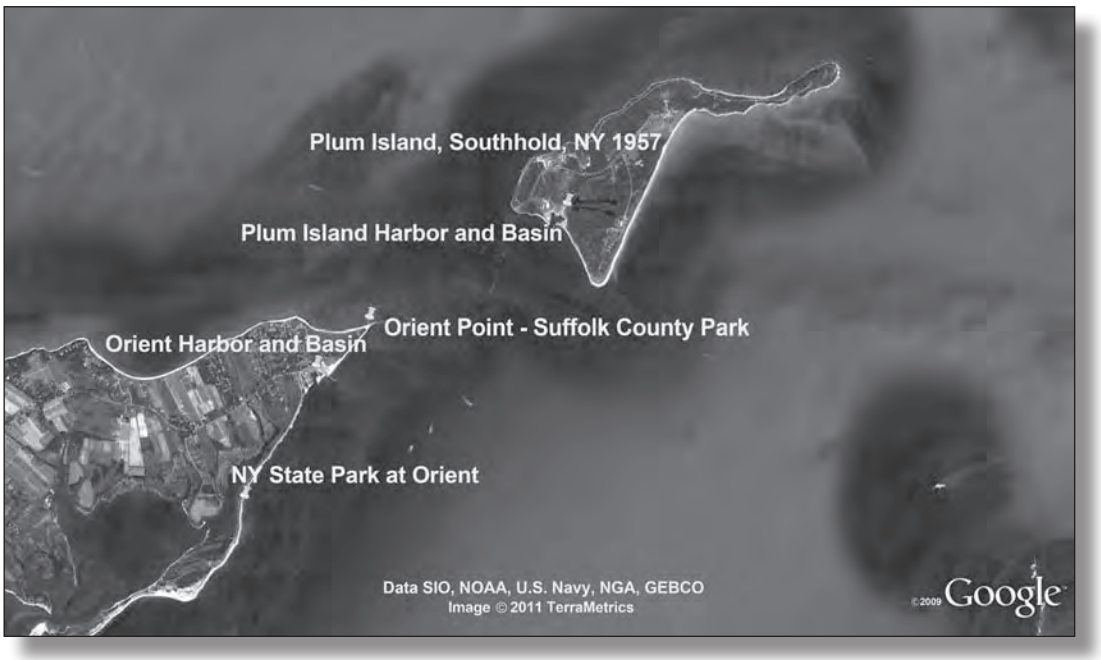
Dr. Castagna is a technical writer-editor for the New York District of USACE. She can be reached at <joanne.castagna@usace.army.mil>. Follow her on Twitter at <http:twitter.com/writer4usacenyc>.

No Mystery at Plum Island

By Dr. JoAnne Castagna

As a child growing up on Long Island, New York, I shared with many other children a curiosity about what was occurring on the mysterious Plum Island, a restricted bit of land just off our northeastern shore. There were stories in the media and in books that the federal government was conducting animal experiments there. My vivid imagination envisioned bizarre operations being performed on animals, resulting in Frankenstein-like creatures which would then roam the barren beaches of the island on additional arms and legs. Ironically, I was reading *Plum Island,*[1] a novel by Nelson DeMille, when I learned about the work that the U.S. Army Corps of Engineers (USACE), New York District, has been performing on the island for the past decade.

Plum Island has been the home of the Plum Island Animal Disease Center that's been in existence since the



Aerial view of project area



Restored bulkhead on Plum Island

mid-20th century. The center has the important role of performing diagnosis, research, and education to protect America's livestock and food supply from animal diseases. The work by USACE supports important work on the island, preserves the island's rich history and environment, and improves area beaches.

In 2001, the U.S. Department of Agriculture (proprietors of the site at the time) asked USACE to restore the eroding bluff around the island's historic lighthouse. The Plum Island Light, built on a 3-acre plot on the western end of the island in 1869, is no longer operational. Engineers used 17,000 tons of stone to construct an 800-foot rock revetment erosion control structure to stop the erosion of the bluff. Leftover stone was used to rehabilitate two jetties at the entrance to Plum Island Basin. All of the stone for this work was beneficially reused material from the USACE Sag Harbor Breakwater rehabilitation project.

In 2007, officials from the U.S. Department of Homeland Security (current proprietors of the island) were so pleased with the Corps' work that they asked USACE to replace a bulkhead and perform needed sand dredging in Plum Island Harbor, a body of water around the island, and Orient Harbor, a body of water on the northeastern end of Long Island. The dredging supports the important work being performed on the site and improves area beaches. The ferries that carry workers to the island were hitting the bottom of Plum Island Harbor; so in 2008, USACE dredged approximately 17,430 cubic yards of sand from Plum Island Harbor. This year, an additional 9,925 cubic yards were dredged to create and reinforce a previously constructed dune on the island and to build a sand stockpile for emergency use if the dune erodes. Restoring the dune protects a freshwater wetland on the island that serves as a recharge area for the main well field that supplies the island with all of its fresh water.

The dune also acts as a barrier and prevents the ocean salt water from mixing with the wetland's freshwater ecosystem. In 2008, 46,000 square feet of the dune were graded and planted with beach grass. This year, an additional 13,250 square feet were graded and planted. In addition, fencing was placed on the dune to help prevent sand erosion.

USACE also dredged approximately 14,835 cubic yards of sand from Orient Harbor, using this sand to restore two Long Island beaches—Orient Beach State Park and Orient Point County Park. There are plans to dredge an additional 10,000 cubic yards. These beaches need the sand because they experienced serious beach erosion from storms. The sand is being used to stabilize utility poles that were weakened and blown inward and to protect roadways that suffered erosion. The sand will also build up beaches, providing additional recreational area for the public during summer beach seasons.



Sand dune seeded to protect island wetland

Dr. Castagna is a technical writer-editor for the New York District of USACE. She can be reached at <joanne.castagna@usace.army.mil>. Follow her on Twitter at <http://twitter.com/writer4usacenyc>.

Footnote:

[1]Nelson DeMille, *Plum Island,* Grand Central Publishing, New York, New York, 1997.



Dedication

The following members of the Engineer Regiment have been lost in overseas contingency operations since the last issue of *Engineer*. We dedicate this issue to them.

Corporal Raphael R. Arruda	744th Engineer Company, 54th Engineer Battalion, 18th Engineer Brigade	Tompkins Barracks, Germany
Specialist Chazray C. Clark	Troop B, 4th Squadron, 4th Cavalry, 1st Brigade Combat Team	Fort Riley, Kansas
Private First Class David A. Drake	515th Engineer Company, 5th Battalion, 4th Maneuver Enhancement Brigade	Fort Leonard Wood, Missouri
Sergeant William B. GrossPaniagua	Company A, 3d Brigade Special Troops Battalion	Schofield Barracks, Hawaii
Specialist Steven E. Gutowski	515th Engineer Company, 5th Battalion, 4th Maneuver Enhancement Brigade	Fort Leonard Wood, Missouri
Staff Sergeant Nigel D. Kelly	Company A, 3d Brigade Special Troops Battalion, 3d Brigade Combat Team	Schofield Barracks, Hawaii
First Lieutenant Ivan D. Lechowich	515th Engineer Company, 5th Battalion, 4th Maneuver Enhancement Brigade	Fort Leonard Wood, Missouri

Fallen Engineers Memorial Unveiled



One of the highest priorities of the Army Engineer Association (AEA) is to recognize all Army engineers who have given their lives in the defense of the United States of America. Equally important is to recognize those engineers who received wounds in combat resulting in the award of the Purple Heart. AEA is accepting donations for the maintenance of the Memorial Wall for Fallen Engineers unveiled at the Sapper Grove at Fort Leonard Wood, Missouri—home of the Army Engineer Regiment—during the ENFORCE 2011 conference. To learn more, go to <*http://www.armyengineer.com/memorial_wall.html*>.



Rebuilding a Maintenance Program After Deployment

By Major Andrew N. Liffring, Second Lieutenant Tyler M. Holloway, and Chief Warrant Officer Four John R. Cheek

After returning from a 15-month deployment to Afghanistan, the 62d Engineer Battalion struggled to reestablish a battalion maintenance program. Junior leaders were not engaged in the motor pools, money was being spent to maintain excess equipment, and low productivity in the maintenance bays resulted in overtasked mechanics who were unable to complete maintenance. To increase readiness, the battalion worked to develop a maintenance program that used the experience of its maintenance warrant officers to assist companies at the grassroots level. At the same time, the battalion followed a strategy based on sharing knowledge, reducing costs, and increasing productivity. The strategy increased readiness by reducing inefficiencies, sharing knowledge, and creating synergies between organizations.

