ENGINEER

The Professional Bulletin of Army Engineers

January-April 2010



Headquarters, Department of the Army
PB 5-10-1 Approved for public release, distribution is unlimited.

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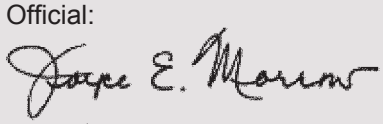
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Engineer (ISSN 0046-1989) is published three times a year by the United States Army Engineer School and the MSCoE Directorate of Training, 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926. Periodicals postage is paid at Fort Leonard Wood, Missouri, and additional mailing offices.

POSTMASTER: Send address changes to MSCoE Directorate of Training, ATTN: ATZT-TDS-BS (Engineer), 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926.

CORRESPONDENCE, letters to the editor, manuscripts, photographs, official unit requests to receive copies, and unit address changes should be sent to *Engineer* at the preceding address. Telephone: (573) 563-4104, DSN 676-4104; e-mail address: *<leon.engineer@conus.army.mil>*; Internet home page: *<http://www.wood.army.mil/engrmag/default.htm>*.

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OFFICIAL DISTRIBUTION is targeted to all engineer and engineer-related units.

PERSONAL SUBSCRIPTIONS are available for $24.00 ($33.60 foreign) per year by contacting the U.S. Government Printing Office, P.O. Box 979050, St. Louis, Missouri 63197-9000.

ADDRESS CHANGES for personal subscriptions should be sent to the Superintendent of Documents, P.O. Box 979050, St. Louis, Missouri 63197-9000.

ENGINEER

The Professional Bulletin of Army Engineers

Volume 40 PB 5-10-1 | Headquarters, Department of the Army | *January-April 2010*

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Front cover: ENFORCE 2010 and Beyond

Back cover: Clockwise: U.S. Army divers in Port-au-Prince, Haiti; Hyex fills Hesco, Victory Base Complex; construction at Al Anbar Province, Iraq; and Soldier and military working dog, Dura'iya, Iraq.

DEPARTMENTS

2 **Clear the Way**
By Brigadier General Bryan G. Watson

3 **Lead the Way**
By Command Sergeant Major Robert J. Wells

4 **Show the Way**
By Chief Warrant Officer Five Robert K. Lamphear

5 **Dedication**

5 **Proposed Fallen Engineers Memorial**

39 **The Engineer Writer's Guide**

53 **Subscription Order Form**

FEATURES

6 **ENFORCE Campaign Plan Work Groups**
By Mr. Michael A. Dascanio

8 **Army Engineer Association: The Engineer Regiment's Lifetime Network**
By Colonel Jack O'Neill (Retired)

10 **Adapting the Army: Institutionalizing Counter-IED Training Efforts**
By Mr. Dorian D'Aria and Mrs. Tahnee L. Moore

14 **Strengthening the Regiment: Training and Readiness Authority–Plus**
By Lieutenant Colonel Diana M. Holland

18 **Engineers Build Capacity in Stability Operations**
By Colonel Jeffrey R. Eckstein

21 **Army Training Support Enterprise: A New Paradigm for Training Support**
By Ms. Deborah O. Billups

23 **Army Reserve Update**
By Colonel Jose E. Cepeda

25 **Multitasking Under Fire**
By Captain Daniel J. Lucitt

28 **The Brigade Engineer**
By Major Gerald S. Law

32 **National Guard Solar Power Projects**
By Dr. JoAnne Castagna

34 **Joint Engineer Operations Course**
By Lieutenant Colonel Shawn P. Howley (Retired) and Mr. Michael A. Dascanio

36 **The GeoPDF Project: Creating Maps for the Non-Mapper**
By Mr. Raymond G. Caputo

38 **Welcome Addition: 210A Warrant Officers in Modular Engineer Companies**
By Captain John A. Dills III

40 **USACE Projects Impact Iraq's Environment**
By Mr. Ronald A. Reeves and Mr. Scott D. Harris

42 **Engineer Doctrine Update**

44 **Route Reconnaissance and Clearance: A Marine Aircraft Wing Future Capability**
By Major Nick I. Brown and Major Taylor P. White

48 **Battle of Dara**
By Captain Andrew J. Dornstadter

51 **Transformation in Korea**
By Major Rafael Pazos and Captain Miguel Uc

Clear The Way

Brigadier General Bryan G. Watson
Commandant, United States Army Engineer School

ENFORCE 2010 – Three Major Themes



More than any time in our history, today our Engineer Regiment is composed of a great depth of combat experience, a wide breadth of applied engineering savvy, and an incredible force of innovative Soldiers—particularly our young leaders. Equally historic, today's engineer operations around the world—from Iraq and Afghanistan to Haiti, and from Korea to the Horn of Africa—require greater partnering of engineers across nations and Services. Further, we are at a pivotal time in our history as a Regiment—solidifying the enduring lessons learned from nine years of combat and applying them to the challenges we face in the next decade of persistent conflict.

As such, there are three major themes for this year's ENFORCE. Allow me to elaborate on these themes and highlight a few key events:

Theme #1 – Gaining Sage Wisdom From Our Young Leaders. One of the features of this year's ENFORCE is an emphasis on giving young leaders a louder voice and getting their advice and counsel on the future. For example, our Warfighter Forum will consist of young officers, warrants, and NCOs who have served at platoon, company, and battalion level—telling senior leaders, and others, their views—from lessons learned to what future capabilities are needed. Our Industry Forum will follow suit, allowing junior leaders to tell our partners in industry what equipment works, what doesn't, and what they need to prosecute the fight. We will also have two keynote speakers—one senior leader and one junior leader—each bringing personal experience, insight, and perspective to our discussion of the future. In keeping with this theme, I've asked brigade and battalion commanders across all components to send junior leaders to ENFORCE—officers, warrants, and NCOs—to participate and take back to their units their view of where the Regiment is going.

Theme #2 – Expanding Engineer Partnerships as a Forethought. This year we will cast a wide net for international and sister Service engineer participation in order to openly discuss and collaborate on the challenges we must face together…as a community of engineers. Nearly all forums and workgroups will be inclusive rather than exclusive for our international engineers, both in content and classification. We will build on our strong partnership with the engineers of our sister Services, exploring ways to advance our integration and complementary interdependence. Seminar venues will allow all of our partners the opportunity to discuss their view of the challenges in specific regions.

Theme #3 – Checking Our Campaign Plan Azimuth and Pace Count. At last year's ENFORCE, we laid out the foundation of a campaign plan for the future that was the subject of debate among senior leaders. The Regimental Headquarters and School have worked hard to put some meat on the vision we established. I will provide the Regiment an update on the campaign plan, and we will use the breakout sessions—attended by the full range of conference participants—to confirm, deny, or adjust our decisive points to ensure that we remain a Regiment that is able to meet the Army's demands.

Continuing to Build Great Engineers. Our experience in nine years of combat has reinforced—again—that Army engineers must be warriors always…and technically proficient in applied engineering. When the commander calls, we must have the skills necessary to solve his problems and the warrior ethos necessary to deliver results on the battlefield…under the toughest conditions. ENFORCE will provide a number of professional development seminars designed to discuss some of the latest construction management techniques and best practices, provide attendees with updates on the latest TTP used in-theater as part of the C-IED fight, get a refresher in geospatial engineering, and many other subjects. Some seminars will even offer the opportunity for professional accreditation. All the while, we will gather as a tribe to celebrate our honored heritage and pay tribute to some among our ranks whose service epitomizes our calling to solve the commander's problems and serve with excellence.

Finally, we will celebrate the rich heritage that is our Engineer Regiment. As in the past, we herald the winners of the Best Sapper Competition and pay tribute to the small units and junior leaders who will receive Regimental Association Awards. We will take a special moment to recognize our Fallen Engineers and highlight our vision of a Fallen Engineer Memorial to be set in red Missouri granite in the Engineer Memorial Grove—the headwaters of our Regiment. Of course, we will also revel in the company of fellow tribesmen—our great family of engineers—at the Engineer Ball.

It will be a spectacular week! I look forward to continuing the professional debate that will set the course of the future. I encourage you to attend if possible…and to be with us in spirit if you cannot.

Lead to Serve. Essayons!

Lead The Way

Command Sergeant Major Robert J. Wells
United States Army Engineer School



There are more than 74,000 enlisted engineers in the Army, and every one of them should have a voice at our yearly conference. I hope to see a large turnout of enlisted engineer leaders at ENFORCE 2010. It's a great opportunity to rekindle old friendships and create new ones. Our experiences over the past nine years have transformed a Regiment that focused on major combat operations to a Regiment that operates on a battlefield without an easily recognizable enemy. The training and preparation of our formations is just as complicated when you account for the variety of missions required of an engineer and the short amount of time we have to prepare for the next deployment. There's no better place to discuss these issues with engineer leaders from across the Regiment than at ENFORCE.

The Regiment recognizes that it's that time to institute counter-improvised explosive device (C-IED) training—beginning with basic combat training and continuing to the Sergeants Major Academy—and the same goes for warrant officer and officer training. We will have started C-IED training by the time you get to ENFORCE, and I hope you'll take time to observe what we're doing for young engineers. This is a big shift in what we require of young Soldiers during basic combat training. Observing their surroundings and reporting anomalies isn't something they are used to doing, especially when they're marching from one training event to another. Then, their only concern is staying no more than 5 meters behind the Soldier in front of them. Young Soldiers tend to shut out everything when doing routine tasks like conducting a movement, where they should be treating it like a movement to contact. The attention to detail outside the wire should be at, or above, the same level of concentration they devote to playing a video game. Soldiers should be completely absorbed in the environment. Every minute outside the wire is an opportunity to gather intelligence and save lives.

We have an imbalance of C-IED proficiency in the NCO Corps. Standardizing certain individual and collective tasks as the baseline standard will give NCOs a good foundation to implement C-IED training in units. We'll tackle the tasks required of an engineer leader in support of C-IED operations—from intelligence, surveillance, and reconnaissance (ISR) requirements to vehicle recovery. This year we'll start defining the responsibilities of first sergeants to platoons and how they can leverage battalion support systems.

Robots are here to stay. I'd argue that light fighters need robots just as much as, if not more than, mounted Soldiers. Robots should be thought of in the same context as any breaching equipment. Ask yourself which you would choose if given a choice of investigating an active explosive device with a robot or with Sapper Wells. Sapper Wells would definitely choose the robot.

The Army's College of the American Soldier (CAS) is a great program for engineers seeking to complete their college degree. SGM William Bennett, at the Engineer School's Directorate of Training and Leader Development, has led the Regiment's efforts to leverage a pure, online degree program with Touro University specifically tailored for engineer Soldiers fighting in full spectrum operations. The CAS program will ensure that Soldiers are not tied to a specific satellite college or university and won't PCS and find out that the school doesn't have a local office, thereby requiring that they change schools and perhaps lose some of the credits they have earned. With the CAS program, they'll be able to complete their degree anywhere—Fort Bragg, Hawaii, Korea, Jalalabad, or Mosul.

Our partners in industry will be at ENFORCE, displaying either new or prototype equipment. Attending the conference will give Soldiers the chance to make a difference in the design or construction of future engineer equipment.

It looks as if our Regiment will offer one of the strongest fields for this year's Best Sapper Competition. It's a great competition, and we hope to broadcast it for our deployed engineers to enjoy. Sappers in training should not expect exactly the same events as last year, since the competition, as well as the Sapper Leader Course, is continually updating its instruction to maintain relevancy with our formations.

Our fraternal organizations stand proudly behind our efforts in the evolution of the Army Engineer. They are part of our culture—a fraternity of past heroes of the Regiment who have nothing but the best intentions for engineers young and old. Without their support, this annual gathering of the best engineers in the world would not be possible.

The ENFORCE conference is unique in that we look at the past year's accomplishments, recognize heroic engineers, celebrate the lives of fallen engineers, and make plans for future endeavors. I hope to see you there.

Show The Way

Chief Warrant Officer Five Robert K. Lamphear
Regimental Chief Warrant Officer



This year's ENFORCE promises to be one of the best ever held here at Fort Leonard Wood. In addition to receiving a Regimental Campaign Plan update from BG Watson, the Engineer School Commandant, attendees can participate in wide-ranging activities such as Warfighter Forums, professional development seminars on the latest construction management techniques and practices and other subjects, Best Sapper Competition, Regimental Association Award presentations, and equipment displays and attend a special ceremony to recognize our Fallen Engineers. The week concludes with the Engineer Regimental Ball, which is always a hit with our participants. My message to you: If you are the senior engineer warrant officer in your organization, ENFORCE is THE place to be. I look forward to seeing you there.

In addition to the activities listed above, we will hold our second annual Council of Engineer Warrant Officers and recognize the Warrant Officers of the Year for the USAR, ARNG, and Active Army. Our first Council was a great success and led to many of the initiatives recently approved and/or implemented. I am pleased to announce that the Army has approved our proposal to retitle our two warrant officer MOSs to better reflect today's missions. Effective 1 February 2010, our Utilities Operation and Maintenance Technician MOS title changed to Construction Engineering Technician and our Geospatial Information Technician title changed to Geospatial Engineering Technician. TRADOC also approved changes in the Standards of Grades for both 210As and 215Ds to reflect the changes in rank structure in our units due to modularity. TDAs and MTOEs will be changed to reflect the name changes and grade adjustments.

I am pleased to announce that CW4 (R) Jim Flinn has been nominated to serve as the next Honorary Chief Warrant Officer of the Regiment. CW4 (R) Flinn completed his stellar career right here at Fort Leonard Wood, and we look forward to seeing him at this year's ENFORCE and the Regimental Dinner. I want to take this time to personally thank CW5 (R) Jeffrey Popp for his outstanding performance during his tenure as Honorary Chief Warrant Officer of the Regiment. He has represented the Regiment and its members well. The title of Honorary Chief Warrant Officer of the Regiment is one more accomplishment to add to the notable credits for his distinguished career. Thank you, Jeff, for a job well done.

In professional development news, the long-awaited update to DA Pamphlet 600-3, *Commissioned Officer Professional Development and Career Management*, hit the street on 1 February 2010. The pamphlet serves primarily as a professional development guide for all officers. Perhaps most important, it serves as a mentoring tool for leaders at all levels and is an important personnel management guide for assignment officers, proponents, and HQDA selection board members. Chapter 14 covers Engineer Branch officers and warrant officers. General information on all warrant officers can be found in Chapter 3. Reserve Component warrant officer information can be found in Chapter 7. Detailed career development information on Construction Engineering Technicians and Geospatial Engineering Technicians can be found beginning on page 127 of Chapter 14. Included in this chapter are the Warrant Officer Development Models, otherwise known as Career Maps, for both MOSs. I highly encourage you to download a copy of this new update and use it as a guide to manage your career. Provide a copy to your rater and senior rater during your OER counseling sessions. Equally as important is that you read and understand our fellow engineer Officers' Professional Development Model and Career Map.

The next engineer warrant officer accessions board will be held in July. I can't stress enough that we are still hiring both Construction Engineering Technicians and Geospatial Engineering Technicians. To assist you in recruiting your replacements, WO1 Kent Frye has posted the latest versions of our 210A/120A and 215D/125D recruiting trifold on Warrant Officer Net. Click on the Engineer icon and you can download the files for your use. We are looking for outstanding NCOs who possess a sustained and demonstrated level of technical and leadership competency as supported by rater and senior rater comments on NCOERs. For commanders and warrant officers in the field, when asked for a letter of recommendation, I urge you to only recommend your best NCOs for the warrant officer program. For more information about the upcoming board or how to become an engineer warrant officer, log on to the Army recruiting website at *<http://www.usarec.army.mil/hq/warrant>*. Until next time, stay safe. Essayons!



Dedication

The following member of the Engineer Regiment has been lost in the War on Terrorism since the last issue of *Engineer*. He is the 299th Fallen Engineer since the War began. We dedicate this issue to him.

Hickman, Sergeant First Class Jason O.B. 4th Brigade Combat Team (Airborne), 25th Infantry Division Fort Richardson, Alaska

Proposed Fallen Engineers Memorial



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 to support the design and construction of a Memorial Wall for Fallen Engineers to be located in the "Sapper Grove" at Fort Leonard Wood, Missouri—home of the Army Engineer Regiment. To learn more, go to <*http://www.armyengineer.com/memorial_wall.html*>.

ENFORCE Campaign Plan Work Groups

By Mr. Michael A. Dascanio

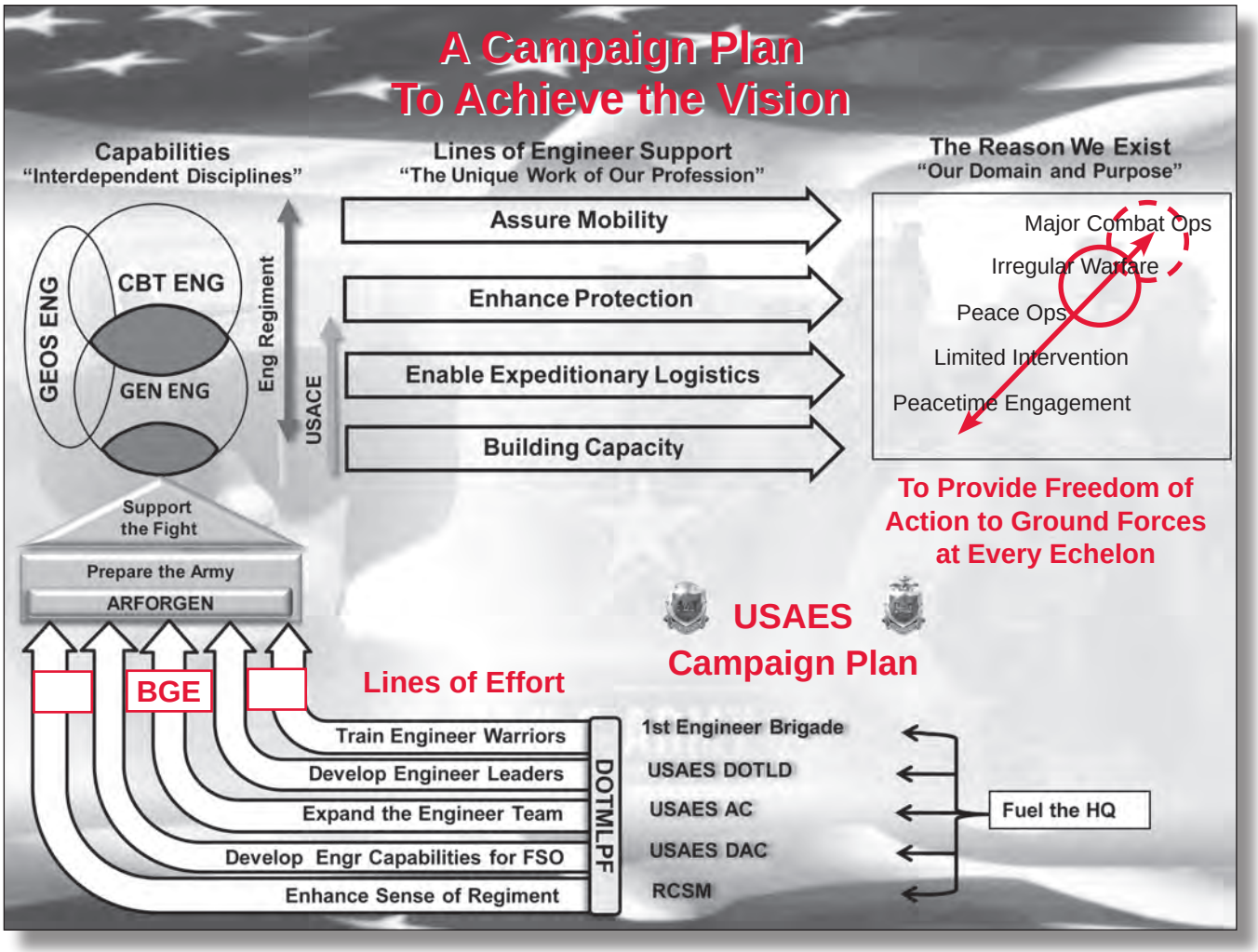
One of the key events of this year's ENFORCE is the Campaign Plan Work Group Program. The task and purpose of the work groups is to review the Regimental Campaign Plan to update the current status of the lines of effort (LOE), prioritize current decisive points, and discuss possible additional decisive points.

In this era of evolving national strategy, persistent conflict, Army Force Generation (ARFORGEN), transformation, and constrained resources, this hard work is harder—and more complex—than ever. Yet, as professionals, our charter is to achieve our vision in spite of existing conditions. But to do so successfully, we must first understand the framework within which we operate.

So…why a campaign plan, you ask? Every profession has a vision, purpose, and reason to exist, but simply having a vision is not good enough. There must be a plan and action. And that action—in order to be comprehensive, coordinated, and synchronized—must be organized, prioritized, assigned, guided, and monitored to achieve any measure of success. Professionals do this hard work; amateurs don't.

Military engineering is a subprofession within the greater profession of arms. The Engineer Regiment is the manifestation of this profession within the Army. It is a body of people—not just equipment, organizations, or technology—with a passion or calling to serve as a warrior with unique technical skills. These technical skills set the Engineer Regiment apart, providing unique knowledge, services, and capabilities that the Army needs to accomplish its missions.

By analyzing this framework within the context of the existing conditions, we've learned much about ourselves. While doing so, we discovered the need to revise and reenergize our vision and mission, and develop a clear strategy—translated into an executable campaign plan—to achieve our vision.



ENFORCE Campaign Plan Work Groups

WG1	WG2	WG3	WG4	WG5
Topic: Train Engineer Warriors	Topic: Develop Engineer Leaders	Topic: Expand the Engineer Team	Topic: Develop Engineer Capabilities	Topic: Enhance Sense of Regiment

Wednesday PM: Work groups (task/purpose) introduced during Commandant's Campaign Plan Update

Thursday AM: Work group leads present current status of the LOE

Thursday PM: Work groups prioritize the decisive points and discuss potential additional decisive points

Friday AM: Work group leads backbrief

** Final room assignments depend on estimated size of work groups.

Five work groups will spend the morning session of Thursday, 22 April, reviewing their respective decisive points and gaining a strong understanding of their status. In the afternoon session, the groups will prioritize their decisive points within their LOE and discuss potential adjustments to the LOE. On Friday, the groups will gather in the auditorium as a collective body and provide backbriefs on their group's discussions and recommendations.

Train Engineer Warriors. Led by the 1st Engineer Brigade, this work group will focus on how we execute institutional training within our Regiment. Key discussion topics will include updates to the Sapper Leader Course and Basic Officer Leader Course and developing plans for institutionalizing Counter Explosive Hazards Center (CEHC) training.

Develop Engineer Leaders. Led by the Directorate of Training and Leader Development (DOTLD), this work group will address several important decisive points, to include the Engineer University Concept, Virtual Battlespace System (VBS2) development, and Officer Education System (OES) redesign. Discussions will include an explanation of the Engineer University white paper, which is the concept for developing engineer core training and electives. We will also discuss the VBS2 integration initiatives, which are rapidly revolutionizing classroom training into an interactive environment. Finally, many will have great interest in providing feedback on the current status of the Regiment's OES training.

Expand the Engineer Team. Led by the Engineer School's Assistant Commandant, this work group will discuss decisive points that include establishing a governance framework of engineer forums; developing joint, interagency, intergovernmental, multinational, industry, and academia (JIIM-IA) partnerships; and establishing a Liaison Officer (LNO)/Exchange Orientation Program with our sister Services.

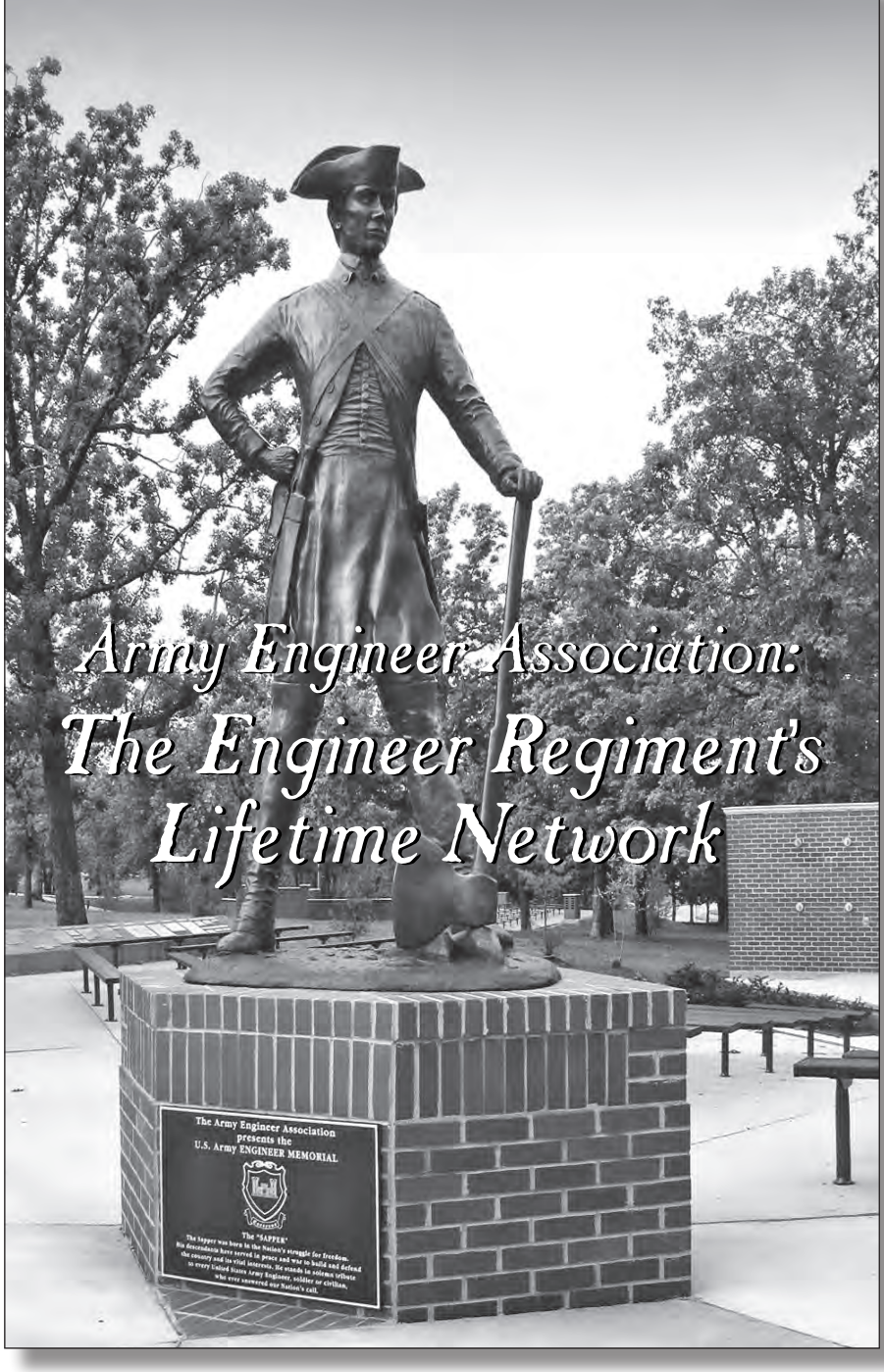
Develop Engineer Capabilities for Full Spectrum Operations. Led by the Engineer School's Deputy Assistant Commandant, this work group will focus on the decisive points that help us as a Regiment to synchronize doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF), with emphasis on the elements that are actioned outside the Engineer School, primarily by the Maneuver Support Center of Excellence (MSCoE). Decisive points in this LOE include initiatives in the areas of doctrine, organization, and equipment. Several geospatial initiatives, along with the emerging base camp proponency, are also included in this LOE. Key discussion topics will include the Brigade Engineer Battalion proposal, explosive hazard detection systems, the migration to a mil-Wiki type of publications, the geospatial intelligence (GEOINT) concept, rules of allocation, and a review of our equipment portfolio.

Enhance a Sense of Regiment. Led by the Regimental Command Sergeant Major, this work group will discuss the Fallen Sapper Program and the Wounded Sapper Program. The group will also discuss how we can help the Army Engineer Association (AEA) refocus their roles and adjust to a younger target audience and how we can develop a Regimental Information Engagement Plan.

We are looking forward to your active participation in these work groups in order to ensure that we have identified the right focus for our Regiment, which will enable the Engineer Regiment to successfully support our Army well into the future.

Mr. Dascanio is a lieutenant colonel in the United States Army Reserve. He serves as the acting Director of Training and Leader Development, United States Army Engineer School, Fort Leonard Wood, Missouri.





Army Engineer Association: The Engineer Regiment's Lifetime Network

By Colonel Jack O'Neill (Retired)

The Army Engineer Association (AEA) is evolving and adapting to change, just as our units and leaders are meeting today's challenges. Founded in 1988 as the Engineer Regimental Association during then Major General Daniel R. Schroeder's tenure as commandant of the United States Army Engineer School, it became the AEA in December 1991. It was envisioned to be a branch and alumni association for all Army engineers, regardless of grade, component, or specialty. That purpose is still valid, and since 1991 the AEA board of directors and staff have shared, promoted, and rewarded the proud accomplishments of the Regiment. AEA has grown and matured quite well, publishing the superb bimonthly *Army Engineer Magazine*; providing a host of regimental recognition programs; operating a successful gift store in the United States Army Engineer Museum at Fort Leonard Wood, Missouri; and offering a variety of events to foster the unique partnership between the Regiment and industry.

Program Improvements

But AEA membership has not sustained a steady period of growth. Thanks to suggestions by Brigadier General Bryan G. Watson, Commandant of the Engineer School, we closely reexamined our member benefits and incentives and are now launching an improved set of programs. Every member of the Regiment can benefit in some way by being an AEA member, and AEA benefits endure for a lifetime. The central theme of AEA is sharing and giving back: sharing knowledge, experiences, ideas, and opportunities through the network and giving back to the Regiment by supporting worthwhile AEA awards and programs.

Engineer Fraternal Network for Life

Our Army engineer family is a proud and powerful network of thousands of professionals. Consider the 80,000 engineer Soldiers in the Active Army, United States Army National Guard, and United States Army Reserve; the 35,000 Soldiers and civilians of the United States Army Corps of Engineers major Army command; the engineers performing installation public works across the Army; and all the engineer veterans of those organizations. That's a huge number.

AEA is the linchpin for that network. We manage a comprehensive professional and historical information network through our magazine, website, and e-mail announcements. AEA's links to engineer alumni organizations, combined with our new presence on Facebook, add to our social network feature, and our business services to supporting firm members from industry enable AEA to provide specialized job networking and an online career center.

Remembering Our Fallen

AEA established a web-based regimental memorial register at <*www.armyengineer.com/index.html*> that lists the names of our comrades lost since the terrorist attacks of 11 September 2001. AEA also provides information to help survivors of those fallen. We are raising funds to erect a

"AEA assists engineer Wounded Warriors by supporting fund-raising efforts, promoting job opportunities, and reaching out to them in our communities. ... Look for them, reach out, and help them stay connected to the engineer fraternal network for life."

memorial wall honoring fallen engineers of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) at Fort Leonard Wood, and we have a new $2,500 annual scholarship award for a survivor of a Fallen Engineer from OIF or OEF.

Helping Our Wounded

AEA assists engineer Wounded Warriors by supporting fund-raising efforts, promoting job opportunities, and reaching out to them in our communities. They need help and they're all around us, in hospitals or in our communities, healing and coping. Look for them, reach out, and help them stay connected to the engineer fraternal network for life. We also have a new $2,500 annual scholarship award for a combat-wounded engineer from OIF or OEF.