Maintenance Situation

In March 2010, 8 months after returning from Afghanistan—and 2 months into the train/ready force pool (sometimes referred to as the train/ready phase) of Army force generation—the battalion maintenance program was unable to support the battalion training plan. Restructuring from a legacy organization into a modular organization absorbed the attention of battalion leaders. Personnel realignments, property accountability, and the creation of new systems distracted attention from the battalion maintenance program. To add confusion, every company in the battalion got a new commander and nearly half the senior noncommissioned officers rotated out of the battalion within 90 days of returning from deployment. With this loss of experience came a lack of oversight of subordinate unit maintenance programs, which led to errors in initial data entry into unit Standard Army Maintenance System (SAMS)-1 computers. Initial inspections of SAMS-1 computers revealed that equipment was misidentified as pacing items, was listed with incorrect service data, or was completely missing from the system. By themselves, these problems were easily fixed, but the battalion also suffered from Class IX parts distribution problems. Only one of the four line companies had Class IX parts that supported the equipment on its shop stock listing, and the authorized stockage list (ASL) at the supply support activity did not support the battalion equipment. This resulted in long lead times for parts. To make matters worse, the battalion failed its semiannual environmental inspection in November 2009 and every senior motor sergeant in the battalion was due for reassignment or retirement.

These problems resulted in a maintenance nightmare, with several pacing items sitting deadlined in the motor

pool, incorrect Army Materiel Status System reports being forwarded to Department of the Army, services and calibrations falling behind schedule, and safety messages stacking up without being addressed. There was nowhere to go but up.

The Solution

To help company commanders reestablish their maintenance programs and mitigate the loss of senior motor sergeants, the battalion pushed its maintenance warrant officers down to the company level to provide guidance to staff sergeants serving as company motor sergeants. Two excess maintenance technicians were placed in supervisory positions in maintenance shops at the 68th Engineer Company and 104th Engineer Company. The 74th Multirole Bridge Company maintained its organic maintenance technician. These warrant officers made an immediate impact by reestablishing demand-supported shop stocks, reconfiguring service schedules, and updating SAMS-1 computers to accurately reflect unit vehicle densities. With their expertise in place at the companies, the battalion focused on developing a battalion maintenance program.

Knowledge Sharing

The keystone to the 62d Engineer Battalion maintenance strategy was increasing the knowledge of junior leaders on The Army Maintenance System (TAMS) and then sharing that knowledge among the different maintenance entities to create a shared understanding of the maintenance problems that the battalion faced. To increase knowledge at the junior leader level, the battalion instituted a weekly maintenance professional development program. The weekly classes, held during command maintenance periods, reemphasized what leaders should be checking during command maintenance, demonstrated capabilities, and reinforced maintenance standards. Classes ranged from 10 to 30 minutes and were taught by a platoon leader or lieutenant immediately after first formation to ensure maximum participation.

To reinforce this learning, the battalion conducted intensive quarterly maintenance weeks when the battalion inspected companies to ensure that they were meeting Army maintenance goals. The week usually coincided with a training holiday, allowing commanders to focus on supply and maintenance systems for 4 days. The event usually consisted of—

- Command maintenance.
- Operator inspection on preventive maintenance checks and services procedures.
- Environmental inspection.
- Inspection of military-owned, demountable containers; supply rooms; nuclear, biological, and chemical rooms; and company communications rooms.
- Weapons maintenance.
- Organizational clothing and individual equipment layouts.
- Protective mask maintenance.

The week gave commanders the time and resources to effectively maintain equipment and update systems and provided an assessment of the battalion sustainment functions.

As the battalion increased its knowledge of TAMS, the weekly battalion maintenance meetings provided a forum to share information, solve problems, and build a common operational picture of sustainment issues. The meetings were chaired by the battalion executive officer, with required attendance by company executive officers, motor sergeants, maintenance technicians, the battalion property book officer, supply officer, signal officer, safety noncommissioned officer, environmental control officer, maintenance control officer, maintenance control sergeant, and maintenance control technician. The meetings reviewed the status of—

- Company maintenance.
- Lateral transfers.
- Budgets.
- Financial liability investigations of property loss.
- Communication systems.
- Automation.
- Safety-of-use messages.
- Environmental concerns.

This created a common operational picture on sustainment issues across the battalion and allowed company staffs to synchronize efforts to achieve immediate goals or request additional assistance from the battalion to meet readiness goals.

Reduced Costs

Budget restrictions required that fleet maintenance operations become more efficient. In a typical month, the battalion spent $180,000 to $230,000 on Class IX repair parts, representing more than 70 percent of its annual budget. To reduce costs and still maintain a fleet of more than 450 vehicles, the battalion increased the efficiency in Class IX distribution channels, reducing the need to locally purchase parts and reducing excess property so that funds spent to maintain equipment were spent on authorized equipment. Quick, dependable delivery of parts eliminated the need to tie up capital on inventory in company shop stocks. A problem for most engineer units is the need for low-density, specialized equipment. This prevents the servicing supply support activity from capturing many demands and typically results in long lead times for parts. When an ordered part shows a long lead time, the normal work-around is to use a government purchase card to buy directly from a local equipment dealer. This solution works as long as a unit has the required financial resources.

To reduce costs, the 62d Engineer Battalion focused on increasing the number of command-stocked parts on the ASL at the supply support activity. Representatives attended ASL review boards to voice opinions on what parts should be stocked. This allowed the battalion to align company shop stocks with the ASL, ultimately reducing the lead time for parts. However, this process is time-consuming and only works for those parts identified as on hand.

In cases where demands did not justify adding a part to company shop stocks or the supply support activity ASL, the battalion worked closely with the 4th Support Brigade and Tank-Automotive and Armaments Command representatives to expedite the delivery of those parts. The battalion motor officer and motor technician used the Finance and Logistics System and Logistics-Integrated Warehouse Parts Tracker databases to track rollover document numbers and the status of each high-priority part. Those parts with long estimated shipment dates resulted in an inquiry to the brigade motor technician, the 4th Support Brigade or Tank-Automotive and Armaments Command representative, or the Army Materiel Command parts manager. This kept the pressure on the distribution system to deliver the part; and in some cases, parts were delivered faster than through local purchase.

Although increasing the responsiveness of the Class IX distribution system helped cut costs, the greatest cost savings came from reducing excess property. From 2009 to 2010, the battalion identified and reduced more than $1.6 million in excess property. The money saved allowed a better allocation of those resources throughout the battalion. The battalion executive officer, property book officer, and supply officer reviewed each company property book monthly and compared it to equipment found at the unit and to equipment authorized by the company allowances. Any unauthorized or excess equipment was immediately turned in or laterally transferred to another unit. By March 2011, the battalion had turned in or laterally transferred more than $2.6 million in excess property.

Increased Production

Increasing production was the most difficult part of the maintenance strategy. After two deployments in 3 years and the strain they put on Families, the last thing the battalion commander wanted was to make Soldiers work late. At his direction, the motor pool was to close by 1700 nightly to ensure that Soldiers had time to spend with their Families. This policy forced leaders to balance scheduled maintenance with demands for unscheduled maintenance. The 62d Engineer Battalion did this by defining scheduled maintenance requirements and then allocating "excess" labor to meet unscheduled maintenance needs. This helped to determine daily requirements in respect to time, labor, and bay space.

To determine the scheduled maintenance requirements, the maintenance control officer reviewed each company service schedule and consolidated them into a battalion level maintenance schedule that outlined the bumper number, the time estimated to complete the service, the number of mechanics needed to complete the service, and the bays required to perform the service. This allowed the maintenance control officer to see where the current scheduled maintenance plan was resource-constrained and to redistribute the effort where assets were available. This plan was then compared to company quarterly training plans and further refined.

Once the battalion service schedule was created, scheduled and unscheduled maintenance requirements were reviewed daily by the battalion executive officer, maintenance control officer, and battalion maintenance technician. This review consisted of examining each company SAMS non-mission-capable report, scheduled maintenance progress, and other maintenance issues affecting the battalion. It provided a way for the battalion to quickly synchronize resources to meet ongoing problems.

Under this program, the battalion quickly caught up on delinquent services and surged when needed. The surge capability was critical while preparing company-size elements for deployment. In late 2010 and early 2011, with no detriment to the other companies in the battalion, the 62d Engineer Battalion completed 295 services for the 74th Multirole Bridge Company as it prepared to induct equipment into the left-behind equipment program.

Conclusion

Reestablishing a maintenance program after deployment is an arduous, but necessary, task that sets the foundations for future success as units enter the train/ready force pool of the Army force generation process. The 62d Engineer Battalion met this challenge by pushing its maintenance warrant officers to the ground level, where they focused on sharing knowledge, reducing costs, and increasing productivity. This strategy allowed them to leverage junior leaders and synchronize resources to improve readiness.

Before serving as executive officer of the 62d Engineer Battalion, Major Liffring served as a platoon leader, company executive officer, company commander, observer/controller, and brigade engineer. He holds a bachelor's degree from the Colorado School of Mines and a master's in business management from Norwich University. He is a registered professional engineer in Kansas and is currently assigned to the Fort Worth District of the U.S. Army Corps of Engineers.

Second Lieutenant Holloway is the 62d Engineer Battalion maintenance officer. He holds a bachelor's degree from Washington State University.

Chief Warrant Officer Four Cheek served for 12 years as an enlisted Soldier before receiving his warrant. He served in the 62d Engineer Battalion as battalion motor technician. His education includes the Warrant Officer Candidate, Basic, and Advanced Courses; Engineer Equipment Repair Course; Contracting Officer Representative Course; and Army Basic Instructor Course.