Recognizing and Rewarding Our Best

AEA administers multiple award programs that recognize individual and team excellence in the Regiment. AEA-sponsored components of the United States Army Engineer Regimental Award Program, enabled mostly by corporate sponsors, are as follows:

- DeFleury Medal for professional excellence
- Essayons Award for spouses who make significant contributions to the Regiment
- Army Combat Engineer Sergeants (ACES) Award for the best squad leader/section sergeant in every engineer battalion, separate engineer company/detachment in all components
- Best Platoon Leader Award for the top engineer platoon leaders in the Active Army and Reserve Component
- Van Autreve Award for the engineer Soldier of the Year, named for Sergeant Major of the Army Leon L. Van Autreve
- Super Sapper Awards for the best junior engineer Soldier in each battalion or separate company-size unit in the force
- Flowers Award for Best Sapper Team for the winner of the annual competition at Fort Leonard Wood, named for Lieutenant General Robert B. Flowers (Retired)
- Best Warrant Officer Award for the Active Army and Reserve Component
- Lieutenant General (John W.) Morris Outstanding Civilian Award

Supporting Junior Members and Families

Junior members enjoy the most benefit from AEA. First, the annual dues structure is designed to benefit them. Second, the majority of our annual Soldier memorial scholarships are offered only to junior members. AEA recognition programs that emphasize junior members include the ACES, Best Platoon Leader, Van Autreve, and Super Sapper awards. Family member benefits include a limited number of scholarships and the spouse-focused Essayons Award.

Chapters

AEA chapters are out there, although some are more active than others. AEA has a quick-and-easy "Chapter in a Box" document to assist any group interested in forming a chapter. Several of the brigade-level chapters have recently organized top-notch events and conferences. The Montgomery C. Meigs Chapter in Washington, D.C., annually supports the area Castle Ball, and brigade-level senior leader conferences have been quite successful for the 18th, 20th, and 36th Engineer Brigades. Local chapters can support a variety of events such as unit runs, sports tournaments, award ceremonies, formal dinners and military balls, meetings, and conferences. Some chapters enjoy local sponsorship from area businesses.

Engineer Regimental Store

Long established in the Engineer Museum at Fort Leonard Wood, the AEA Regimental Store is a true asset to the Regiment. Proceeds from the store support the museum and the many AEA programs and services oriented toward service to the Engineer Regiment. The store serves members of the Regiment, family members, and alumni of the United States Army Corps of Engineers, providing a wide variety of one-of-a-kind merchandise.

Conclusion

AEA provides a worthwhile and affordable service to the Engineer Regiment. If you're a leader of engineers, informing others of the benefits of AEA is part of taking care of your people. You can legally advise them that they can benefit from joining AEA and simply provide them with information about what those benefits are. They can share and give back too.

Colonel O'Neill (Retired) is a 30-year veteran of the United States Army Corps of Engineers and has been the executive director of AEA since March 1998. AEA has offices at Fort Belvoir, Virginia, and in the Engineer Museum at Fort Leonard Wood, Missouri.

Adapting the Army:
Institutionalizing Counter-IED Training Efforts

By Mr. Dorian D'Aria and Mrs. Tahnee L. Moore

The success of U.S. forces during the early phases of combat in Afghanistan and Iraq provides testimony to the competence of American Soldiers, the superiority of their equipment, and the exceptional quality of their training. However, after the conclusion of conventional combat operations, our Soldiers faced a resilient and adaptive enemy bent on continuing the fight and hindering any transition to peace, democracy, and public order. To do this, our enemy had to change the conditions of the battle and nullify or defeat elements that gave us superiority. For instance, to defeat our long-range weapons and standoff capabilities, he hid among the populace and attacked us at close quarters. He avoided force-on-force combat by employing improvised explosive devices (IEDs) plus hit-and-run tactics against convoys and units to inflict casualties. He used explosives to attack the vulnerable underbellies of our vehicles and emplaced explosively formed penetrators off to the side to defeat front-mounted, downward-looking detection and neutralization systems.

Keeping Training Relevant

The enemy's success depended greatly on his ability to be flexible, adaptive, and able to operate on timelines inside our standard Cold War institutional processes. He could change tactics, techniques, and procedures or employ new devices in 60 to 90 days, continually forcing us to play catch-up and rendering our institutional training or materiel systems irrelevant against the current threat by the time they were fielded. Although counter-IED (C-IED) training occurred throughout the many training domains, much of the training lacked integration and standardization. This produced inconsistency in skill levels and did not necessarily support the collective tasks trained at unit home stations. As a consequence, much of the most relevant training and preparation for combat shifted from the generating force to the operational force, complicating deployment preparation and mission readiness.

Considering personnel turnover between rotations, this often presented units with a steep learning curve and forced a lot of predeployment training to concentrate on the fundamentals. Instead of focusing on collective unit training and mission readiness exercises, many units were burdened with learning individual C-IED tasks, irregular warfare counterinsurgency principles, threat analysis, and an understanding of what C-IED assets are available to tailor capabilities based on the threat and operational conditions. In addition, because of the pervasive misconception that our current operational dilemma was unique, theater-specific, and of a limited duration, there was little incentive to alter the status quo and rectify our training strategy. Figure 1, page 11, depicts how we are training C-IED efforts today.

Current U.S. training has been based on the following outdated misconceptions:

- *IEDs are a new threat.* However, IEDs are an enduring threat that have been used since the invention of explosives.
- *IEDs are specific to irregular warfare.* Instead, IEDs are used throughout the full spectrum of warfare.
- *IEDs are unique to current theaters of operation.* This is incorrect. IEDs are prevalent in every global region, to include foreign and domestic areas of operation.

Keeping Training Balanced

In response to the enduring nature of the threat, C-IED training must become more balanced between the institutional and operational domains. Standardization and required implementation of common C-IED training in initial military training and professional military education (PME) is the first step. The next step will be to determine what C-IED lessons should migrate from current operational training requirements to the institutional domain. The migration of critical training ensures a standardized basis of training and provides commanders with more time and flexibility while preparing their units for deployment. This shift in training would result in a more balanced C-IED strategy, as depicted in Figure 2, page 11.

To transform C-IED training in the United States Army Training and Doctrine Command (TRADOC), the TRADOC commander tasked the Maneuver Support Center of

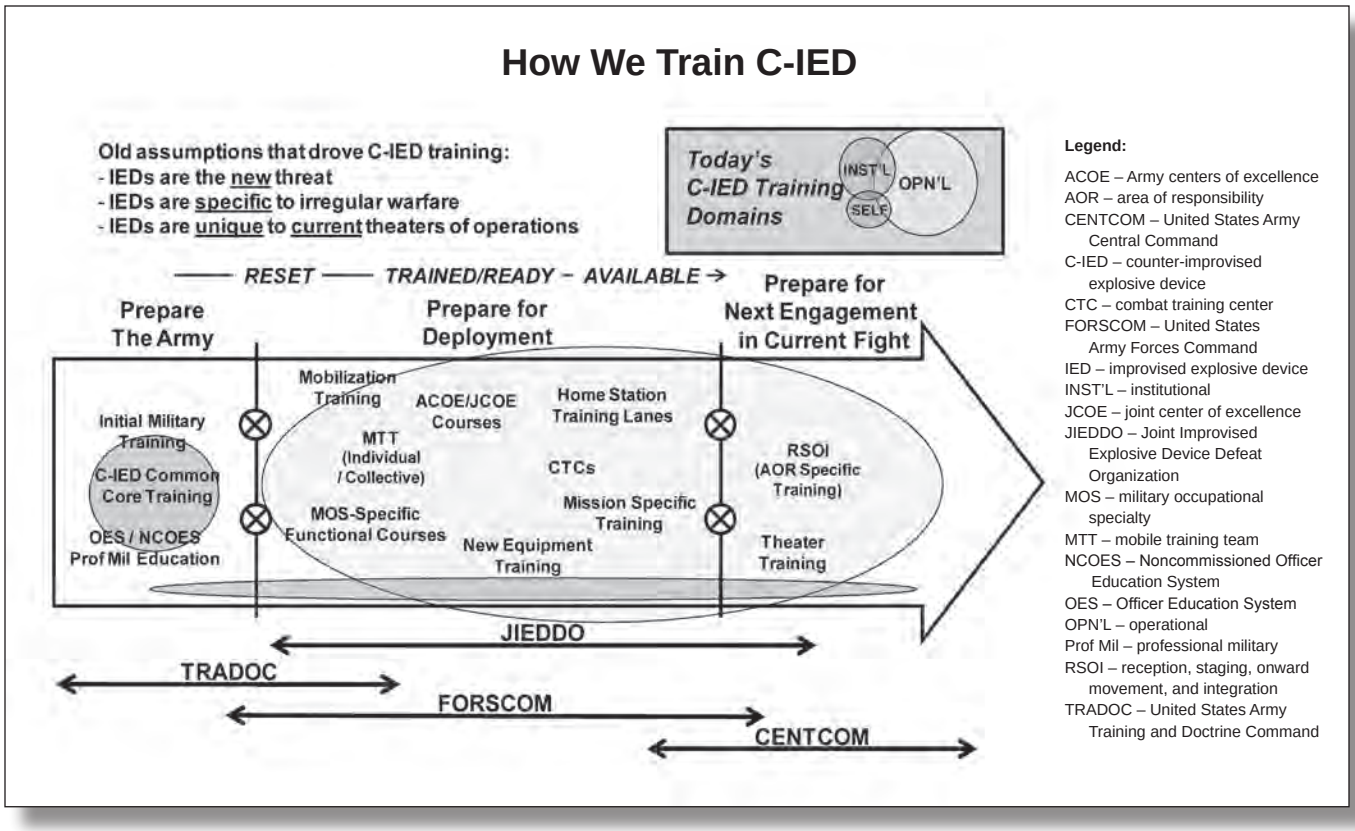


Figure 1

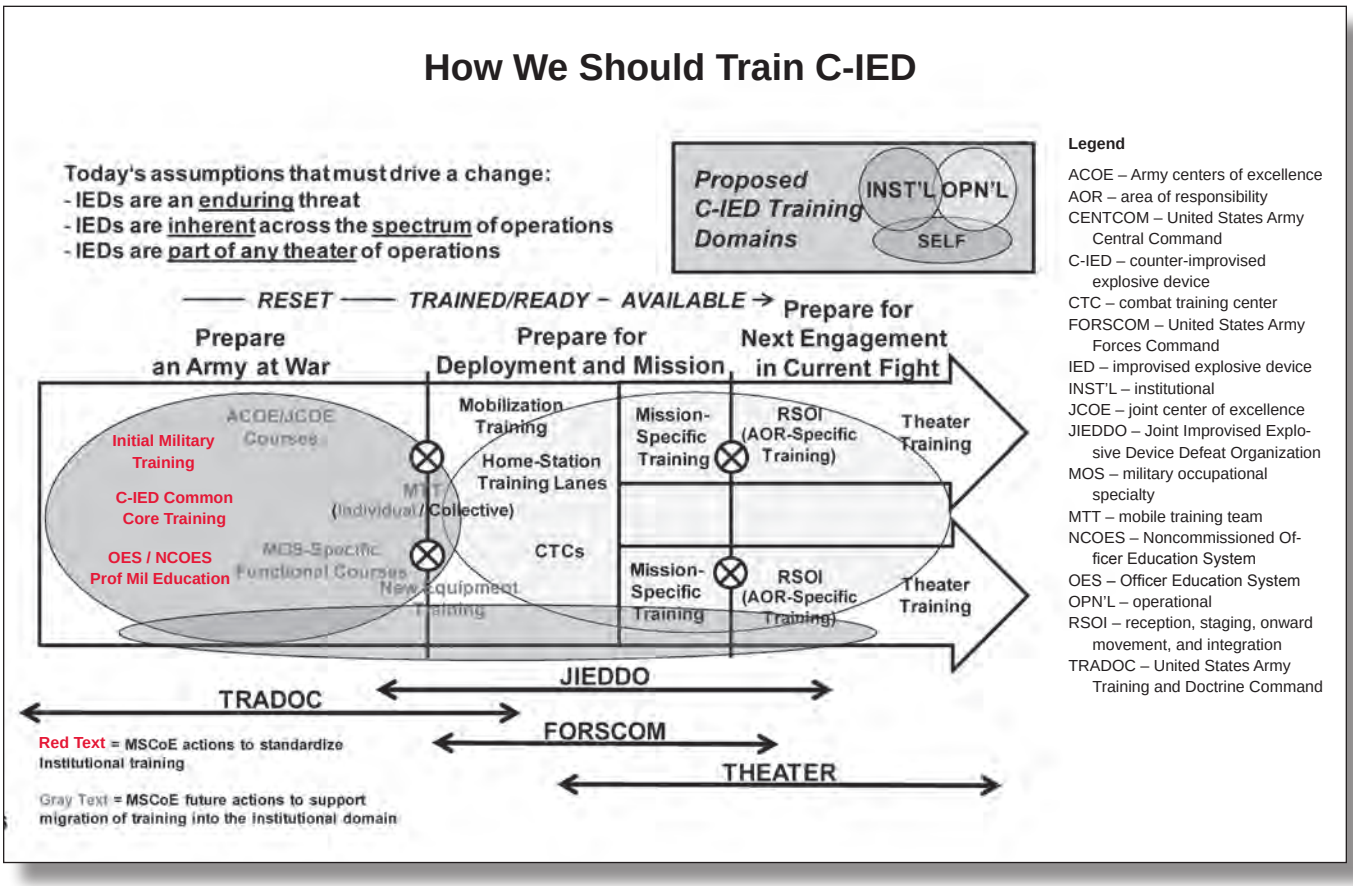


Figure 2

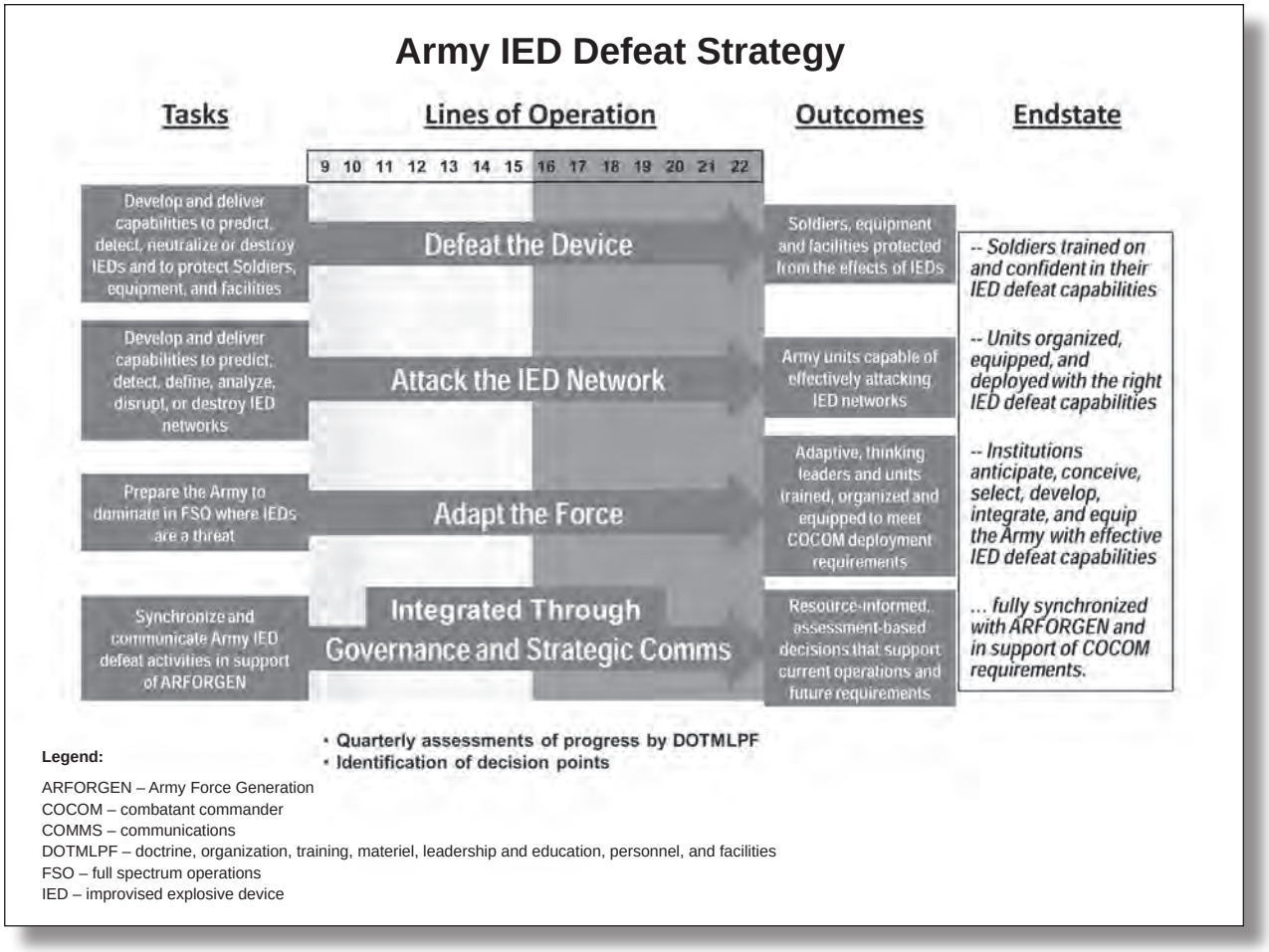


Figure 3

Excellence at Fort Leonard Wood, Missouri—in collaboration with other proponent leaders and centers of excellence—to develop an integrated, standardized program for C-IED training and education. To treat the IED as an enduring threat and prepare units to use pooled capabilities of their combined arms resources requires the Army to embed C-IED training across its educational system. This training must align C-IED tasks with specific training and educational outcomes that complement and reinforce subsequent skill levels, resulting in an integrated hierarchy of knowledge. Because the use of the IED against U.S. and coalition forces is ever-adapting, continual validation of the C-IED training is an important process of the training integration. The validation process must ensure that the training remains current and relevant to the operating force.