Ice Bridging in Alaska: Arctic Engineering at Its Finest



By First Lieutenant Collin W. Russell and Lieutenant Colonel Marc F. Hoffmeister

An ice bridge is a frozen, man-made structure on the surface of a bay, river, lake, or sea. Exploiting the natural conditions found in an arctic environment, ice bridges provide access to remote areas that do not have permanent road networks. If constructed properly, the bridges can facilitate the efficient transportation of equipment and personnel to otherwise inaccessible areas, saving time and money.

Few Army engineers have the opportunity to train on a rare skill set—ice bridging in an arctic environment. The 6th Engineer Battalion (Combat) (Airborne) was uniquely positioned for this opportunity, which provided valuable training for the unit's Soldiers and practical benefits for U.S. Air Force engineers in Alaska. Throughout January and February 2011, a task-organized team of 35 Soldiers from the battalion constructed an ice bridge over the Delta River at the U.S. Army Cold Regions Test Center at Fort Greely, Alaska.

Ice Bridging: A Lost Art

Enabling mobility is nothing new for Army engineers, but the weather conditions necessary to sustain an ice bridge are so extreme that the skill set is difficult to train. An analysis of potential contingency missions in cold-weather environments reveals a need for ice bridging as a capability within the force. Across the Army, there is a lack of existing doctrinal processes in ice bridging and arctic engineering in general. The 6th Engineer Battalion (Combat) (Airborne) recognized this deficiency and has made a concerted effort to institutionalize ice bridging as a capability.

Ice Bridging Test Bed

Due to its location in Alaska and its close working relationship with the Cold Regions Test Center, the 6th Engineer Battalion (Combat) (Airborne) is well suited to serve as the Army's subject matter expert in constructing ice bridges. According to U.S. Army Alaska policies, the battalion trains its Soldiers on cold-weather survival skills in courses taught at the unit level or at the U.S. Army Northern Warfare Training Center in Fort Wainwright, Alaska. This essential training equips Soldiers with the individual skills required to operate in an arctic environment. The battalion also partners with the Cold Regions Test Center, providing operators to conduct cold-weather testing of engineer equipment and variants of the mine-resistant, ambush-protected vehicle.

Equipped with the skills to survive and operate in an arctic environment, the battalion undertakes an annual mission to construct an ice bridge across the Delta River or the Tanana River. The lack of any bridge crossing on these rivers makes ice bridging essential for the Air Force to conduct maintenance and construction on the Oklahoma Bombing Range and Blair Lakes Impact Area on the far side of both rivers.

The ice bridge constructed in February 2011 was 1.2 miles across the Delta River and 75 to 100 meters wide. The battalion team pumped about 3 million gallons of water during the mission. The bridge was strong enough to allow for the transport of excavators weighing 165,000 pounds. As a direct result of these efforts, the Air Force 354th Civil Engineering Squadron (Range Maintenance) was able to—

- Grade and groom 26 miles of winter trail.
- Remove 12 destroyed target vehicles and 51 destroyed container express boxes.
- Construct four new hangar targets and a new fuel farm.
- Build 60 new Maverick tank targets and repair six damaged tank targets.
- Fabricate three MiG-29 and 19 antiaircraft artillery targets.
- Excavate and move 74,335 cubic yards of fill material while constructing—
  - Four new antiaircraft artillery pads.
  - 12 new hangar target pads.
  - Six miles of new roads.
- Remove 408,000 pounds of metal target residue.
- Transport and use 26,975 gallons of diesel fuel.

Challenges of Ice Bridging

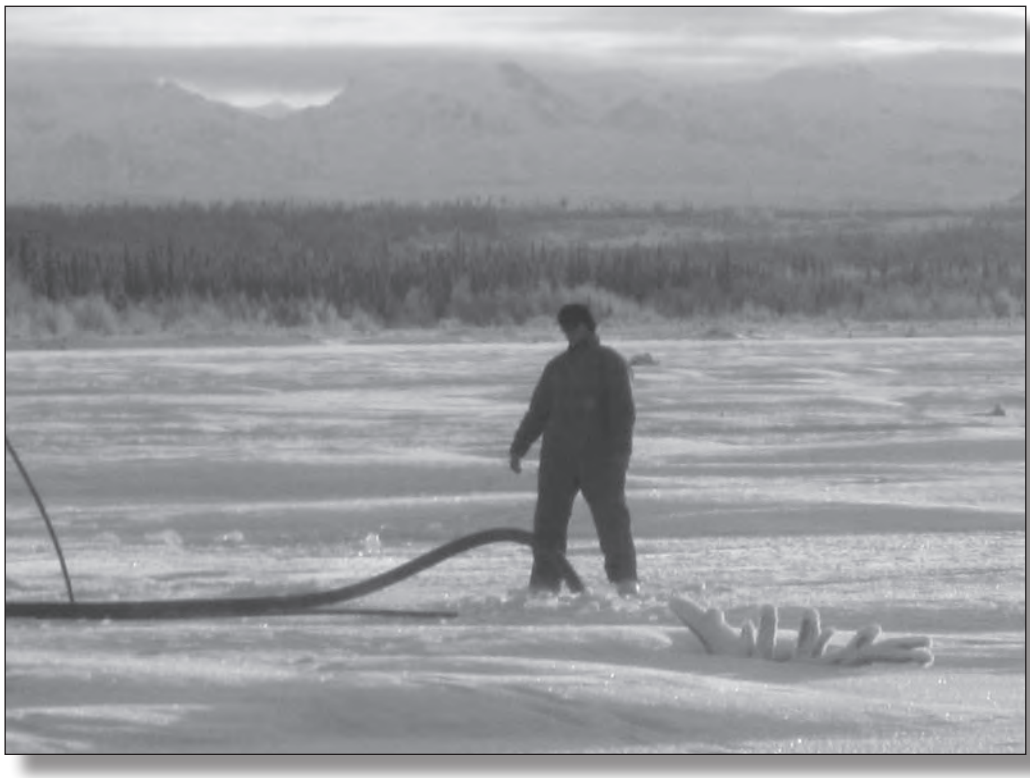
Operating in a cold-weather environment presents unique challenges. The severe cold and gale force winds during Alaska's winter present some of the world's toughest construction conditions. Extreme cold weather can cause equipment malfunctions that are not normally present in warmer climates. Hoses can freeze and become stuck, various items can shatter if dropped, and vehicle brakes can freeze and become inoperable, among other challenges. These malfunctions can prolong construction timelines or endanger an entire mission. Using a small-unit support vehicle equipped with an arctic heater in the rear passenger cab or a warming shelter to keep idle equipment from freezing prevents malfunctions and saves the time it would take to bring equipment to operable temperatures. Routine maintenance is especially critical when operating in severe cold weather.

Safety is another consideration. Soldiers on this mission endured the harshest conditions imaginable, with significant risk of cold-weather injuries. After getting wet while pouring 100,000 gallons of water in temperatures of -26°F, one Soldier remarked that he felt like a "human popsicle," a condition experienced daily by all of the Soldiers during the mission. The Army's extended cold-weather clothing system was not adequate for the subzero temperatures encountered, so Soldiers combined standard Army-issued undergarments with commercial off-the-shelf outerwear. Special waterproof, breathable gloves were locally purchased to ensure dexterity while working with the moving parts on various pieces of equipment.

Types of Ice Bridges

There are three types of ice bridges constructed in the arctic environment:

- Open water bridge.
- Suspended water bridge.
- Grounded ice bridge.



A Soldier monitors a pumping station to ensure that the intake valve does not freeze shut.



A container express is dragged into position to be used as a target on the Oklahoma Bombing Range.



A Soldier drives a four-wheeler with an attached snowplow to contruct an initial berm for the ice bridge. Two Soldiers in the foreground break up the rough surface with hand-tools.

According to Field Manual (FM) 3-34.343, *Military Nonstandard Fixed Bridging,* "Engineers [can] create ice bridges by floating large sections of ice cut from the rear of the ice pack into a transverse position across the water gap. Ice bridges are only an expedient temporary measure."

The suspended water bridge is constructed when the intended gap crossing intersects a flowing river or a lake that has ice already established on it. The water under this type of bridge can degrade the thickness of the ice from the bottom upward, thus requiring constant monitoring of the ice. The grounded ice bridge constructed by the 6th Engineer Battalion (Combat) (Airborne) was a structure that closely resembled a road rather than a bridge. A grounded ice bridge is suspended over water in some areas, while grounded on top of a sand berm or dry portion of the river in other areas. A bridge of this type is usually constructed to cross large expanses of land.

Four-Phase Construction Model

Construction of an ice bridge is a four-phase operation. The first three phases are berming, shaping, and pumping. After the bridge is constructed, the

maintenance phase begins, sustaining the trafficability of the bridge to allow continued mobility along the lines of communication. Ice bridge construction does not follow a set doctrine, so the team developed its own standards and procedures to follow. The key to success lies in understanding the variables that are present: temperature fluctuations, water availability, terrain layout, and the amount and weight of the equipment needed to cross the gap. Only when these variables are understood and analyzed can the gap crossing be constructed.

The common equipment used included M1088 tractor trucks; high-mobility, multipurpose, wheeled vehicles; shovels; mattocks; propane torches; and marking equipment. The mission-specific equipment included typhoon and general-purpose pumps, 3-inch rubber hoses, small-unit support vehicles, 5,000-gallon water trailers, and ice augers. All equipment had to be outfitted for cold weather by ensuring that appropriate fluids and engine block heaters were used.

Phase I—Berming. The berming phase consists of snow-moving operations to create a barrier to stop overflow, which occurs when water below is under pressure, rupturing the ice and covering the surface with shallow water. The shallow water freezes inconsistently and creates a less stable ice structure. The ice below the surface must be at least 36 inches thick for suspended ice or 12 inches thick for grounded ice. These thicknesses will hold the weight of a single D7 bulldozer and represent the minimal thickness to proceed with ice bridging operations using heavy equipment.

Phase II—Shaping. The shaping phase aims to create an even distribution of water during the third phase. During the shaping phase, Soldiers hastily fill existing ravines, gullies, or crevices with snow, ice, or dirt. Water is then added and allowed to freeze overnight. This process decreases the natural variations in the terrain by filling the low areas with "icecrete," which is frozen water mixed with dirt, sand, or gravel. It can be worked in the same way as concrete, making solid fills that can then be expanded upon in the next phase.

Phase III—Pumping. The pumping phase creates a uniformly smooth surface that will ultimately become the surface of the ice bridge. The goal is to create a consistent level of ice across the entire span of the ice bridge by pumping water from the river directly below or from a 5,000-gallon water trailer. This phase relies heavily upon layering ice at appropriate intervals to create strength and density so that it can support the weights that will cross the bridge. The battalion team used a 4.5-horsepower, 3-inch pump to pull water from the river and a water trailer.

Phase IV—Maintaining. The maintenance phase involves monitoring the thickness of ice down the length of the bridge and ensuring that the ice does not degrade. To maintain the strength and thickness of the ice, a minimum of 1 inch of ice should be spread daily across the length of the bridge. The ice bridge can be degraded by wind damage from the top down or by the flow of the river current below.

Institutionalization of Ice Bridging Capabilities

Due to the lack of existing doctrinal processes, the 6th Engineer Battalion (Combat) (Airborne) has several ongoing initiatives to institutionalize ice bridging across the force. Based on lessons learned from the ice bridging mission in January and February 2011, the battalion developed standing operating procedures that documented best practices and lessons learned. The success of the ice bridging mission has resulted in a greater understanding between Army and Air Force engineers. The deputy chief of staff–engineer of U.S. Army Pacific is assessing the feasibility of conducting a subject matter expert exchange program in which theater security cooperation objectives can be met by engaging partner nations on technical engineering topics. Ice bridging is a capability that could benefit a number of countries within the U.S. Pacific Command area of responsibility. If the program is approved, the battalion's expertise could be shared with friends and allies, supporting theater security cooperation objectives and further cementing ice bridging as a niche capability with utility far beyond Alaska.

Within months of completing the ice bridge across the Delta River, the battalion initiated planning for ice bridging operations during the winter of 2011–2012. Lessons learned will be applied to those operations in order to refine the tactics, techniques, and procedures to enable mobility across what would otherwise be severely restricted, or even impassable, terrain. As these tactics, techniques, and procedures are refined, the battalion will disseminate best practices and continue to take the lead in arctic engineering, providing a niche capability to an Army that may one day require mobility support during contingency operations in an arctic environment.

For more information concerning ice bridges, contact First Lieutenant Collin Russell at <*collin.russell@us.army.mil*>.

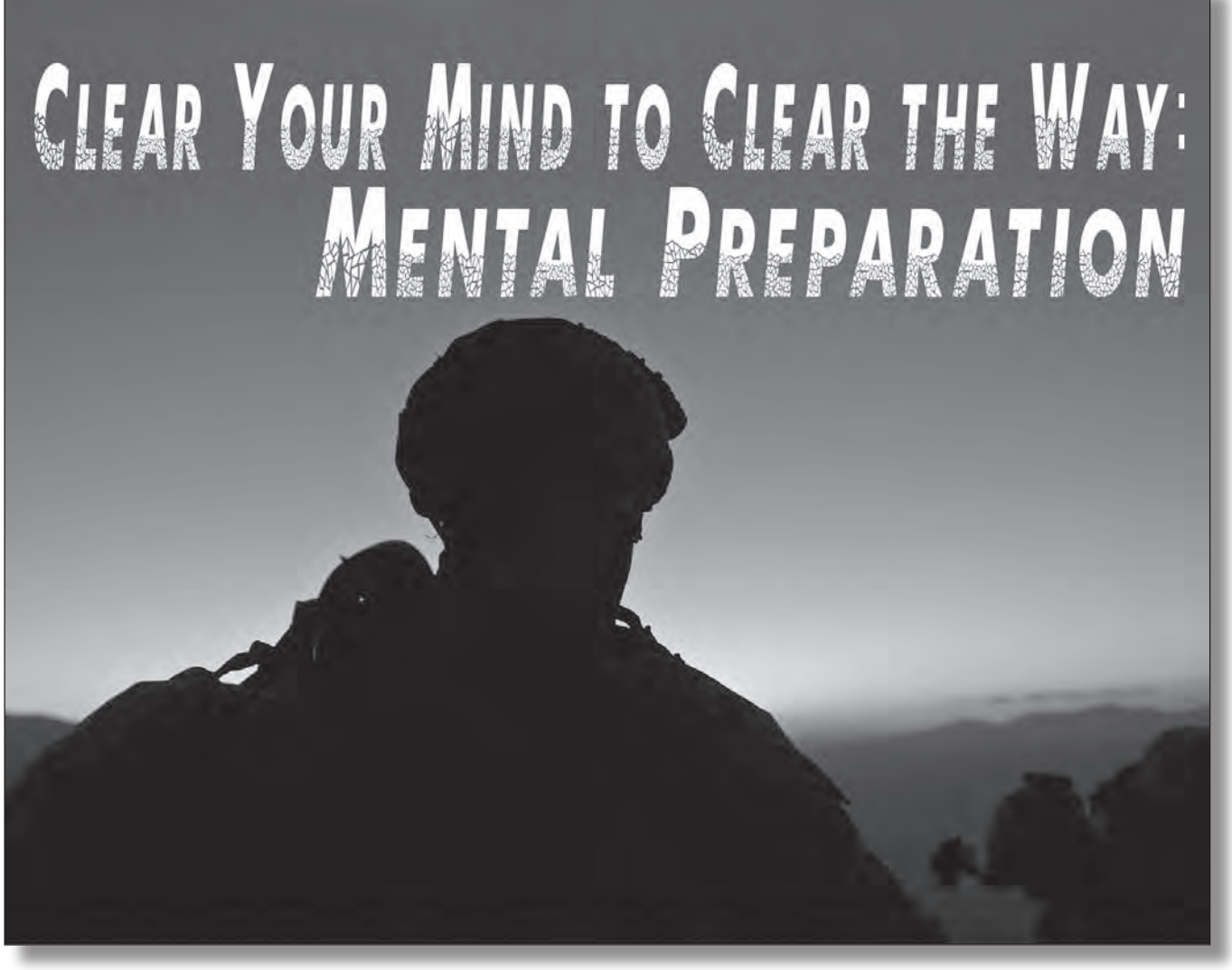
Reference:

FM 3-34.342, *Military Nonstandard Fixed Bridging*, 12 February 2002.

First Lieutenant Russell is a platoon leader for the 56th Engineer Company, 6th Engineer Battalion (Combat) (Airborne) at Joint Base Elmendorf-Richardson, Alaska. He served as the officer in charge of the team that constructed an ice bridge over the Delta River in February 2011. He is a graduate of the Engineer Basic Officer Leadership Course and holds a bachelor's degree in history from Texas A&M University.

Lieutenant Colonel Hoffmeister is the commander of the 6th Engineer Battalion (Combat) (Airborne). He holds a bachelor's degree in aerospace engineering from the U.S. Military Academy, a master's degree in engineering management from the University of Missouri–Rolla (now Missouri University of Science and Technology), and is a registered civil professional engineer. He is also a graduate of the Army Command and General Staff College, the Joint Combined Warfare School, and the Engineer Officer Basic and Advanced Courses.

Clear Your Mind to Clear the Way: Mental Preparation



By Major Travis S. Tilman, Dr. Ken Ravizza, and Dr. Traci Statler

Engineer route clearance missions require hours of planning and preparation. Some of this preparation occurs each time a unit gets a mission and is part of the standing operating procedure or troop leading procedures. Some of the preparation is role-dependent: a .50-caliber gunner must check headspace and timing, a robot operator must check the functionality of the cameras on the robot, a squad leader must ensure that his squad has adequate water and food, and a Buffalo driver must conduct operator level preventive maintenance checks and services. Each member of a route clearance team is responsible for a different task to prepare for each mission. However, the one aspect of preparation that is easily overlooked when there are so many other tasks to complete is individual mental preparation—the ways that team members prepare themselves mentally to be in the right mind-set before leaving the base. The purpose of this article is to help Soldiers develop a mental preparation routine, integrate it into mission preparation, and consistently establish the right mind-set as they leave base to clear routes.