Lines of Operation

After a holistic analysis of the C-IED threat, the Army has identified three primary lines of operation (LOOs)—Defeat the Device, Attack the IED Network, and Adapt the Force—that are pivotal to defeating enemy IEDs. These three LOOs are integrated through an administrative LOO called "Governance and Strategic Comms," which provides synchronization, resourcing, and strategic oversight of all C-IED efforts across the Army. Even though each LOO contains its own unique tasks and training necessary to achieve its specific strategic objective, they also share numerous common tasks that are threaded throughout each. Figure 3 depicts these LOOs and the outcome each produces.

Identify Critical Common Tasks

As the first step toward achieving these goals, the TRADOC Integrated Capabilities Development Team (ICDT) convened a training summit at Fort Leavenworth, Kansas, in November 2009 to identify what C-IED training is needed at each echelon of skills within the Army—from Soldiers entering initial training through senior leaders attending advanced PME. This effort was collaborative, involving expertise from across the Army and the broader Department of Defense C-IED community of practice, with the goal of implementing changes in the spring of 2010. Key to the overall analysis was the identification of critical common tasks that Soldiers must successfully perform to survive and function in a C-IED environment. The analysis entailed a review of current operational needs; Soldier interviews; and study of mobile training team (MTT) tasks, doctrine-related tasks such as the Army universal task list, and educational tasks such as the Automated Systems Approach to Training (ASAT). This analysis provided a basis for Soldier outcomes and defined the skills and knowledge a Soldier must possess to survive and function in a C-IED environment.

Identify Enduring Common Skills

The second step in the analytical process was the identification of enduring common skills that cross Army proponencies. Using all current deconstructed C-IED training and requirements, the summit members acted as a critical task selection board to determine—

- Common-to-all C-IED tasks that will transition into the institutional training domain and be reinforced with the operational training domain.
- Branch-specific tasks critical to combatant commanders to be developed in the formal Army training development process by their respective schools and centers.
- Tasks that cross centers of excellence and formally assign development of those tasks to the C-IED proponent.
- Common-to-some C-IED tasks that would cross specific communities.

Develop a Training Support Package

The third step in the analytical process was the task analysis and development of a training support package to sustain the identified common C-IED critical tasks. This C-IED training package will identify the method and time of instruction and the resources required for the proponent to conduct the training.

Migrate Training to Institutional Domain

The fourth step in the analytic process entailed the migration of current C-IED operational training into the institutional training domain. Within the operational training domain, new equipment training, MTTs, and many functional courses were established to meet the needs of Soldiers moving into theater.

Key to any training strategy is the ability to provide resources for the effort and a timeline that will allow adjustments to the curriculum to ensure that it is relevant to the threat and operational requirements. Much of the C-IED training conducted by numerous schools and home-station organizations has been funded by various joint and Army agencies. However, a large portion of C-IED training within the operational training domain is neither funded nor recognized by the Army resourcing process and primarily uses a variety of contingency fundings. The ICDT, in conjunction with the United States Army Combined Arms Center Collective Training Directorate (CAC-CTD) has started the resource legitimization process using the Combined Arms Training Strategy (CATS). CAC-CTD incorporated the three C-IED-associated tasks from the Shared Collective Task List (SCTL) into the protection functional CATS. The Maneuver Support Center of Excellence linked C-IED training enablers with the SCTLs using the ASAT database. As the CAC ASAT consolidated database for record is uploaded, units across the force will be able to identify C-IED training resources in association with their full spectrum operations mission-essential task list using the Digital Training Management System.

Conclusion

The changes forthcoming in the Army's C-IED training strategy will provide a template and foundation for transforming our institutional training domains to become more flexible and responsive to the operational force and better support the Army Force Generation. It will—

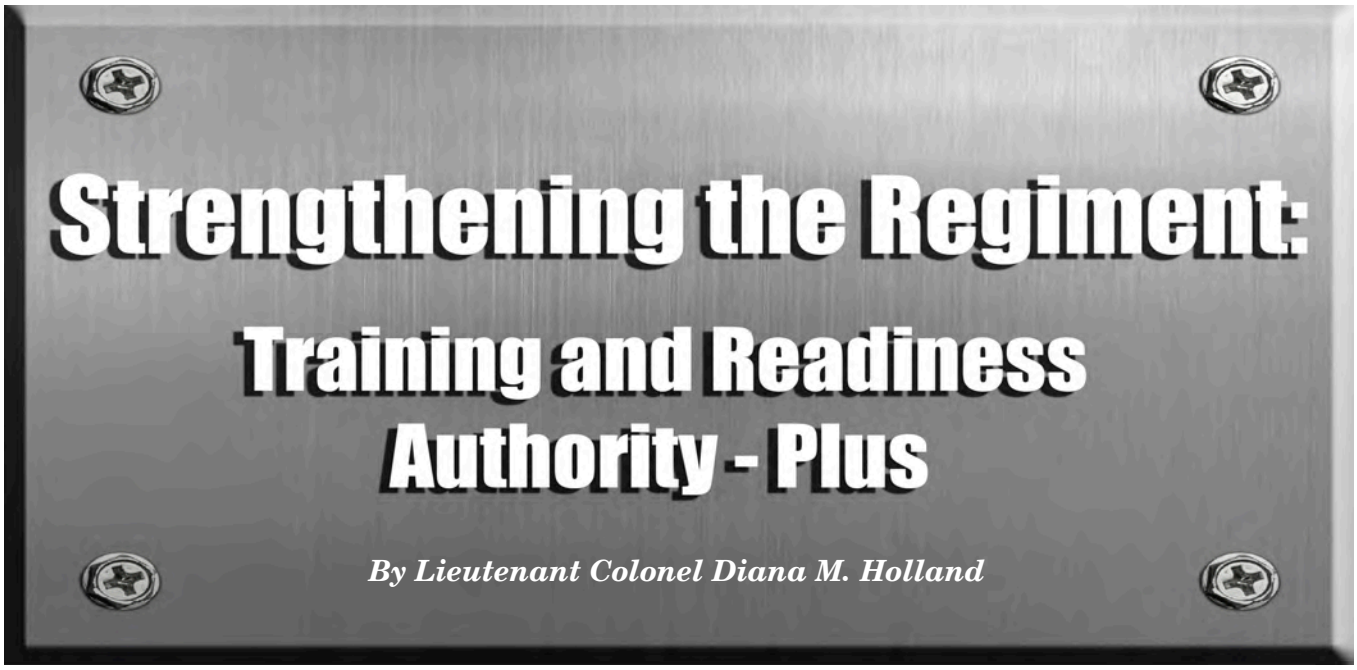
- Tie in requirements with skill sets.
- Ensure integration within educational hierarchies.
- Establish decision points to evaluate and update training.
- Promote better standardization and synchronization across proponencies.
- Link resources to execution.

As a result, these mechanisms will ensure that the institutional domain is better postured to support an Army at war, in any theater around the globe, and be able to respond to any changes in enemy tactics or weapon systems.

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Mrs. Moore is Chief, Training Branch, United States Army Training and Doctrine Command Improvised Explosive Device Defeat, Integrated Capabilities Development Team, United States Army Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri. She holds a bachelor's in secondary education from Jacksonville State University, Jacksonville, Alabama, and a master's in instructional technology from the University of Wyoming.





Strengthening the Regiment:

Training and Readiness Authority - Plus

By Lieutenant Colonel Diana M. Holland

On 10 July 2008, the Training and Readiness Authority (TRA) policy took effect for the 92d Engineer Battalion (also known as the Black Diamonds). The policy directed attachment of the battalion to the 36th Engineer Brigade (also known as the Rugged Brigade) at Fort Hood, Texas, for TRA with secondary attachment to the 3d Infantry Division (3ID) at Fort Stewart, Georgia, for administrative control (ADCON)(-)/Title 10 responsibilities. There was considerable confusion surrounding the policy in the initial months following implementation. Some thought that there would be no difference and that business would continue as usual. Others believed that the geographic distance between the 36th Engineer Brigade and the 92d would hinder complete implementation of TRA. Many concluded that TRA would disrupt effective command and control and that the policy would be rescinded. However, for the Black Diamonds, TRA presented an opportunity for the battalion to formalize a habitual connection with the Engineer Regiment for the first time since the Vietnam War. Thus, the battalion decided to embrace the policy and forge the strongest relationship possible with the 36th Engineer Brigade. This article explains how and why the battalion pursued this decision and describes the resulting benefits.

Weighing the Options

The incoming 3ID and 36th Engineer Brigade leadership encouraged the 92d Engineer Battalion to shape implementation of TRA to best support the Black Diamonds, so the command group considered two options: One was to maintain the status quo and limit the battalion's relationship with the 36th Engineer Brigade to only what was required by the United States Army Forces Command (FORSCOM)—execution order. An alternate approach was "TRA-Plus"[1]—realign as many brigade-level functions as possible with the 36th. The 92d favored the latter approach for three reasons:

- TRA-Plus offered the opportunity to rebuild stronger relationships between engineer units.
- Once the mandatory changes required under TRA were overlaid on pre-TRA practices, the battalion experienced a high rate of conflicting guidance and requirements from different headquarters.
- The situation that evolved in the immediate aftermath of TRA did not appear to be a stable, long-term solution for effective command and control of the battalion, especially considering future deployments of the various headquarters.

Implementing TRA

Some aspects of TRA were straightforward. The policy dictated that the 36th Engineer Brigade would provide training guidance and approve the battalion's training plans and mission-essential task lists, validate deploying units, and review the unit status report. The TRA brigade commander was now in the battalion's rating chain, and the TRA brigade assumed all responsibilities regarding the reenlistment program. In the areas that were specifically tasked to the TRA chain of command but required installation support or oversight, the division coordinated directly with the battalion as though the latter were a separate unit. ADCON(-)/Title 10 responsibilities that remained with 3ID included general court-martial convening authority, installation support, fielding of new equipment, and resources for training approved by the TRA brigade commander. These specified requirements for the 36th Engineer Brigade and 3ID were quickly implemented. However, other areas required further consideration, and until they could be realigned, the actions were processed through the 3d Sustainment Brigade at Fort Stewart.

During this interim period, the battalion concluded that more could and should be done to strengthen ties with the



The 36th Engineer Brigade command sergeant major speaks to Soldiers of the 92d Engineer Battalion during a visit to Fort Stewart.

36th Engineer Brigade. The battalion's leaders used three principles to guide the way ahead:

- Minimize the number of headquarters that handle the same issue.
- Maximize the chain of command (92d to 36th to 3ID) to the greatest extent possible.
- Understand the second- and third-order effects of a course of action. For example, will a recommendation create more work than necessary, and will it stand the test of time?

Following is a discussion of five areas for which the battalion's senior leaders challenged assumptions and made recommendations that would support the Black Diamonds yet facilitate a strong relationship with the 36th Engineer Brigade.

Awards Approval Process

Initially, the battalion processed awards requiring colonel-level approval or endorsement through Fort Stewart's 3d Sustainment Brigade, assuming that such actions would be easier to complete with the headquarters on the same installation. However, with digital technology, geographically distant headquarters could process paperwork just as easily as a colocated headquarters. Thus the question became: Does it make sense to realign this process so that the 36th Engineer Brigade commander approves the battalion's awards? We concluded that it should be realigned, because he was in the rating chain and executed many command responsibilities already. If the award required a general officer's signature, it should be routed back to Fort Stewart and the 3ID commander. Once implemented, this system proved to be very efficient and has reinforced a single chain of command from the 92d Engineer Battalion to the 36th Engineer Brigade to 3ID.

Property Accountability Functions

Similar to the awards process, the 3d Sustainment Brigade commander initially served as the financial liability investigation for property losses (FLIPL) approving official because of his proximity to the battalion. However, as already determined, location was no longer a limiting factor. Again, we concluded that the 36th Engineer Brigade would be the appropriate headquarters to process FLIPLs for the following reasons:

- The 36th was responsible for the Command Supply Discipline Program of the battalion.
- The commander of the 36th was required to approve company changes of command—an event largely influenced by the success of inventories.
- Property accountability is a criterion for evaluation reports, and the TRA colonel is in the rating chain.

Processing FLIPLs, like awards, was just as timely through the distant headquarters as it had been though the colocated ADCON brigade. The revised approval process aligned all property functions with one headquarters and reinforced the primary chain of command.

Installation Functions

The most difficult functions to assign or reassign were those involving installation agencies. Matters such as sexual assault, equal opportunity, the Alcohol and Substance Abuse Program, and safety took several months to resolve. At first, all of these issues remained with the 3d Sustainment Brigade in order to ensure continuity. However, it became clear that the 36th had responsibility for these functions and required input. For example, the Army Readiness Assessment Program (ARAP) is tracked through the TRA headquarters. Likewise, the 36th Engineer Brigade commander has an interest in the battalion's safety program. At times, he directs the battalion to implement his intent for, and report back on, specific subjects such as



The 36th Engineer Brigade commander observes a 92d Engineer Battalion project at Fort Stewart.

motorcycle safety and the battle-buddy program. Similarly, the equal opportunity function is heavily shaped and assessed by training—a TRA function—and because the treatment of Soldiers and allegations of discrimination are command climate issues, it seemed best to align these areas with the 36th Engineer Brigade. In cases that required installation support or senior commander visibility, the battalion reported and worked closely with garrison agencies and 3ID. These revised processes streamlined high-visibility functions through one brigade-level headquarters.

Military Justice

The 92d Engineer Battalion command team also considered the feasibility of shifting special court-martial convening authority responsibilities to the TRA headquarters. Like FLIPLs and awards, much of the paperwork could be completed via digital technology. Furthermore, because the commander of the 36th Engineer Brigade was in the rating chain and responsible for the readiness of the 92d, it seemed that he should be responsible for administrative separations and Uniform Code of Military Justice actions. Leaders specifically considered the possibility of a Soldier who wished to appeal a field grade Article 15 and speak with the brigade commander. Such a situation could be handled using telephonic and video conferencing. However, the battalion concluded that it was best to retain military justice matters at Fort Stewart because of the prominent role of legal advisors—both for the defense and the command. This is the only major brigade-level function that the 36th does not process; however, the battalion commander routinely provides situational awareness of legal issues to the brigade commander.

Deployments

As many garrison procedures were being resolved, important questions emerged regarding deployments:

- What would happen if the 36th or 3ID deployed and the 92d did not?
- Which headquarters would cover the functions that were being formalized?
- Were brigade-level responsibilities transitioning to Fort Hood—only to be returned to Fort Stewart when the 36th deployed?
- Which headquarters would have oversight of the 92d Rear Detachment when the battalion deployed?

The battalion leaders pondered several scenarios and concluded that the ongoing realignment of functions to the 36th Engineer Brigade would stand the test of Army Force Generation (ARFORGEN).