A Soldier may have many things on his mind before leaving the base that could prevent him from being completely focused on the mission. However, he cannot afford to wait until his team gets several kilometers down the road to set aside personal problems and be ready to search for improvised explosive devices (IEDs). Personal concerns may not be easily left behind. Route clearance missions can be very boring, and news from home can interfere with focusing on the road or the enemy. During the mission, it is important to recognize when these thoughts become distractions and to deal with them using a refocus plan. (See "Clear Your Mind to Clear the Way: Managing the Moment," *Engineer,* January–April 2011.) Many elite athletes have learned to use a mental preparation routine to help eliminate distractions before a performance so that they can focus when they step into the arena.

The following is an example from baseball legend Hank Aaron. The interview comes from *Heads-Up Baseball,* by Ken Ravizza.

Question: *You mentioned coming to the park and "focusing." What does that mean to you?*

Aaron: *That means tuning out everything else. You get to the ballpark sometimes and you see three or four guys sitting around the corner playing cards, you see somebody over in the corner talking on the telephone; anything other than taking the time to focus in on what they have to do. When you get to the ballpark, you ought to be able to get yourself in tune to knowing who the pitcher is that you're going to face. It's kind of like taking a harness and putting it*

An effective mental preparation routine is a way to transform from the normal, everyday self into a mentally focused and prepared warrior.

on a horse and letting him look nowhere but straight ahead. If you concentrate, and start thinking about what you're doing, consistently, you're going to automatically become a better hitter. That's what separates the guy that's going to hit .300 from the guy that's going to hit .270.

Question: *You were amazingly consistent over an incredible number of years. To what would you attribute that?*

Aaron: *The same that we're talking about. I think my ability to focus was a lot different than the average guy's. A lot of guys would be distracted by different things. I was totally in tune with what I was doing. I was involved with a lot of things—I went through divorce, I went through having a child die, I went through the home run record—but as soon as I got to the ballpark, my focus would always change. A lot of people used to carry things on the field, but for some reason, once I put that uniform on, or once I walked into that clubhouse, no matter what happened at home, I could totally get focused. I could focus in on pitchers and what I had to do.*

While Hank Aaron was not dealing with a combat situation, he was dealing with performing under a great deal of pressure. Besides what was stated in the conversation above, he was also dealing with being an African-American pioneer in a sport where many white fans did not want him to succeed in breaking Babe Ruth's home run record. However, he learned to mentally prepare himself for each game upon arriving at the ballpark. He did not wait until something significant happened in the game or when it was his turn to bat; he began preparing when he got to the ballpark. An effective mental preparation routine helps Soldiers get ready for action in the same way as precombat checks, standing operating procedures, preventive maintenance checks and services, and troop leading procedures. It provides a funneling effect to help eliminate distractions, establish consistency, promote focus, and increase self-confidence.

A Successful Past Mission

Just as history teaches the lessons of the past, personal experiences are helpful to improve performance. Soldiers should close their eyes, take a few deep breaths, and think back to a past training or combat mission where they were completely locked in and focused on finding IEDs. If they haven't had that experience, they should think of the best mission they've had. It might be a weapons range or some other time when they were really focused. They should think back to the way they prepared for that mission and try to answer the following questions:

- What were you thinking?
- What were you doing?
- How was your focus?

Transformation

An effective mental preparation routine is a way to transform from the normal, everyday self into a mentally focused and prepared warrior. There are many ways to do this. Some Soldiers may focus by listening to a certain type of music. Others may gain confidence and focus as they put on their uniform and personal protective gear. Think of Sylvester Stallone as Rambo—tying his laces, putting on his bandana, and firmly sheathing his knife. Watch the film *Gladiator* and note when Russell Crowe as Maximus picks up and rubs a handful of sand, signaling that he is prepared to fight. The moment of putting on body armor, a helmet, and gloves can serve as a signal of readiness—physical and mental—for the mission. Some Soldiers may clean their weapons before a mission because it helps them to prepare mentally. Some may make up their bunks to signal their transformation. There is no right or wrong answer as long as the routine is purposeful and consistent. What signifies your transformation to a focused and prepared warrior?

Start of a Mission

Hank Aaron began his mental preparation as soon as he got to the ballpark. Many elite athletes begin their mental preparation when they enter the locker room and do not end it until they are committed and ready to perform. This might be when they tie the final knot in their shoelaces, when they walk out of the locker room, or when they step onto the playing field. Routines differ for each athlete, but they consistently use their routines in practice and during competition. A Soldier's mental preparation for a mission might begin the moment he receives a warning order or the minute he wakes up before a routine mission. However, it ***should not*** begin just when the Soldier is leaving the base or he will not be mentally prepared.

End of a Mission

At the earliest, a mission does not end until the vehicles are back online, with fuel tanks topped off. It does not end 400 meters before the gate; the enemy is watching and waiting for Soldiers to let down their guard. Similarly, the mission does not end as Soldiers lay

in bed trying to sleep. There must be a point of transition from a mission to a resting phase or to the next mission. A good point to use is the after action review. These reviews are vital because they allow Soldiers to capture and process the lessons learned while they are risking their lives on a combat mission. A journal of personal lessons learned can serve as a transition point to end the previous mission and provide an outlet for frustrations or anger. Writing down these emotions on paper can help keep them from building up over a deployment and growing into sizeable distractions. However, a journal should also include the good things that happen. Reflecting on positive outcomes can help the writer recognize what needs to be done to get similar results in the future. Also, security concerns should be considered by anyone keeping a journal.

Personal Mental Preparation Routine

Figure 1 shows how the mental preparation routine funnels into and connects a Soldier with the mission. It is designed to eliminate distractions and allow focus on the mission. It includes events inherent in troop leading procedures and mental preparation. The following are items that might be included when developing a routine:

Before:

- Conduct 5 or 10 minutes of controlled, slow, deep breathing to help clear your mind, focus on the present moment, and relax.
- Study maps of the route and alternate routes. Visualize traveling the roads. Identify potential IED and enemy ambush sites. Ask what other problems could occur along the routes.
- Reflect on personal missions. Why does the Soldier risk his life? Is it to ensure that medical supplies get to a small village? Is to allow coalition forces to safely reach an objective so that they can defeat enemy forces?
- Choose a focal point or something very small that requires genuine concentration to see. The focal point is helpful in pulling the mind to the present moment and can help in refocusing amidst chaos.

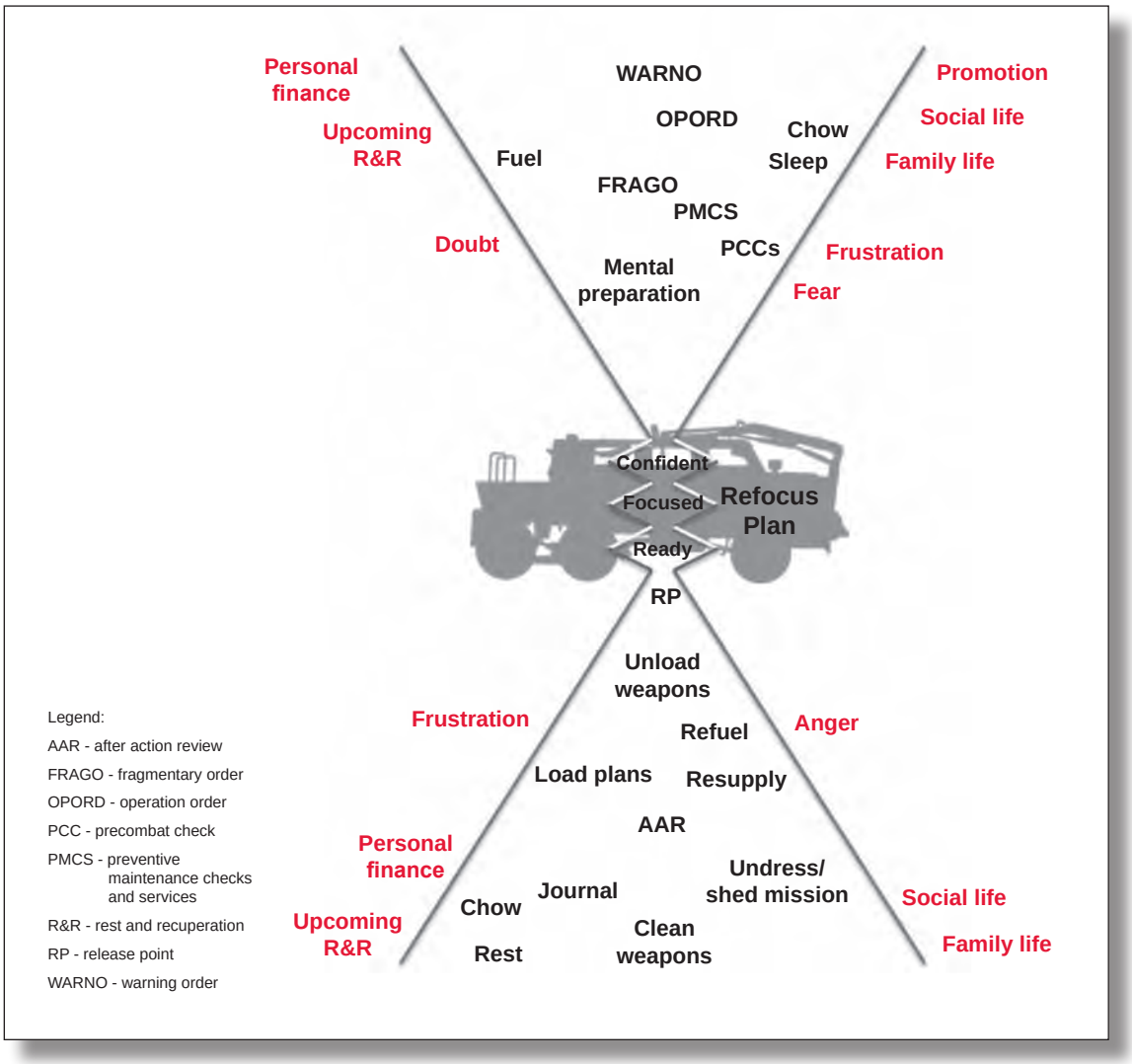


Figure 1

After:

- Prepare an after action review to capture the lessons learned so that there can be future improvement.
- Write in a journal to help mentally "let go" of the mission. Writing is a powerful tool to release strong emotions.
- Fully take off the uniform and "shed" the mission at the same time. A mission should not be carried to bedtime or to the next mission.