- Many brigade-level TRA headquarters were assigning a colonel to serve as the rear commander, and the headquarters retained the TRA responsibilities of its deploying commander.
- One of the purposes of the mission support element (MSE) at Fort Stewart is to execute ADCON(-)/Title 10 responsibilities for separate FORSCOM units on the installation; thus, whether 3ID was deployed or not, the MSE would support the 92d Engineer Battalion.
- The battalion's rear detachment would report directly to the division rear detachment and the 36th Engineer Brigade's rear detachment—a mirror image of the relationship between the units when they were not deployed.

Recommendations

In a previous article in *Engineer*, the authors stated that in implementing TRA in the 20th Engineer Brigade, Fort Bragg, North Carolina, "given the myriad of tasks a battalion faces daily, weekly, and monthly, a good bit of

analysis and common sense was still required to decide which commander would take the lead on a given topic."[2] As it turned out for the 92d, this was an understatement. Every leader and staff officer having to interact with the 92d knew that there were numerous issues that required alignment with a commander, but no one knew enough to consider matters beyond the major functions specified in the FORSCOM order. Therefore, many responsibilities were left undefined, with the understanding that units would deal with them as requirements emerged. The battalion did handle those issues, but each action required time for the staff to develop the process and for the command group to explain its recommendations to other headquarters. Following are three specific recommendations to methodically implement an effective TRA relationship between geographically separated units.

Plan for Implementation

Commanders and staff officers who will be affected by TRA must carefully review the FORSCOM order and develop a detailed plan on how best to implement the policy on their installation and with their TRA units. There was considerable confusion about TRA within many agencies on Fort Stewart. Institutional memory was that the 92d had always "belonged" to a logistics headquarters, and it was difficult to change that notion. Information and reports regarding the 92d were misdirected because relationships had changed. Sometimes, when agencies acknowledged that the 92d was TRA to a brigade on another installation, they stopped sending information at all.

Single-Report Format and Guidance

Leaders should minimize the number of headquarters that have influence on, input to, or require reports from a unit that is separated from its TRA headquarters—or if unable to do so, determine which headquarters has primary responsibility for a particular task and agree on a single-report format and guidance. In the early months after TRA took effect, the 92d received fragmentary orders (FRAGOs) from 3ID, 3d Sustainment Brigade, and 36th Engineer Brigade. Sometimes those orders addressed the same requirement (such as reporting Department of Defense Form 93, *Record of Emergency Data*, updates or motorcycle safety) but contradicted each other. In most cases, the action officers of the different staffs compromised in favor of another headquarters' FRAGO, but the effort required to reach those agreements was time-consuming for everyone involved.

Consistent Functional Chains

To the greatest extent possible, align the major functions with a single headquarters. For example, all personnel tasks for a unit should have a consistent personnel chain. At first, the approval process for the 92d's awards went through the 3d Sustainment Brigade to 3ID; evaluation reports went through the 36th to 3ID; Soldiers were requisitioned through the 36th; and Officer Candidate School packets went directly to 3ID. It took almost a year to align these functions so that all personnel actions flowed to the 36th and back to 3ID. The only functions that were fully aligned along a consistent chain of responsibility upon implementation of TRA were those associated with operations and training—"fair share" taskings, schools, orders, training resources—and it was in these areas that the battalion faced the least friction and confusion.

TRA-Plus Benefits

The TRA policy has greatly benefitted the 92d Engineer Battalion. For example, the 36th Engineer Brigade convened a conference in October at Fort Hood, and all the Black Diamond command teams attended. The conference was an engineer bonding and professional development opportunity that leaders in the 92d do not normally experience in garrison. Similarly, the commander of the 36th, during visits to Fort Stewart or when receiving briefings via teleconference, takes the opportunity to provide guidance and offer professional development to various audiences in the battalion.[3] Finally, as the 92d prepares to deploy to Operation Enduring Freedom, it is able to easily draw on the engineer-specific experiences of other units of the 36th that have recently deployed to that theater. Implementing TRA-Plus has brought even greater benefits to the two organizations by streamlining processes and further strengthening an engineer relationship. The process took more than a year to complete and often encountered institutional resistance, but the results were ultimately worth the effort.

Lieutenant Colonel Holland is the Commander, 92d Engineer Battalion, Fort Stewart, Georgia. Previous assignments include plans officer, Operations Directorate, United States Central Command; S-3, 92d Engineer Battalion; plans officer, 3d Infantry Division; and assistant professor, United States Military Academy (USMA). She holds a bachelor's from USMA, a master's from Duke University, and a master's of military arts and sciences from the School of Advanced Military Studies. She is also completing a Ph.D. through Kansas State University.

Endnotes

[1]*TRA-Plus* was a term coined by Brigadier General Bryan G. Watson, United States Army Engineer School Commandant, during a conversation with the author regarding the 92d Engineer Battalion's TRA/ADCON initiatives.

[2]Colonel Duke Deluca, Lieutenant Colonel Fred Kaehler, and Lieutenant Colonel Robert T. Morgan, "TRO [training and readiness oversight]: Clarifying Roles and Responsibilities," *Engineer*, January–March 2007, pp. 11–13.

[3]Though some professional development issues are common to all branches and do not require the specific attention of an engineer colonel, the author believes that there are times when branch does matter, such as in career advice, technical expertise, and engineer capabilities.

Engineers Build Capacity in Stability Operations

By Colonel Jeffrey R. Eckstein

It has been more than a year since the United States Army published Field Manual (FM) 3-07, *Stability Operations*.[1] Army engineers continue to conduct operations in Iraq and Afghanistan, as well as support geographic combatant commands. For most units, nothing has changed. Commanders still must balance the demands for clearance of routes, construction of combat outposts, protection of the force, execution of projects for the Commander's Emergency Response Program (CERP), training of host-nation security forces or local officials, and support for brigade combat teams (BCTs).

The United States Army Corps of Engineers (USACE) element in Iraq—the Gulf Region District—actively executed projects, and commanders balanced similar activities, but the district also supported capacity-development activities. This experience in the 21st century has taught us that we must do more than simply complete construction projects and execute missions in support of maneuver units. Success in the new environment requires the United States to build capacity in partner nations, and the Engineer Regiment is an indispensable component of capacity building. In keeping with the regimental motto of *Essayons*, this article examines the role of United States Army engineers in capacity building and recommends a framework to integrate it into engineer mission planning.

Stability Tasks

FM 3-07 provides the primary stability tasks, enumerating the specific areas that engineer units support. The three core stability tasks are as follows:

Establish Civil Security

Many engineer missions and projects directly support the Army, the maneuver BCTs, and the joint force, including performing route clearance, constructing combat outposts, and ensuring force protection.

Establish Civil Control

Engineer activities involve undertaking or supporting the completion of specific projects for the host nation, such as building or repairing police stations, training areas, and courthouses.

Restore Essential Services

The Army seeks to provide needed services to the host nation, including delivery of food, water, electricity, and medical service. Engineers support Army units that are assigned these missions.

Other Stability Tasks

Two other stability tasks—support to governance and support to economic and infrastructure development—are not part of the core mission-essential task list, but engineers may be required to provide assistance as requested by other agencies.

"Engineers need a stability operations framework to shift the traditional focus ... to a broader strategic perspective of improving host-nation capacity."

Building Capacity

A review of stability operations in FM 3-34, *Engineer Operations*, reveals a corresponding list of missions and tasks for stability operations. In reference to capacity building, the manual states that "support for infrastructure development may be extended to assist the [host nation] in developing capability and capacity."[2] However, it does not discuss in detail how engineers support capacity or capability development. It focuses on performing assessments of infrastructure features and gaining an understanding of their current situation within the host nation. The manual lists typical missions or projects that engineers may undertake or support, some of which include immediate repairs of infrastructure to support the host nation.[3]

FM 3-34 is the only Army manual to directly address engineer involvement in capacity building, and this is under the heading of infrastructure development. Engineer experiences in Iraq and Afghanistan have involved such

elements of capacity building. These efforts include a Multinational Corps–Iraq engineer staff liaison team with the Republic of Iraq Ministry of Oil, USACE subject matter expert support to the Bayji Oil Refinery, and numerous CERP projects focused on improving local services. Yet, these efforts fall short of what is required for success in the 21st century.

FM 3-07 offers a pivotal insight as to the importance of capacity building, stating that "through stability operations, military forces help set the conditions that enable the other elements of national power to succeed in achieving broad goals of conflict transformation."[4] A key aspect of setting the conditions for success—second only to security—is building host-nation capacity from the ground up. Capacity building is the area in which engineers can accomplish their traditional tasks and significantly contribute to setting conditions for successful conflict transformation.

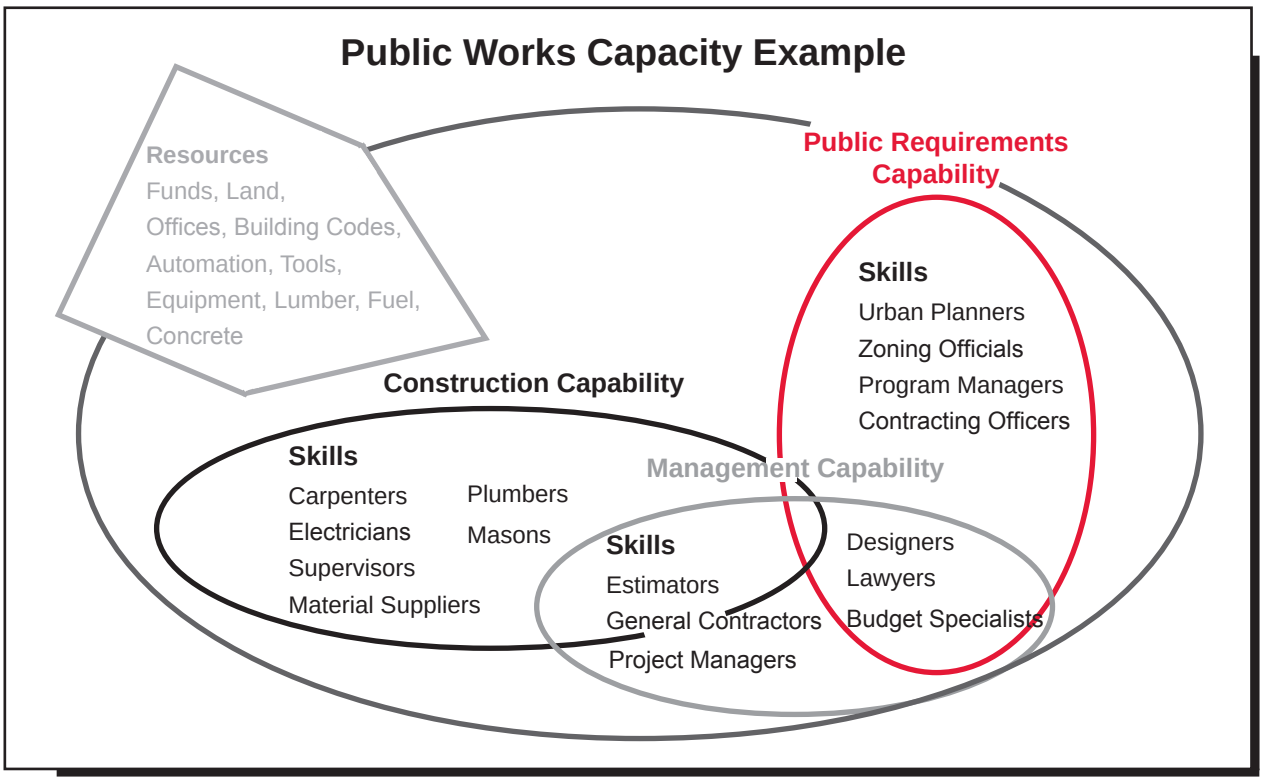
Engineers need a stability operations framework to shift the traditional focus from completing standard projects to a broader strategic perspective of improving host-nation capacity. With such focus, the way engineers execute a project may prove more important to long-term stability than the actual project. Recognizing this, USACE recently published Engineer Regulation 5-1-16, *Capacity Development–International*,[5] requiring all its international projects and programs to incorporate capacity development.

A similar approach for tactical and operational units employed in stability operations is critical. Any framework to assist with analyzing and integrating capacity building in engineer operations must include understanding the relationships among skills, capabilities, and capacity. FM 3-07 provides a definition for capacity building in its glossary: *The process of creating an environment that fosters host-nation institutional development, community participation, human resources development, and strengthening managerial systems.*[6] From this definition, it is clear that capacity includes institutions, communities, human resources, and management systems.

Creating Capability

The Army does not define capability, but Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, defines it as *"the ability to execute a specified course of action."*[7] That definition is not useful in the context of capacity building. A better definition of capability is *the collective employment of resources and skills to achieve a desired outcome*. Resources may include raw materials, funds, offices, building codes, people, automation, and tools. Skills are a person's knowledge or physical ability to execute specific tasks. Understanding the skills needed to create capability and appropriate capabilities to build capacity is the key to capacity building. Capacity cannot be developed directly from skills. To apply a multiechelon approach, one must understand the relationships among resources, skills, capabilities, and capacity.

The figure below is a simplified depiction of the elements of public works capacity in a local government. Available resources, coupled with skills, create the capability. The grouping of several capabilities builds capacity. Here, resources and construction skills create construction capability. The public requirement, construction, and management capabilities build the public works capacity. Skills may not be unique to a capability, and capabilities are not



necessarily unique to capacities, but the figure does not depict this possibility.

For engineers, the need for a host nation to possess public works capacity creates new challenges. Instead of delivering a project or executing a mission in support of a maneuver unit, the engineers must focus resources on improving host-nation skills, capabilities, and capacity. The engineer headquarters must enable capacity building during project execution. An example that illustrates the relationships among skills, capabilities, and capacity may be useful. Suppose that an engineer unit receives the mission to construct a police station. The unit can use its resources, funding, and personnel to execute the mission by purchasing materials for troop construction, or it can attempt to obtain a construction contract. However, while considering a construction contract, the unit determines that there is no host-nation contractor available for, or capable of, executing a construction contract. This lack of civil capacity means the unit must complete the construction mission with its own personnel, but it also presents an opportunity to build host-nation capacity.

Rather than directly executing the project, the unit can seek unemployed local nationals and train them as carpenters, masons, electricians, and plumbers. After a training period, the unit can use the trainees, through on-the-job training, to execute the project. Army engineers provide the drawings, materials, supervision, and coordination with host-nation officials for the actual construction of the police station. Multiple iterations of such activities could result in developing a pool of skilled host-nation workers.

If skilled workers already exist but host-nation construction companies do not, the engineer unit can serve as a general contractor. The unit can build construction capability by hiring the skilled workers and training native personnel as superintendents and quality control managers —thereby teaching future contractors who can bring local skilled workers together for new projects. Potentially, by working with the local government, the unit could train and mentor a local agency in contracting for supplies, workers, and project development and implementation. Such practices lead to building or increasing capability within the host nation. Cumulatively, they can lead to increased capacity within the host-nation government and society.

Responsible government agencies require training or mentoring to develop programs that identify and prioritize requirements for public works such as police stations. Key agency responsibilities include acquiring funding, determining which projects to execute, and managing project execution. When key government agencies can do this in conjunction with sufficient construction and management capabilities, the host nation has increased its capacity. Increasing capacity is a very difficult task to undertake. It is outside the bounds of what an engineer unit would normally attempt, but capacity building is still within the realm of project managers. Field grade leaders can easily identify the requirements and interrelated actions. As a minimum, engineer leaders can conduct the initial assessment and make a proposal for increasing capacity. The point is that engineers can increase skills, capabilities, and capacity while identifying gaps for the host nation and contribute even more significantly to conflict transformation.

The intent of the example on page 19 is to show the relationships among skills, capabilities, and capacity. During my 15 months in Iraq, many people talked of increasing the capacity of the Iraqi security forces, ministries, or provincial governments. What was often missing was a discussion of whether the particular Iraqi elements had the skills and capabilities required to increase their capacity. We usually provided resources and mentoring in the belief that we would build capacity, but too often we missed the mark. If we understand how resources, skills, capabilities, and capacity are related, we can effectively work to improve skills and capabilities, use resources, and build host-nation capacity. Instead of simply executing projects, engineers could be an important participant in the capacity-building process and add significant value to stability operations. This is equally true for theater engagement.