Use Figure 2 to develop a personal mental preparation routine. Write specific actions to take to mentally prepare. Having created a routine, learn it, know it, and use it. Use it during training and before rehearsals. Adjust it and refine it to meet the realities of the current situation. It may be desirable to have one mental preparation routine for missions with advanced warning and another, shorter routine for short-notice missions.

A mental preparation routine does not guarantee success, but it allows Soldiers to occupy the right mind-set and achieve success more often. Create a routine, practice it, and adjust it as needed. Soon it will become an integral part of mission preparation and allow you to be focused and confident as you leave the base. Even if the mental preparation routine allows you to find just one more IED per month, it will be worth it.

Major Tilman is an instructor at West Point's Center for Enhanced Performance. He commanded Company E, 1st Battalion, 12th Cavalry Regiment during Operation Iraqi Freedom. He is a West Point graduate and holds a master's degree from California State University, Fullerton.

Dr. Ravizza is a professor of kinesiology at California State University, Fullerton. He is the coauthor of Head's Up Baseball *and a sport psychology consultant for USA Volleyball and the Tampa Bay Rays baseball team. He has consulted with numerous collegiate, Olympic, and professional teams and athletes over the past 30 years.*

Dr. Statler is an assistant professor of applied sport psychology at California State University, Fullerton and is a consultant to a variety of collegiate, Olympic, professional, and individual athletes.

References

Major Travis S. Tilman, Dr. Ken Ravizza, and Dr. Traci Statler, "Clear Your Mind to Clear the Way: Managing the Moment," *Engineer,* January-April 2011, pp. 46-49.

Ken Ravizza and Tom Hanson, *Heads Up Baseball,* McGraw-Hill, New York, New York, May 1998.

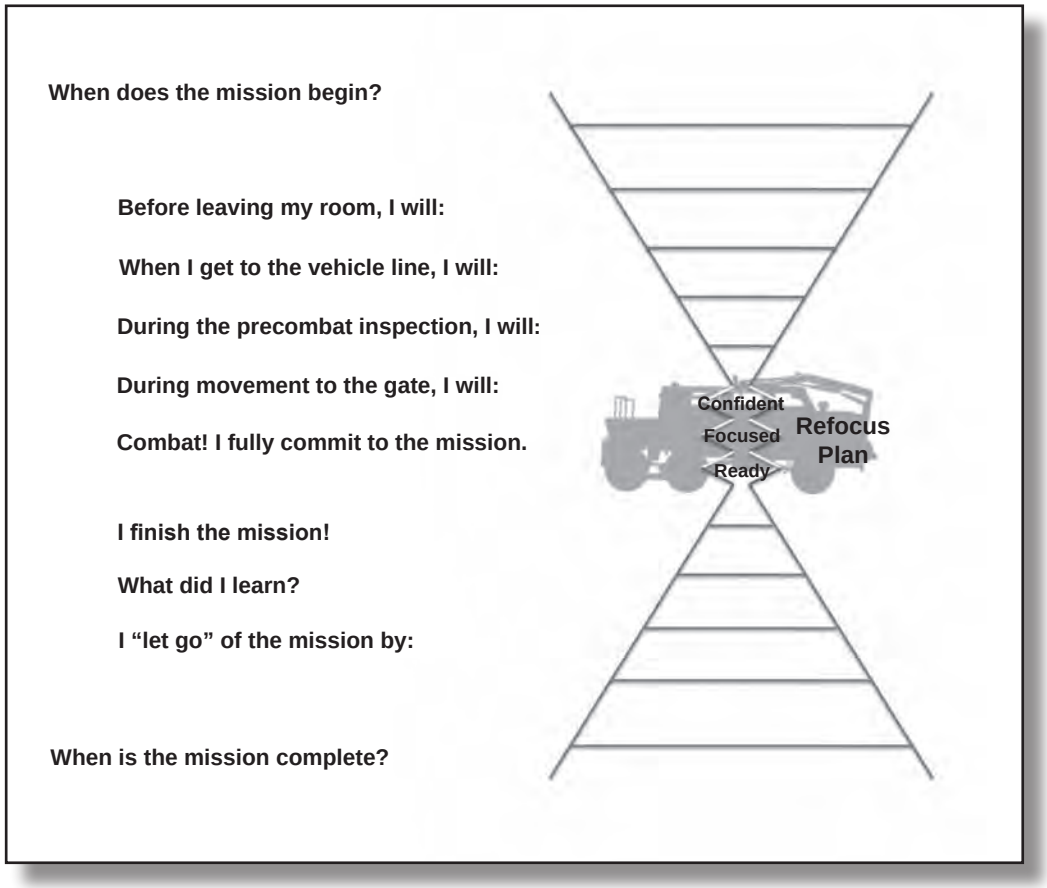


Figure 2



FORT BELVOIR'S ENGINEER REPLACEMENT TRAINING CENTER

By Mr. Gustav Person

Visitors to Fort Belvoir, Virginia, are probably struck by the modern stone buildings that line the main thoroughfares. At the height of World War II, those areas were considerably different. They were home to the Engineer Replacement Training Center (ERTC), located north of the main post, which was formally inaugurated in March 1941 in the ramp-up to America's entry to that conflict. Conscription had been reintroduced in September 1940, and Fort Belvoir was transformed from a sleepy little Army post to a vast training establishment that, at the height of the war, turned out an average of 5,000 trained engineer Soldiers per month. A second ERTC was established at Fort Leonard Wood, Missouri, in May 1941 with cadre from Fort Belvoir; and a third, smaller ERTC was organized at Camp Abbot, Oregon, in the Deschutes National Forest in 1942.

Construction at Fort Belvoir during World War II marked the third major expansion effort in its history. The two previous periods began in 1912 when the War Department acquired the Belvoir peninsula, located on the Potomac River about 18 miles south of Washington, D.C., to train engineer Soldiers stationed at Washington Barracks



Photo courtesy of Fort Belvoir History Office

A wartime postcard shows the ERTC at Fort Belvoir.

(now Fort McNair) during the summer months. The U.S. Army Engineer School at Washington Barracks in the District of Columbia was simply too small for that mission when America entered World War I in 1917. Hundreds of temporary wooden buildings and other structures, lining a central parade/training ground, were quickly built at a new cantonment named Camp Andrew A. Humphreys. The Engineer School was formally transferred to Camp Humphreys in 1919, and the name was officially changed to Fort Humphreys in 1922, reflecting its new status as a permanent Army installation. Between 1926 and 1935, the Army demolished all temporary wooden buildings and replaced them with permanent brick buildings in what is now known as the Historic District. This area also contained modern barrack quadrangles for the two engineer regiments on post. The name changed again in February 1935 when President Franklin D. Roosevelt was persuaded to change the name to Fort Belvoir, to reestablish the post's links to its colonial past.

Replacement Training Center Construction

Twenty-one replacement training centers throughout the United States were scheduled to begin full operation around 15 March 1941. More than 60 projects were due for completion before that April. Construction had to be accomplished in the face of continuing shortages and changing requirements and at a season of the year when outdoor building work was normally suspended. Before 16 December 1941, the responsibility for nonmilitary post construction was vested in the construction division of the U.S. Army Quartermaster Corps. The U.S. Army Corps of Engineers was in charge of fortifications, roads, river and harbor work, and airfield construction; while the Quartermaster Corps was responsible for barracks, stores, and whatever else was required to house the Army. The areas of responsibility were often difficult to delineate; and as early as 1910, proposals were made to consolidate the construction function within one branch, usually the engineers. The constructing quartermaster at each post oversaw construction projects dealing with contractors, ordering materials, putting through change orders, and the many other details involved in ensuring that a job was completed on time and within budget. The Quartermaster Corps was also represented on post by the post quartermaster, who maintained buildings and utilities, fed men and animals, and provided transportation and clothing. The position of constructing quartermaster carried a great deal of responsibility, acting as the direct representative of the Quartermaster General in his principal construction duties. In December 1940, the construction division was directed by Lieutenant Colonel Brehon B. Somervell, who went on to plan and supervise the construction of the Pentagon. The operations branch chief was Colonel Leslie R. Groves, who later supervised the Manhattan Project.

By autumn 1940, the huge construction project was well underway to build "temporary" wooden barracks;

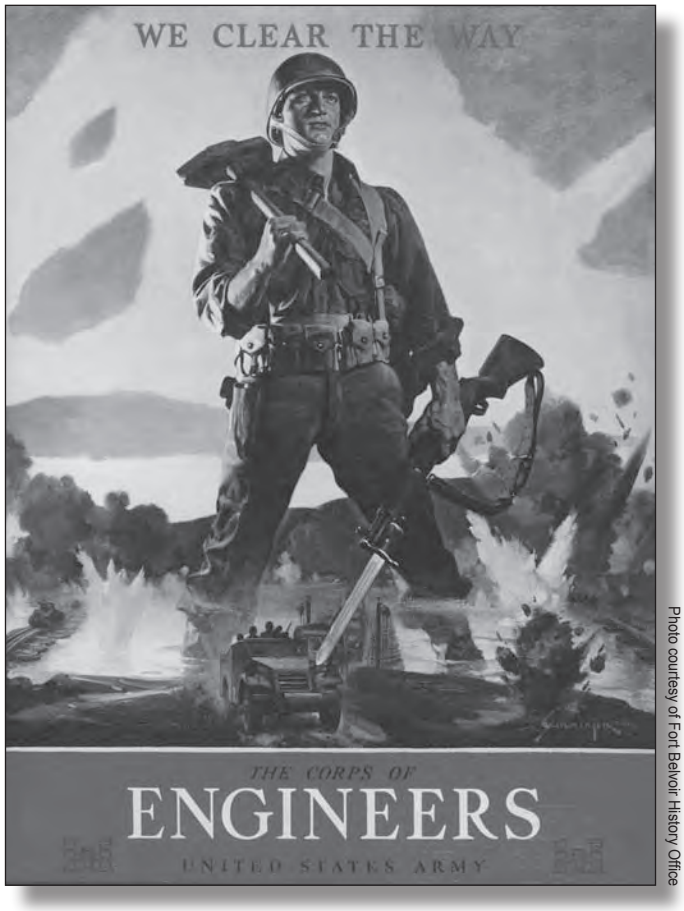


Photo courtesy of Fort Belvoir History Office

This recruiting poster was rendered in 1942 by famed poster artist Jes W. Schlaikjer.

headquarters, training, administration, and supply buildings; service clubs; and chapels at the new center, which had previously been a run-down farm near the main post. The new cantonment would later encompass 300 acres, and the entire Fort Belvoir installation expanded to include 10,000 acres. It was anticipated that the use of these buildings would only last 5 years, or the duration of the war. In fact, many were still in use in the 1980s and 1990s. (The last barracks building was demolished during a training exercise by the post fire department on 14 June 2004.) The site was selected not only because of its proximity to the main post, but also because its terrain was suited to all types of engineer training. All training facilities were within 2 miles of the cantonment area, except the combat firing range, which was about 4 miles away.

During this time, the U.S. War Department experienced considerable disputes with manufacturers due to its decision to build perishable wooden-frame buildings, rather than investing in permanent buildings of brick and tile. Makers of concrete and cinder blocks, cement siding, structural steel, and asbestos sheeting took up the cry for less restrictive designs. The bricklayers' union demanded work for its members. Congressmen asked the Army to reconsider. The typical barracks building was considered significant because of the new technologies employed, including the standardization of plans, prefabrication of



Photo courtesy of Office of History, Corps of Engineers

Lieutenant Colonel William M. Hoge served as first commander of the ERTC.

units, and an assembly line approach to production. The design for the enlisted men's barracks was developed during the 1930s by Works Progress (later Work Projects) Administration architects and draftsmen as part of a project to update the World War I cantonment plans. They were built of wood because ". . . American experience held that a war period was always a temporary period." These barracks were rectangular buildings, measuring 30 by 80 feet, with two stories, nine bays, and asphalt shingle-covered side gable roofs with projecting eaves. Each building covered a masonry foundation and included a single detached exterior side chimney. There were first- and second-floor entry porches in the gable end and dual side entries with entry porches. In addition to the barracks buildings, each complex included day rooms, organizational storehouses, and battalion storage buildings. Barracks buildings were designed to house 63- and 74-man units. A later type, designated "Modified Theater of Operations Type Construction," was adopted by the spring of 1942 as the shortages of materials began to be severely felt.

In all, 253 buildings were constructed in the ERTC, including 163 barracks buildings and 36 mess halls. Miles of roadways were paved to provide access to the complex. Most mess halls were designed to feed 1,000 Soldiers at each meal. In off-duty hours, Soldiers could visit two service clubs and four theaters. Entertainment facilities were later expanded to 11 recreation halls, although blacks and whites used separate facilities. During the first week of December 1941, engineer Soldiers began work on a large amphitheater in the center of the ERTC that could seat 6,250 Soldiers for shows, outdoor entertainment, and open-air classes. It was originally planned for new trainees to work on this project as part of their engineer training. A smaller amphitheater, seating 3,000 Soldiers, was also constructed. The new hospital incorporated 36 barracks type buildings and remained the station hospital until 1957. That site is now occupied by the post exchange and commissary.

By April 1943, most construction had been completed. At that time, Major General Eugene Reybold, Chief of Engineers, told officer candidates, "The mission of the Army's Corps of Engineers is developing with the progress of our attack. We are finishing up the biggest job of emergency construction the United States has ever seen. Now we're moving on to a job of construction overseas. . . . We've got a date with a certain paperhanger, and an engineer keeps his appointments."

Engineer Training

By mid-December 1940, a cadre had formed and the Engineer School appointed Lieutenant Colonel William M. Hoge as the first commanding officer of the ERTC. Hoge was a rising star within the Army. During his tour of duty there, he designed an obstacle course (popularly known as a "steeplechase for Soldiers") for military and physical fitness training, which later became the standard for all other training facilities within the Army. He served at Fort Belvoir until February 1942. In March 1944, Hoge was given command of the Provisional Engineer Special Brigade Group, which included two engineer special brigades. On 6 June 1944, Hoge's command played a significant part in securing the beachhead at Omaha Beach in Normandy; and he remained in command of the beachhead until July. Hoge was later appointed to command Combat Command B of the 9th Armored Division, which successfully defended St. Vith during the Battle of the Bulge. On 7 March 1945, the leading elements of his command seized the Ludendorff Railroad Bridge over the Rhine River at Remagen. After the war, he commanded the Engineer Center at Fort Belvoir from January 1946 to June 1948.

Activity was intense at the ERTC in early 1941 as the cadre organized headquarters, groups, battalions, and companies. The first group of 250 trainees arrived from the Replacement Center at Fort Lee, Virginia, on 17 March 1941. Thousands of workmen labored at landscaping, paving roads, laying sidewalks, and painting barracks; and the job of training Soldiers as fillers for units being organized for war began without delay. Fort Belvoir's total population expanded rapidly; and by November 1942, 30,260 personnel were assigned to the post. Eventually, the ERTC was to contain a headquarters company, a truck motor company, and three engineer training groups, totaling 10 battalions. Each battalion had four companies, each company had three platoons, and each platoon had

three squads. The basis for the assignment of trainees was 880 men per battalion, or a total capacity of 8,800 in the 10 battalions. Three battalions were composed of African-Americans with white officers and senior noncommissioned officers.

Nearby were sites for demolitions, field fortifications, roads, obstacles, weapons training areas, and fixed and floating bridges. Heavy engineer equipment, machines, and pontoon boats poured in. Between March 1942 and March 1943—

- 120 bridges were constructed.
- 400 timber obstacles were erected.
- 36 antitank ditches were dug.
- More than 200,000 yards of barbed wire were used to construct field fortifications.

For floating bridge training, a 2,000-foot channel was dredged so that six companies could train simultaneously. Accotink Creek, on the west side of the Belvoir peninsula, could accommodate four steel bridges, 16 wooden trestle bridges, and 48 foot bridges at one time. Bailey bridge training followed the final adoption of the bridge in February 1943.