Summary

Again this year in *Cobra Gold*, the United States Army Pacific's annual engagement exercise with Thailand, planners will determine the best project to build based on U.S. training objectives and the needs of the host nation. Rather than looking back over the past 20 years at 20 successful projects, we might better apply a capacity-building framework that focuses on the relationships between resources, skills, capabilities, and capacity building. Then perhaps, 20 years in the future, instead of looking back at deteriorating projects, we could look back at the number of trained, skilled workers; new construction businesses; and innumerable projects planned and coordinated by the regional government and built through host-nation capacity. Such successes would contribute to achieving the U.S. objectives of a stable and vibrant modern nation-state. Such an achievement would be equally viable in Iraq and Afghanistan.

Colonel Eckstein is Commander, United States Army Corps of Engineers, Vicksburg District. He is the former division engineer and chief of staff, 25th Infantry Division, and Commander, 84th Engineer Battalion. He is a professional engineer in Florida and Virginia.

Endnotes

[1]FM 3-07, *Stability Operations*, 6 October 2008.

[2]FM 3-34, *Engineer Operations*, 2 April 2009, para. 5-34, p. 5-9.

[3]FM 3-34, para. 5-34, p. 5-9.

[4]FM 3-07, para. 2-6, p. 2-2.

[5]Engineer Regulation 5-1-16, *Capacity Development–International*, 30 June 2009.

[6]FM 3-07, p. Glossary-3.

[7]Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001, p. 74.

Army Training Support Enterprise: A New Paradigm for Training Support

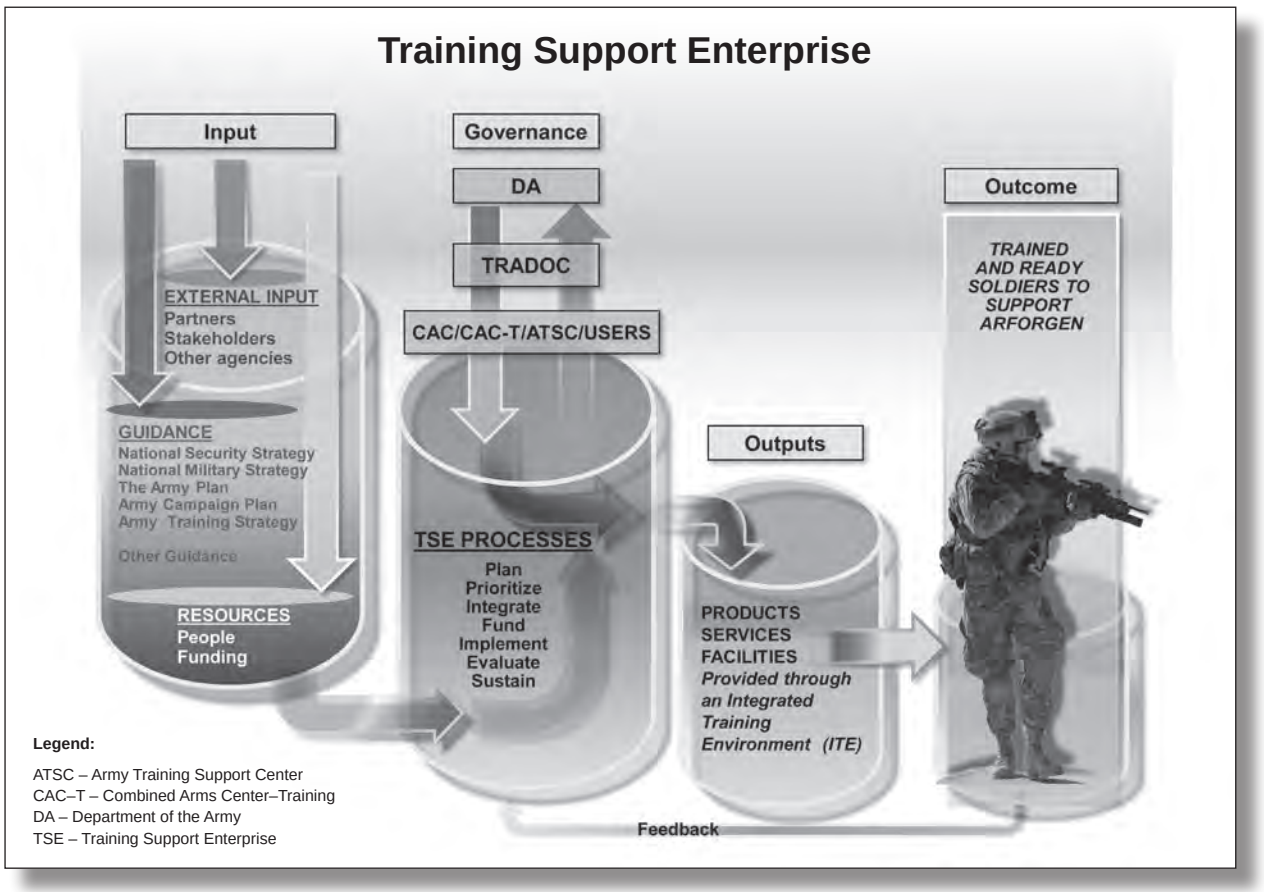
"To be prepared for war is one of the most effective means of preserving peace."

—General George Washington

By Ms. Deborah O. Billups

Since the Revolutionary War, the United States Army has prepared its Soldiers to conduct their wartime missions through extensive training. That training has often required some type of training enablers—whether people, facilities, products, or services—that allow Soldiers to meet the training standard under conditions that closely replicate those encountered during their mission. Today, we refer to those enablers as training support. More specifically, we define *training support* as encompassing the training information infrastructures, products, materiel, personnel, services, and facilities to enable integrated training and education. Training support develops and sustains leader, Soldier, and civilian competencies and enhances unit readiness across the institutional, operational, and self-development training domains in an *integrated training environment*.

While the look and feel of training support has changed significantly because of the continuous and significant advances in technology, the intent—to ensure that Soldiers and civilians have the training enablers necessary to prepare them to accomplish their mission during both war and peace—has not. This becomes increasingly challenging as we continue to operate in complex environments that require innovative training and training support solutions to ensure the success of our Soldiers and civilians, whatever their missions. One of the first steps in ensuring relevant training support solutions is establishing a comprehensive Army Training Support Enterprise that provides relevant



The complex TSE governance process in achieving the critical outcome—trained and ready Soldiers

training support capabilities responsive to the needs of Soldiers, civilians, leaders, and mission/combatant commanders and ensures Army readiness.

What Is an Enterprise?

Army Regulation 25-1, *Army Knowledge Management and Information Technology*, defines an enterprise as "the highest level in an organization; it includes all missions, tasks, and activities or functions."[1] This definition can be applied to the Training Support Enterprise since it represents the entire organization of training support, including all the processes, actions, and functions necessary to develop and deliver integrated, operationally relevant training support capabilities.

While the Army currently has a Training Support System (TSS) Enterprise, it is limited in scope. It is composed of the Sustainable Range Program (SRP), Integrated Training Area Management (ITAM) Program, Soldier Training Support Program (STSP), Battle Command Training Support Program (BCTSP), and the Combat Training Center (CTC) Modernization Program. These programs are managed collectively and include many training support capabilities—including ranges; instrumentation; training aids, devices, simulators, and simulations (TADSS); services; and personnel.

As broad as the current TSS Enterprise appears to be, it represents only a portion of all the training support capabilities that have grown over the past 10 to 15 years and even those on the horizon. Some of the other programs and their capabilities that should form the Enterprise include, but are not limited to—

- Army Training Information System (ATIS).
- Distributed Learning (dL) products and services.
- Standards in Training Commission (STRAC) for ammunition.
- Training development, delivery, and student management processes and tools.
- Mobile learning and interactive multimedia capabilities.

Although this is not a complete list, it does represent an expanded view of what the Enterprise must encompass to provide comprehensive training support.

Why Do We Need an Expanded Enterprise?

The advance of information technology, the demands of an era of persistent conflict, and the Army Force Generation (ARFORGEN) model have necessitated a change in training support capabilities and how that support is executed—from providing essentially institutional and home-station training support capabilities to mobile, reconfigurable, integrated, and interoperable capabilities to Soldiers and civilians at any time or place. Most of the training support capabilities of today do not have these characteristics.

The capabilities of the existing Enterprise are often developed independently within functional "silos," resulting in training support solutions that are redundant and not interoperable, integrated, or reconfigurable. For example, capabilities for classrooms are developed independently, based on the type of facility—such as a dL Classroom XXI, Digital Training Facility (DTF), or Institutional Battle Command Arts and Sciences Program (I–BCASP) classrooms. While they all serve as classrooms and require networked infrastructures and facility support personnel, they are developed in parallel because they are funded through different programs and their purpose and audience may be different. These training support facilities typically compete for limited resources and do not provide the most efficient responses to current and future force requirements.

Without Training Support Enterprise processes that eliminate stovepipes and enable integration and synchronization of capabilities, we will continue to develop inefficient training support solutions that are not fully responsive to the needs of the customers. Applying the Training Support Enterprise solution to the training facility example should result in the development of fewer facilities at a lower cost with more varied capabilities to support several different purposes and audiences.

How Do We Get There?

The United States Army Training and Doctrine Command (TRADOC) recognizes these shortcomings and has designated the United States Army Combined Arms Center (CAC) to lead the effort to establish a holistic, integrated approach for managing training support through the expanded Training Support Enterprise.

CAC is taking steps to ensure that an expanded Training Support Enterprise becomes a reality. The first key step is educating those involved in training support on the *who, why, what, when, where,* and *how* of the Enterprise. It is conducting meetings and briefings with many of those involved at all levels to describe the Training Support Enterprise, communicate the value added, establish responsibilities, and gain consensus. This effort will encourage leaders to take a holistic view of Training Support Enterprise objectives, processes, and resources and empower them to act cohesively to integrate related training support functions.

Additionally, CAC and others in the training support community have begun working together to define the governance processes critical to ensuring that objectives are achieved, risks are managed appropriately, and resources are used responsibly. The governance processes will provide the means to bring together training support managers and others involved in training support under a single umbrella to collaboratively identify like requirements and opportunities for leveraging capabilities across programs and lines of operation (LOOs). Specifically, the governance processes will—

- Ensure that training support capabilities are linked with approved training strategies.
- Provide a means to holistically identify gaps and eliminate redundancies.

(Continued on page 24)

ARMY RESERVE UPDATE

By Colonel Jose E. Cepeda

These are exciting times to be a United States Army Reserve engineer. The Army Reserve grew as an organization to a record-breaking strength exceeding 208,000. Of that number, more than 16,000 Army Reservists proudly serve the Regiment in 2 theater engineer commands (TECs), 4 engineer brigades, 2 maneuver enhancement brigades (MEBs), and 26 engineer battalions. We comprise 25 percent of the total Army engineer force. Since 2001, the Army Reserve has downsized from 298 to 248 engineer units. Yet, it continues to support the full spectrum of operations from engineer units in 41 states and territories. Since 2002, 94 percent of all Army Reserve engineer units have deployed. Since 11 September 2001, more than 13,000 Army Reserve engineers have answered the call to duty.

We welcomed the return of the 416th TEC's deployable command post (DCP), the 926th Engineer Brigade from Iraq, and the 420th Engineer Brigade from Afghanistan in 2009. The United States Army Engineer School started a new initiative to include all returning engineer brigades in its lessons learned program and dispatched a team to the 926th Engineer Brigade in May 2009 and again in August 2009. In addition, the Engineer School sent an assistance team to the 412th TEC's DCP at Camp Shelby, Mississippi, in August 2009. The 412th TEC's DCP, the 372d Engineer Brigade, and the 411th Engineer Brigade were also preparing for 2009–2010 deployments.

The Army Reserve is riding the winds of change as it transforms from a strategic reserve to an operational reserve. The United States Army Reserve Command (USARC) is moving from Fort McPherson, Georgia, to Fort Bragg, North Carolina; the Office of the Chief of Army Reserves will move from Washington, D.C., to Fort Belvoir, Virginia; and the United States Army Human Resources Command will move from Saint Louis, Missouri, to Fort Knox, Kentucky. The Army Reserve engineer community saw four new commanders at major units in 2009:

- 416th TEC (Major General Paul E. Crandall)
- 411th Engineer Brigade (Brigadier General David L. Weeks)
- 420th Engineer Brigade (Brigadier General James H. Doty Jr.)
- 926th Engineer Brigade (Brigadier General Bud R. Jameson Jr.)

Five Army Reserve engineers—the four officers named above and Brigadier General Eddie Chesnut, deputy commander of the 416th TEC—received general officer promotions.

The commandant and command group of the Engineer School attended many of the major Army Reserve engineer training conferences and exercises throughout the year, including the 416th TEC Senior Leader Conference in April and the 412th TEC Warfighter Conference in June. Major 2009 Army Reserve exercises included Operation Essayons at Fort Hunter Liggett, California, in May; Operation Sand Castle at the National Training Center (NTC) at Fort Irwin, California, in July; and Operation River Assault at Fort Chaffee, Arkansas, in July.

This year, Engineer School personnel will see Army Reserve engineers in action again, including:

- 412th TEC's Operation River Assault at Fort Chaffee, from 10–24 July
- Army Reserve engineer battalion rotations at NTC, from May to August
- Operation Essayons at Fort McCoy, Wisconsin, in July
- Castle Installation-Related Construction at Fort Dix, New Jersey, in July

In 2009, the Engineer School trained more than 2,500 Army Reserve officers, warrant officers, noncommissioned officers (NCOs), and enlisted Soldiers at Fort Leonard Wood, Missouri. This number does not include the 250 mobilized Individual Ready Reserve engineers the school trained. The Army mobilizes four multirole bridge companies per year—two of them Army Reserve units—which are trained and evaluated at Fort Leonard Wood. We have a strong Army Reserve NCO liaison team serving at Fort Leonard Wood to help retain Soldiers. In 2009, they exceeded United States

Army Training and Doctrine Command standards by keeping the Army Reserve attrition rate to a low 3 percent.

The Army Reserve will benefit from increased resident instruction time at Engineer School courses. The Basic Officer Leader Course increased to 17 weeks and, with the addition of the 201A construction engineering technician course, the Basic Warrant Officer Course increased to 26 weeks. We strongly recommend that new brigade and battalion commanders attend our premier course, the Engineer Precommand Course. The Engineer School is considering including new command sergeants major, as well. In addition, the Engineer School hosts an annual engineer Total Army School System trainer workshop and conducts critical skill review boards requiring active Army Reserve participation.

For 2009, the Army Reserve nominated candidates for all appropriate regimental award categories, as outlined in Fort Leonard Wood Pamphlet 672-1, *Itschner and Grizzly Awards*, *Sturgis Medal*, and *Van Autreve Award*.[1] Army Reserve regimental award nominations are sent to USARC in January and submitted to the Engineer School, and awards are presented at the annual ENFORCE Conference. The 2009 winners were as follows:

- *Itschner Award*: 955th Engineer Company, 489th Engineer Battalion, Fort Leonard Wood, Missouri
- *Outstanding Engineer Platoon Leader (Grizzly) Award*: First Lieutenant Christopher G. Smiley, 955th Engineer Company, 489th Engineer Battalion, Fort Leonard Wood, Missouri
- *Outstanding Engineer Warrant Officer Award*: Warrant Officer Three Nathan P.D. Harvel, 321st Engineer Detachment, 844th Engineer Battalion, Bethlehem, Georgia
- *Sturgis Medal:* Staff Sergeant Jay L. Kochuga, 336th Engineer Company, 463d Engineer Battalion, Youngwood, Pennsylvania
- *Van Austreve Award*: Specialist Ricky L. Weissend, 375th Engineer Company, 844th Engineer Battalion, Eva, Alabama

It has been a great honor and privilege to serve at the Engineer School. In February, my replacement, Colonel Aaron Walter, became the new Engineer School Deputy Assistant Commandant–Army Reserve. Colonel Walter will help support and carry the Army Reserve engineer community to the next level. Essayons!

Colonel Cepeda was Deputy Assistant Commandant–Army Reserve when he wrote this article.

Endnote

[1]Fort Leonard Wood Pamplet 672-1 was revised on 18 November 2009. The new title is *The Itschner, The Outstanding Engineer Platoon Leader, The Outstanding Engineer Warrant Officer, The Van Autreve, and the Morris Outstanding Civilian Award and the Sturgis Medal*.

("New Paradigm," continued from page 22)

- Establish forecasting, validation, prioritization, and integration criteria for program capabilities.
- Establish metrics that focus on outcomes.
- Synchronize varied processes and schedules with important Army drivers, including resourcing and policy decisions.
- Enable resource-informed decisions at the lowest possible level.
- Provide the analytics to enable rapid decisionmaking by leaders to adjust to mission, technology, and funding changes.
- Establish reporting requirements and processes that provide total asset visibility across the Enterprise.
- Apply knowledge management strategies and applications to enable rapid decisionmaking and identify second- and third-order effects of decisions.

What Are the Challenges?

But even with education and well-defined governance processes, establishing the Training Support Enterprise is a complex process that will not happen overnight. This broad undertaking includes a myriad of challenges that involve developing, delivering, and sustaining relevant training support capabilities. The greatest challenge, however, is change.

Establishing the Enterprise will require extensive systematic and synchronized activity to ensure the most efficient and effective use of limited resources. It will require conscious, deliberate actions by the many players who are committed to ensuring that training support is continuously acquired, managed, maintained, sustained, and disposed of in the most effective and efficient manner possible. Additionally, it will require leadership commitment, guidance, and support to ensure that those involved in the Enterprise judiciously execute their responsibilities.

What is the End Result?

With everyone working together, the end result will be a Training Support Enterprise that distributes available resources to achieve the optimal balance between effectiveness, efficiency, and strategic risk. It represents a new paradigm for training support to better enable Army readiness and respond to the needs of Soldiers, civilians, and leaders anytime, anywhere.

Ms. Billups is a concepts and plans specialist at the Combined Arms Center–Training, Army Training Support Center, Fort Eustis, Virginia. She holds a master's in education from Old Dominion University.

Endnote

[1]AR 25-1, *Army Knowledge Management and Information Technology*, 4 December 2008, p. 120.

Multitasking Under Fire

By Captain Daniel J. Lucitt

It is ironic that as the United States Army focuses on the modularity of its force, one unit strived for and succeeded in forming a legacy-type force. The effort was based on the needs of the current fight and the results could only be accomplished through flexibility. This common-sense determination was due to the foresight of the leaders of the 40th Engineer Battalion and the 2d Brigade Combat Team (BCT) of the 1st Armored Division, home-stationed in Baumholder, Germany. This article is not an argument for a return to the earlier structure of fighting force, but it serves as a good example of Army small-unit flexibility and versatility.

Assuming command, breaking apart task organization, retraining for a new mission under the parent battalion, and moving into a different operational environment were the jobs on the first quarter calendar of events for Charlie Company, 40th Engineer Battalion. The Army has come to a point where that kind of flexibility is the norm. Four or five years ago, flexibility was a buzzword that fit cleverly into every canned set of talking points. Now, flexibility—coupled with determination—is at the heart of the Army culture. Whether it's a field artillery battery that retrains to serve in a military police capacity or the Soldiers of an engineer platoon who serve as civil affairs escorts, the Army has come to employ all forms of flexibility effectively.

In October 2008, Charlie Company was to conduct a change of command while deployed in Baghdad, Iraq. Normally this is a run-of-the-mill activity, even while deployed. However, it was the fifth company-level change of command for the BCT in as many months. The only obstacle to the obligatory change-of-command inventories was the task organization of each of the company's platoons to different maneuver battalions organic to the 2d BCT. What made the inventories especially challenging was that the platoons



Third Platoon conducts an interrogation.

were located at different combat outposts and forward operating bases (FOBs).

Then the 2d BCT took control of the operational environment held by the 3d Brigade, 101st Airborne Division, nearly doubling the BCT's area of operations (AO). With this expansion, a second company of engineers would be needed to conduct route clearance throughout the gained area. Therefore, the battalion commander requested permission to reconstitute Charlie Company to accomplish the route clearance missions in the newly acquired AO. The 40th, a legacy engineer battalion, by now looked more like a special troops battalion. It had an engineer company assigned, while two others—Alpha and Charlie—were tasked to maneuver units. The battalion had administrative control of Signal Corps and Military Intelligence Corps companies, the required Headquarters and Headquarters Company, and administrative and logistics support of the brigade headquarters company.

Charlie Company was reconstituted at FOB Hammer to start company-level combat operations. In quick succession, the company had change-of-command and relief-in-place/transfer-of-authority ceremonies. Then the leaders turned their attention to retraining sappers who had previously been trained in route clearance but had performed other duties during the deployment thus far. The training plan included a "right-seat, left-seat" ride with the battalion's Bravo Company. It was determined that the retraining would take place before conducting the change-of-command inventories.

The focus of the training plan was to ensure that the noncommissioned officers (NCOs) were directly responsible for all training in their platoons. Three of the four platoon sergeants were explosive ordnance clearance agent (EOCA)-qualified and a select few squad leaders had attended one of the two available Route Reconnaissance and Clearance Courses. Responsibility for the training rested squarely on the shoulders of these leaders, who would perform the missions with the Soldiers.

The Soldiers needed to reinforce the basics of their route clearance skills and the fundamentally sound practices they had used throughout previous deployments. Theater-level Iron Claw Academy route clearance training[1] was offered to the company, but the leaders opted to trust the company's NCOs to pass along the training they had already received to bring the company together with a common mission. The plan worked, and within a few short missions the Soldiers were recording finds and reducing explosive hazards on the routes they patrolled, greatly reducing the risk to U.S. and coalition forces.

Route clearance operations and refresher training became the top priorities as Charlie Company continued its transition with Bravo Company, hindering the change-of-command inventory schedule. Training was scheduled to allow each platoon a day to refit, permitting time to conduct inventories and prepare for the next day's mission. This illustrated the old maxim that the mission comes first. The company's supply team members were recognized by the commander of Multinational Division–Center for their



Second Platoon's TALON robot (center) returns after emplacing C-4 on a positive find.



Charlie Company Soldiers follow as their Iraqi partners take the lead on a route clearance patrol.

efforts to ensure that inventories ran as smoothly as possible.

As the company reorganized for its new mission, a need developed for route clearance in the AO of 4th Battalion, 27th Field Artillery. This required a movement of forces from FOB Hammer to Camp Stryker. The need for a platoon to begin route clearance operations was a major forcing factor in moving the command post, additional engineer equipment, and containers. For the second time in the deployment, the company began decentralized operations in support of the BCT. The size of the company and the flexibility of each of its platoons ensured a seamless transition into the unit's new AO. The company was able to conduct route clearance operations independently within days of arriving, well before the rest of the BCT was established in its new home at Camp Stryker.

The entire company moved to Camp Stryker from FOB Hammer within 10 days, and the relief in place began before the company was fully reestablished. Due to the extensive equipment drawn during the relief in place—and throughout the remainder of the deployment—Charlie Company had a complement of more than 70 vehicles. Soon the unit assumed responsibility for the famed Route Tampa, a main supply route (MSR) for U.S. and coalition forces in Iraq. Although Charlie Company only "owned" a relatively small section of Route Tampa, the company took complete control of it. It also became the only route clearance company in-theater to clear Route Tampa and also have partnerships with the Iraqi Army and Iraqi Police. In addition to its route clearance missions along MSR Tampa, Charlie Company also was responsible for conducting route clearance for two more units, effectively doubling its mission load and operational tempo.

As a postscript to this multifaceted transition, Charlie Company maintained a partnership with Iraqi forces throughout the deployment, cleared Route Tampa several days a week, and cleared routes on the interior of its own brigade's footprint. At tour's end, the company had participated in five named operations, cleared more than 30,000 kilometers, and interrogated 335 explosive hazards. Those numbers read well for an entire tour, but the fact is that Charlie Company accumulated those numbers in just seven months and did it without fatalities.

In conclusion, the first quarter of fiscal year 2009 proved to many in the 2d BCT that the unsung efforts of just over one hundred sappers could accomplish Herculean feats. The facts are simple; in less than 30 days, the Soldiers went from a daily operational role with one set of missions to a daily operational role with a completely different mission set. The transition took place under fire during a change in leadership, with all the inventory requirements that such a change entails. At a time when leaders liken changing the Army's structure to steering an aircraft carrier and compare its efforts to a marathon rather than a sprint, a few dedicated engineers exemplified just the opposite. Those efforts proved vital and timely.

Captain Lucitt is Commander, Charlie Company, 40th Engineer Battalion. Commissioned in 2001, he has a bachelor's and is working on a master's in geospatial engineering. His previous assignments include the 1st Cavalry Division and 2d Brigade, 75th Infantry Division. He is a graduate of the Infantry Captains Career Course.

Endnotes

[1]Captain Scott F. Swilley, "Iron Claw Academy: Developing Route Clearance Capabilities in the Iraqi National Police," *Engineer Professional Bulletin*, Volume 38, July–December 2008, pp. 56–58.

The Brigade Engineer

By Major Gerald S. Law

This article compares the increased engineer cell duties for brigade combat teams (BCTs) conducting operations at Forward Operating Base (FOB) Fenty, Afghanistan, to engineer duties at Fort Carson, Colorado, and the Joint Readiness Training Center (JRTC) at Fort Polk, Louisiana. It also presents lessons learned for brigade engineers and units deploying to Afghanistan. It is not a manning discussion, nor does it propose manning adjustments.

In May 2009, 4th BCT, 4th Infantry Division, deployed from Fort Carson to Afghanistan in support of Operation Enduring Freedom. By late June, the BCT had assumed responsibility for Nangarhar, Nuristan, Kunar, and Laghman (N2KL) provinces, which cover more than 25,250 square kilometers in the eastern portion of Afghanistan. Furthermore, the region contains several Taliban-contested routes along the Afghanistan–Pakistan border, with mountainous terrain encompassing peaks more than 15,000 feet high; narrow, steep valleys; and the strategically important Torkham Gate.

Unlike previous deployments in Iraq, the BCT's mission in Afghanistan required deployment to more than 30 FOBs, combat outposts (COPs), and observation posts throughout N2KL, in elements ranging from squad to battalion size. FOB Fenty, the brigade tactical operations center, is in the city of Jalalabad, in the southern portion of the brigade's area of operations. Here, the BCT engineer cell assumed the engineer duties and responsibilities from the departing unit and began operations. Soon the engineer cell discovered it was overwhelmed and seriously undermanned.



Afghan workers construct a guard tower at a forward operating base.



Local nationals build a stone wall at a U.S. base.

Duties and Responsibilities

The brigade engineer coordinates "the use of engineer and other organic or augmenting assets to conduct combat (mobility, countermobility, and survivability), general, and geospatial engineering support to the BCT," according to Field Manual (FM) 3-90.6, *The Brigade Combat Team*. Simply, the brigade engineer is responsible for all engineer operations occurring within the brigade's area of operations. The responsibilities are the same whether the brigade is at its home station, a training center, or on a deployment. However, the duties can vary greatly. For example, FM 3-90.6 lists 11 duties for brigade engineers, but depending on the location—Fort Carson, JRTC, or FOB Fenty—they may not perform them all.

Fort Carson

The brigade engineer cell was virtually nonexistent at Fort Carson. The BCT was not directly responsible for the construction of its facilities, and there was no requirement to design, contract, approve, or fund the facilities within the BCT's footprint. A brigade engineer cell was not needed to track large-scale construction projects or enablers. Furthermore, there was no requirement to track improvised explosive devices (IEDs) or route clearance packages (RCPs) at Fort Carson. Therefore, the BCT decided an engineer cell was not needed and used the brigade engineer as the future operations (FUOPS) planner.

JRTC

The brigade engineer cell required minimal manning during its JRTC rotation. The BCT conducted an intensive and demanding training rotation at Fort Polk, but again, it was not responsible for the construction and expansion of its FOBs and COPs. No requirement existed for the brigade engineer or engineer cell to design, contract, fund, or track the facilities where the BCT operated. The major requirement for the engineer cell during the rotation was IED and RCP tracking, which BCT leaders decided could be performed by the assistant brigade engineer. IED and RCP tracking is a critical and important task, but it can be performed by one or two Soldiers. Therefore, JRTC operations required just one or two personnel in the brigade engineer cell with the brigade engineer again functioning as the brigade FUOPS planner.

FOB Fenty

Operations in Afghanistan require a dedicated brigade engineer and engineer cell. The owner of the area of operations is responsible for the construction, deconstruction, and expansion of its FOBs and COPs in Afghanistan. The United States Army Corps of Engineers (USACE), local and government contractors, facilities engineering teams, and division/corps engineers are not responsible for the brigade's construction. They are only enablers who have to be managed by the brigade. Therefore, the brigade engineer and engineer cell coordinate, contract, fund, and track

the enablers to ensure that FOB/COP construction and/or expansion operations are properly planned and executed.

Upon arrival, the brigade engineer assumed responsibility for more than 130 major construction projects occurring within the brigade's area of operations, not counting the Commander's Emergency Response Program (CERP) or USACE projects already under construction. Construction requirements increased significantly. Furthermore, the brigade engineer must coordinate and track the IEDs occurring and the RCPs operating within the BCT area of operations. Therefore, a dedicated brigade engineer and engineer cell are required during deployment.

Recommended Personnel

The following list describes the recommended personnel and associated duties found in the brigade engineer cell while conducting operations in Afghanistan:

Brigade Engineer (officer in charge of engineer cell)

- Provides engineer input for warning orders (WARNOs), fragmentary orders (FRAGOs), operations orders (OPORDs), movement orders, and deployment orders. Responsible for BCT engineer operations within N2KL.
- Informs division of all BCT engineer operations, to include FOB/COP construction, deconstruction, expansion, and RCP clearance and status.
- Coordinates RCP operations. Develops the RCP clearance schedule and ensures that it meets the BCT commander's intent. Tracks all RCP equipment, manning, and training, and keeps the BCT commander informed on all RCP issues.
- Coordinates with the BCT counter-IED cell. Advises the cell on all RCP operations and receives and implements advice for future RCP operations.

Assistant Brigade Engineer (engineer cell construction manager)

- Acts as FOB/COP construction manager. Ensures that Joint Funds Utilization Board (JFUB) packets from subordinate battalions are complete, accurate, and suitable. Ensures that purchase requests and commitments are completed and signed by the appropriate personnel. Provides design solutions and alternatives to battalion engineers.
- Acts as construction project approval and funding representative. Ensures that projects are loaded into the Project Information Management Portal. Collects all JFUB requirements from battalion engineers, prioritizes projects based on BCT commander's guidance, and presents the BCT projects to the JFUB for approval.

Logistics Civil Augmentation Program Coordinator

- Acts as Logistics Civil Augmentation Program (LOGCAP) manager. Processes LOGCAP requests from the battalions; assembles packets; ensures that the letter of justification is signed; submits a draft letter of endorsement to the logistical support officer and sends it to BCT supply (S-4) and contracting offices; and tracks all LOGCAP requests, work orders, and contractors.
- Manages Class IV supply items. Reviews all Class IV requests for justification and completeness and submits packets to the BCT S-4 for processing.
- Coordinates U.S. contractor affairs. Develops project list for contractor teams, coordinates contractor movement to FOBs and COPs within the BCT area of operations, and coordinates contractor bill of materials requests.

Environmental Engineer Representative

- Recommends improvements to the health and welfare of Soldiers living within the BCT area of operations and recommends environmentally friendly actions for coalition forces.
- Provides input to engineer plans, WARNOs, OPORDs, FRAGOs, movement orders, and deployment orders; advises the brigade engineer on all environmental issues.

Additional Personnel

Statement of Work Writer

- Assists the engineer cell construction manager with writing approved statements of work for construction packets.

Contingency Real Estate Support Team Agent

- Helps the engineer cell legally obtain land for FOB, COP, and observation post construction and expansion. Legally enters into contracts on behalf of the Army to pay for land obtained from local nationals.