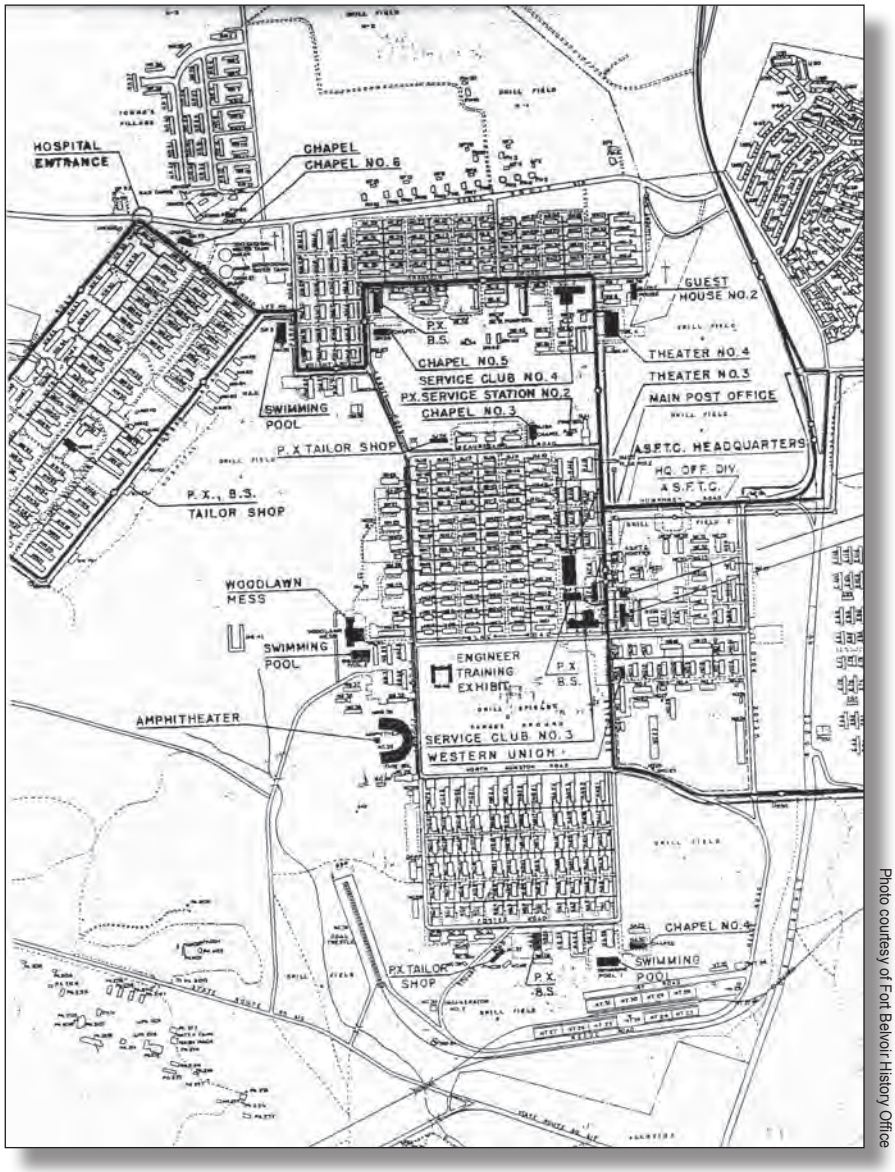


Photo courtesy of Fort Belvoir History Office

The large group of buildings in the center of this 1946 map is the ERTC.

In March 1941, a 12-week basic and advanced training course was organized. The course covered 40 engineer-related subjects. For 7 of the 12 weeks, engineer recruits combined technical with tactical instruction. Trainees learned the elements of reconnaissance; coordination with larger groups; and building fixed and floating bridges, roads, and obstacles. After the attack on Pearl Harbor, the course was shortened to 8 weeks; but in March 1942, it resumed the original length. For many of the Soldiers, this was the only training they received before arriving at a combat theater. By August 1943, the training cycle had been further expanded to 17 weeks and was designed to produce adequately trained specialists and nonspecialists.

By the time Brigadier General Lehman W. Miller assumed command on 2 July 1942, the need for trained specialists had reached emergency levels. It was also necessary to form separate schools to train Soldiers as clerks, equipment operators, carpenters, cooks, and other specialists. The Corps of Engineers actually required 727 occupational specialists per 1,000 troops. Selected trainees, who were closely screened at the reception station, soon began a course involving 4 weeks of basic training and 1 week of studying technical engineer subjects before assignment to a specialist school at Fort Belvoir or a civilian institution. One company from each of seven training battalions became a specialist company, training buglers, truck drivers, messengers, clerks, mess sergeants, cooks, or bakers.

In the spring of 1943, ERTC's emphasis shifted from furnishing fillers for new units to replacing battle casualties. Soldiers normally trained Monday through Friday and a half-day on Saturday. Higher headquarters required that all replacements must "so far as practicable . . . be subjected during training to every sight, sound and sensation of battle." Realistic conditions included live ammunition, land mines, and night bridging exercises. Experiences in North Africa called for more tanks to add realism and to test bridges and obstacles. Instructors also placed greater emphasis on building physical endurance.

Soldiers soon began training at locations off post such as the Blue Ridge Mountains near Luray, Virginia, where



Photo by Marny Malin

The ampitheater, built in 1942 by engineer trainees, is the only surviving ERTC structure.

Soldiers lived and trained for 3 weeks in the field under simulated combat conditions. Later on, this training moved to Fort A.P. Hill, southeast of Fredericksburg, Virginia. This training culminated in a 20-mile road march. Each Soldier carried a rifle, carbine, or pistol; field jacket; helmet; canvas leggings; gas mask; and cartridge belt with a first aid pack, canteen, and light pack.

Spring 1942 had brought a reorganization of the Army. The Services of Supply, a new command, assumed control of the Corps of Engineers except in matters of civil works. In April 1944, all training centers became known as Army Service Training Centers, with the added mission of training for extended field service. A noncommissioned officer leadership course was also developed.



The black lion on the ERTC distinctive unit insignia was from the coat of arms of the Fairfax family, who originally owned the land where Fort Belvoir stands. The family motto on the scroll, "FARE FAC," means "We teach by doing."

After V-J Day ended World War II, the ERTC established a separation point to assist veterans returning to civil life. Some training of replacements continued for occupation forces, but deactivation orders followed in December 1946. During the 5 years of its existence, the ERTC trained 147,000 engineer Soldiers. An additional 22,000 new second lieutenants were trained and commissioned at the post's officer candidate school.

The ERTC remained dormant until the advent of the Korean conflict, when it was reactivated in August 1950 under the command of Brigadier General Albert C. Lieber. The first trainees arrived on 12 September 1950 to begin an intensive 6-week cycle. Later the training program was lengthened to 16 weeks—8 weeks of infantry basic and 8 weeks of advanced engineering training. The ERTC had a headquarters battalion and four engineer training battalions, with at least 18 consecutively numbered companies. Five specialist courses in masonry, carpentry, plumbing, electricity, and air compression operation gave 2,000 trainees skills that they could use in military and civilian careers. In its 3 years of existence in this second iteration, the ERTC trained more than 37,000 Soldiers before closing down again on 31 December 1953.

Mr. Person is the installation historian at Fort Belvoir, Virginia. He retired from the New York State Division of Parole after 30 years of service and is a retired lieutenant colonel from the New York Army National Guard. He holds a master's degree in history from Queens College, City University of New York.

News From USACE

Army Geospatial Center Launches New Online Version of Common Map Background

The U.S. Army Geospatial Center launched a faster, feature-rich version of Common Map Background (CMB) Online earlier this year. CMB Online is a geospatial data discovery and ordering program that allows customers to search, download, and order geospatial data using a simple, Web-based "shopping cart" interface. A common access card is required to access the data at <*https://agcwfs.agc.army.mil/CMB_Online /default.aspx*>.

The latest version of CMB Online performs faster than the previous iteration and offers several new features to users, including additional easy-to-change map bases, a scale display, and a coordinate display via latitude/longitude decimal degrees and the Military Grid Reference System. U.S. Army Geospatial Center officials say that CMB Online dramatically reduces the time and expense required for field users to acquire, manage, and load or import compact discs of geospatial data pertinent to their areas of operations.

Products available range from map and image datasets of small areas of interest to larger country or command datasets. Customers can place requests through the Web site; by e-mail at <*DLL-AGC-cmb@usace.army.mil*>, <*theresa.h.rasmussen@usace.army.mil*>, or <*cmb@tec.army.smil.mil*>; or by telephone at commercial (703) 428-7889 or DSN 364-7889. CMB analysts receive requests from a multitude of agencies, including U.S. Army Corps of Engineers district offices, Army topographic units overseas, and troops preparing for deployment. For more information about the CMB program, visit <*http://www.agc.army.mil/fact_sheet/CMB.pdf* >.

The U.S. Army Geospatial Center coordinates, integrates, and synchronizes geospatial information requirements and standards across the Army, develops and fields geospatial enterprise-enabled systems and capabilities to the Army and Department of Defense, and provides direct geospatial support and products to warfighters. To learn more about the center, visit <*www.agc.army.mil*>.

Terror in Afghanistan Map Published

A map by a U.S. Army Geospatial Center cartographer is featured in the annual "Map Book" published by Environmental Systems Research Institute, Incorporated.® The book is dedicated to acknowledging the accomplishments of geographic information system users around the world.

Mr. Stephen Benzek's two-page map examines civilian casualties due to acts of terrorism in Afghanistan from 2004 to 2009. Its style was derived from newspaper and propaganda maps from the 1930s and early 1940s. The author was inspired to use geographic information system software to simulate these old styles in depicting a contemporary conflict after browsing old maps at the Library of Congress. The diverse terrain of Afghanistan is represented in a hand-drawn style by applying dots to contour lines that are easily created from digital elevation data.

Benzek said he decided to create a map of civilian casualties in Afghanistan rather than Iraq because military operations in Iraq were beginning to wind down, while operations in Afghanistan had just ramped up in 2010. He said that a future map might compare reported civilian terrorism casualties in both countries over time to see how they differ, particularly when compared to the tempo of ongoing military operations.

To view the map, go to <*http://www.esri.com/mapmuseum/mapbook_gallery/volume26/defense-and-military /defense-and-military-2.html*>.









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