Lessons Learned

The following list describes lessons learned for brigade engineers and units deploying to Afghanistan:

Go on the Predeployment Site Survey. The predeployment site survey (PDSS) will help you become familiar with your counterpart's duties and responsibilities several months before deployment. This allows you to validate your training plan at home station, which prepares you for assuming the brigade engineer duties once in-theater.

Inform the Command Group. Ensure that the command group, or at least the BCT operations (S-3) officer, understands before the deployment what the brigade engineer's role and responsibilities are. Ensure that the S-3 understands what the engineer requirements are at home station, training centers, and during deployment. Don't let it be a surprise that you will not be the FUOPS planner once you hit the ground.

Study the Army Theater Construction Management System. Initially, this should occur on the PDSS and later, during personal research. There are mainly four different types of construction within the BCT area of operations—B-huts, Southeast Asia huts (SEAhuts), and



Afghan workers constructed these B-huts at a combat outpost.

one- and two-story brick-and-mortar structures. Learning the types of construction, the cost of each, and construction timelines before arrival will save time during the turnover of responsibilities. The BCT commander won't care if you majored in political science. You wear the castles; you're the engineer. He will expect you to know the basic in-theater construction and how to manage and track it.

Learn the Army LOGCAP process. LOGCAP augments maneuver enhancement forces with civilian contractors. There are many enablers to help with in-theater construction. The brigade engineer must understand how they are managed, funded, and tracked. Refer to Army Regulation 700-137, *Logistics Civil Augmentation Program* (LOGCAP), for LOGCAP processes and objectives.

Emplace an Engineer Chain of Command Within the BCT. N2KL averaged more than 130 construction projects on 35 different FOBs, COPs, and observation posts. This does not count work orders, CERP projects, or USACE projects. Additionally, the engineer cell received hundreds of e-mails from each battalion requesting construction, improvement, and/or expansion. This overwhelmed the engineer cell on a daily basis. To overcome this, the brigade engineer requested that all battalions designate a "battalion engineer" who could prioritize construction requests, turn in basic designs, track construction at the battalion level, and send reports to the brigade engineer.

Know the Duties and Responsibilities of the Brigade Engineer. Learn what is listed in FM 3-90.6. Your command group will use this as a reference. You may or may not perform the duties at home station, but you will during deployment.

Conclusion

The brigade engineer's responsibilities are the same regardless of location; however, the duties can differ greatly. At home station, the BCT is not directly responsible for the construction, deconstruction, and/or expansion of its facilities, COPs, and FOBs. Furthermore, there is no requirement to track IEDs and RCPs on an hourly basis at home station. This leads many BCTs to reduce or eliminate their engineer cells entirely and form them into a planning or training cell.

Training centers implement a requirement to track IEDs and RCPs throughout a BCT training rotation, but a requirement to implement construction enablers and manage them does not exist. For example, BCTs are not required to construct, deconstruct, or expand the COPs and FOBs where they operate during training. Many BCTs establish a small engineer cell to track IEDs and RCPs; however, this does not accurately portray the BCT construction requirements associated with conducting operations in-theater.

The BCT requires a dedicated brigade engineer and engineer cell while conducting counterinsurgency (offensive, defensive, and stability) operations in Afghanistan. Construction, a major component of stability operations, occurs on a large scale in support of coalition forces and local nationals. While the BCT is deployed, there are many agencies available to design, contract, and fund construction projects; however, the BCT is responsible for managing enablers and tracking projects. Therefore, the brigade engineer has a demanding and important responsibility to fulfill while the BCT is deployed, which requires a dedicated engineer cell able to coordinate numerous construction projects, track IEDs, and manage RCPs.

Major Law is the brigade engineer for 4th Brigade, 4th Infantry Division. Past assignments include detachment commander and battalion operations officer with 3d Battalion, 61st Engineer Regiment, 5th Armored Brigade (Training Support Brigade), First Army; assistant brigade engineer, company commander, 44th Engineer Battalion, 2d Infantry Division; platoon leader, 618th Light Equipment Engineer Company, 82d Airborne Division; and platoon leader and assistant brigade engineer, 307th Engineer Battalion, 82d Airborne Division. He holds an associate's in welding engineering from Ricks College; a bachelor's in industrial engineering from Utah State University; a master's in geology and geophysics from the University of Missouri-Rolla (now Missouri University of Science and Technology); and a master's of military arts and sciences from the United States Army Command and General Staff College.

NATIONAL GUARD SOLAR POWER PROJECTS

By Dr. JoAnne Castagna

President Barack Obama said during his inauguration speech on 20 January 2009, "We will harness the sun and the winds and the soil to fuel our cars and run our factories." Mr. Obama and the new administration believe that renewable energy is part of our nation's successful future, possibly because the federal government has already experienced positive results in this area. Under the federal government's Energy Policy Act of 2005, all federal government agencies are required to use some renewable energy. One agency that is continuing to do this successfully is the United States Army National Guard, with the assistance of the United States Army Corps of Engineers (USACE).

Recently the New Jersey Army National Guard sought the expertise of the USACE New York District for construction of two solar power projects. These projects will not only help the Guard meet the country's energy laws but also save money on electricity and earn a profit from the state of New Jersey, which requires its citizens to support the use of renewable energy. Each year, solar system owners who generate more than 1,000 kilowatts of electricity that is connected to the public power grid receive certificates under the New Jersey Solar Renewable Energy Certificate (SREC) Program. These certificates are then publicly sold and traded to New Jersey businesses and individuals, enabling them to receive solar power benefits without building a solar power system themselves. The revenue is returned to the solar system owners.

The New Jersey National Guard is an owner of several solar power systems. They will continue to benefit from the SREC Program with the assistance of USACE, which is constructing two open-panel photovoltaic carport solar



Photo by Armando Jimenez, U.S. Army Corps of Engineer, New York District.

An example of solar power panels on a photovoltaic carport project at the Atlantic City Utility Authority in New Jersey (not constructed by USACE)

power projects for the New Jersey National Guard—one for their agency's Joint Forces Headquarters at Fort Dix and the other for their National Training Facility Headquarters at Sea Girt. To power these two buildings, USACE is erecting the carport structures over two existing parking lots at both locations and then setting up area lighting, inverters, transformers, switchgears, and electrical metering equipment. When the projects are completed, USACE will restore the parking lot pavement (which is already in good shape) by restripping and sealing cracks.

Supported by web steel joists and joist girders, the steel carport structures will have solar photovoltaic power panels—composed of modules—installed on top. Each module is made up of several solar (or photovoltaic) cells that absorb the sun's light and produce electricity—the larger panels producing more. The electricity is in the form of direct current (DC), which is not directly usable energy for a building. Most buildings require alternating current (AC) at a higher voltage. To make usable building power, the solar panel's DC is fed into an inverter that transforms it into AC at a higher voltage. This AC power is then sent to the building's main transformers, where it can be used by the buildings for their energy needs. The New Jersey National Guard's solar power system is tied into the public's power grid, and excess power is shared with the community.

When completed, both structures—including the panels—will be roughly the size of a football field. The Fort Dix project will generate approximately 240 kilowatts, and the Sea Girt project, approximately 238 kilowatts. Both projects are also being designed in a way that will provide the National Guard considerable energy savings during the high-energy-demand months of summertime. At Fort Dix, the panels are being angled for optimum performance. This will provide the Fort Dix building 40 percent of its summer energy needs and the Sea Girt building will provide 80 percent. Placing the panels on an angle also facilitates runoff of rain and snow.

The New Jersey National Guard will earn considerable money from electric bill savings and the state's SREC Program. In total, the Guard will save approximately $116,000 per year in electric bills and earn approximately $350,000 from the SREC Program. Besides these financial benefits, there are additional pluses that come with constructing solar power projects on new open-panel carports on existing parking lots.

Anyone installing a solar power system on an existing building roof, rather than a new roof, will typically have to remove the panels later to repair the roof as it gets old and leaks, which can be very expensive and time-consuming. The solar power system will also add weight or roof load to the existing roof, increasing its deterioration. As the project manager for the USACE New York District emphasizes, a roof may only have one year left, making it impractical to install panels atop it that can last 20 to 25 years. Additionally, placing panels on new roofs makes it unnecessary to acquire building or roofing permits to reinstall roof-mounted solar power systems.

Constructing on existing parking lots also has its benefits. For example, since storm water runoff isn't affected, there are minimal impacts to the environment. In addition, vehicles using the parking lot receive some shading from the sun. An open-panel carport design, as opposed to a solid ceiling structure, is a smart solution, since it prevents debris such as bird nests and snow from accumulating on the carport—which would require regular maintenance. In addition, a solid ceiling adds weight to the structure, requiring a stronger and more expensive structural support.

The project manager for the USACE New York District envisions an increase in solar power project construction and has the following suggestions for builders:

- Before begining a solar power project, seek advice from experts in solar and renewable energy, because they can help save considerable time and money. In the projects highlighted here, the USACE New York District collaborated with the USACE Engineer Research and Development Center, which has extensive experience working on solar power projects with USACE districts, the Department of Defense, and other federal agencies throughout the world.
- When designing a project, make sure the buildings to be provided with solar power are large enough to use most of the energy, or have a "big load," and are situated near the solar power panels. The farther a building is from the panels, the more energy it will take to transport the solar power energy to the buildings, resulting in lost efficiency. For example, solar power panels far out in a desert are impracticable; energy is always wasted when transporting power, since power transmission lines have inherent resistance and capacitance.
- Calculate ahead of time how much money customers will be saving in electric bills in the long run and find out if there are any energy credit programs they can benefit from, such as the state of New Jersey's SREC Program, so that the project is economically justified.

Both solar power projects are expected to be completed by this summer, and according to the New York District project manager, the New Jersey Army National Guard has asked USACE to perform additional solar power projects in the near future—all of which will help meet the nation's environmental goals and the President's renewable energy vision.

Dr. Castagna is a technical writer-editor for the United States Army Corps of Engineers, New York District, and can be reached at <joanne.castagna@usace.army.mil>.

JOINT ENGINEER OPERATIONS COURSE

By Lieutenant Colonel Shawn P. Howley (Retired) and Mr. Michael A. Dascanio

Today, the United States enjoys an overwhelming qualitative advantage not only in our fielded capabilities but also in our cognitive approach to our duties; sustaining and increasing this advantage will require a transformation achieved by combining technology, intellect, and cultural changes across the joint community.[1] Professional military education—Service and joint—is the critical element in officer development and the foundation of a joint learning continuum which ensures that U.S. armed forces are intrinsically learning organizations.[2] The Joint Engineer Operations Course (JEOC) will soon be recognized as a key joint professional military education Phase I (JPME–I) course for engineers.



A small-group leader conducts a class during the JEOC.

Course Description

The JEOC has two parts: a high-end Distributed Learning (dL) Phase and a Resident Phase of instruction designed to prepare selected engineer officers, noncommissioned officers, and government civilians for duty on a joint staff in support of the joint task force (JTF) engineer and joint force commander. Successful completion of the dL Phase is a prerequisite for Resident Phase attendance. It is a 48-hour, self-paced course that can also be incorporated as a standalone self-development course.

Distributed Learning Phase

The dL phase is composed of eight modules:[3]

- United States National Strategy
- Joint Operational Planning
- Joint Engineer Capabilities
- Joint Task Force Engineer Organization
- Theater Engineer Operations
- Transition Planning and Considerations
- Environmental Considerations
- Resident Phase Read-ahead Packet

To enroll in the course, students must first have an active Army Knowledge Online (AKO) or Defense Knowledge Online (DKO) account. Once an AKO/DKO account is established, students should contact course administrator Mr. Dwayne Boeres at <*dwayne.boeres@us.army.mil*> to process their enrollment.

Resident Phase

The Resident Phase is a rotational training course conducted at the United States Marine Corps Engineer School, Quantico, Virginia; the United States Army Engineer School, Fort Leonard Wood, Missouri; the United States Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio; and the United States Navy Civil Engineer Corps Officer School, Port Hueneme, California. The course consists of five days of large- and small-group, facilitator-led instruction with a common operational scenario that parallels the training offered at the Joint Forces Service College. The Resident Phase has multiple seminar and video teleconference discussions between students and deployed joint engineer staffs. The table highlights the dates and locations for the resident courses. The objectives of the Resident Phase are to give students the ability to—

- Describe joint operations, joint warfare, and the joint planning system.
- Describe, comprehend, and apply joint engineer doctrine.
- Describe, comprehend, and apply joint engineer planning using scenarios, historical examples, case studies, and practical exercises.
- Describe and comprehend Service engineer capabilities and support requirements.

- Describe, comprehend, and apply the strengths, effects, and basic doctrinal employment concepts of concepts of Service engineers.
- Describe, comprehend, and apply employment principles for using Service engineer capabilities to support joint and Service engineer requirements.[4]

Resident seating priority is based on the needs of the Service to educate and train joint staff engineer personnel. Potential resident students are divided into three bands, depending on their status and probability of participation with a JTF engineer staff:

- *Band 1.* Personnel assigned to a JTF, combatant command, or component command.
- *Band 2.* Personnel with a high probability of being tasked to help stand up a JTF.
- *Band 3.* Captains preparing to join a prospective JTF headquarters, and all others who would benefit from the JEOC.

JEOC Rotational Course Schedule

Fiscal Year 2010	Location	Fiscal Year 2011	Location
2–6 Nov	United States Marine Corps University— Quantico, Virginia	1–5 Nov	United States Marine Corps University— Quantico, Virginia
12–16 Apr	United States Army Engineer School— Fort Leonard Wood, Missouri	11–15 April	United States Army Engineer School— Fort Leonard Wood, Missouri
14–18 June	United States Air Force Institute of Technology— Wright-Patterson Air Force Base, Ohio	13–17 June	United States Air Force Institute of Technology— Wright-Patterson Air Force Base, Ohio
26–30 July	United States Navy Civil Engineer Corps Officer School— Port Hueneme, California	25–29 July	United States Navy Civil Engineer Corps Officer School— Port Hueneme, California

Course Review

In February 2010, the JEOC underwent a course review at the United States Joint Forces Command (USJFCOM), supported by engineer staff representatives from regional and functional combatant commands. The course review was also supported by the education and individual training programs of USJFCOM's Joint Training Directorate (J-7) and Joint Warfighting Center; Joint Knowledge Development and Distribution Capability; and Operations, Plans, Logistics, and Engineering Directorate (J-3/4).

The purpose of the course review was to improve its currency and relevancy through feedback from the joint engineer community. The review enabled the JEOC training development team to refine the course so it could be entered in the Army Training Requirements and Resource System (ATRRS) and meet the USJFCOM J-7 joint certification criteria to validate the JEOC as a course for JPME–I. The JEOC training development team is considering adjustments to the dL Phase to improve the course's joint education material.

The Way Ahead

The JEOC is a joint logistics staff initiative directed through the Joint Operational Engineer Board, and the course and course management team are hosted by the United States Army Engineer School.[5] More than 500 students have graduated from this course for the joint force and an additional 160 will graduate this fiscal year. Key to the long-term success of the JEOC is establishing formal requirements funding for the course from the Services to the Army through the United States Army Training and Doctrine Command's Training Requirements Analysis System and the Joint Individual Learning Content Certification[6] processes and maintaining currency through feedback from the joint engineer community. To become a member of our adjunct faculty to facilitate a Resident Phase, contact Mr. Shawn Howley at <*shawn-howley @us.army.mil*>; 573-563-5088; or DSN 676-5088.

Lieutenant Colonel Howley (Retired) recently assumed duties as the JEOC program and course manager. He has worked in leadership and organizational development for Army units for more than 20 years.

Mr. Dascanio is a lieutenant colonel in the United States Army Reserve. He serves as the technical director of Training and Leader Development, United States Army Engineer School at Fort Leonard Wood, Missouri.

Endnotes

[1]Chairman of the Joint Chiefs of Staff Notice 1800.01, 15 July 2009, <*http://www.dtic.mil/doctrine/education/edu_ojpme.htm*>.

[2]Ibid.

[3]Joint Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities Change Recommendation Document, 3 October 2008, pp. 5–7.

[4]Ibid, p. 9.

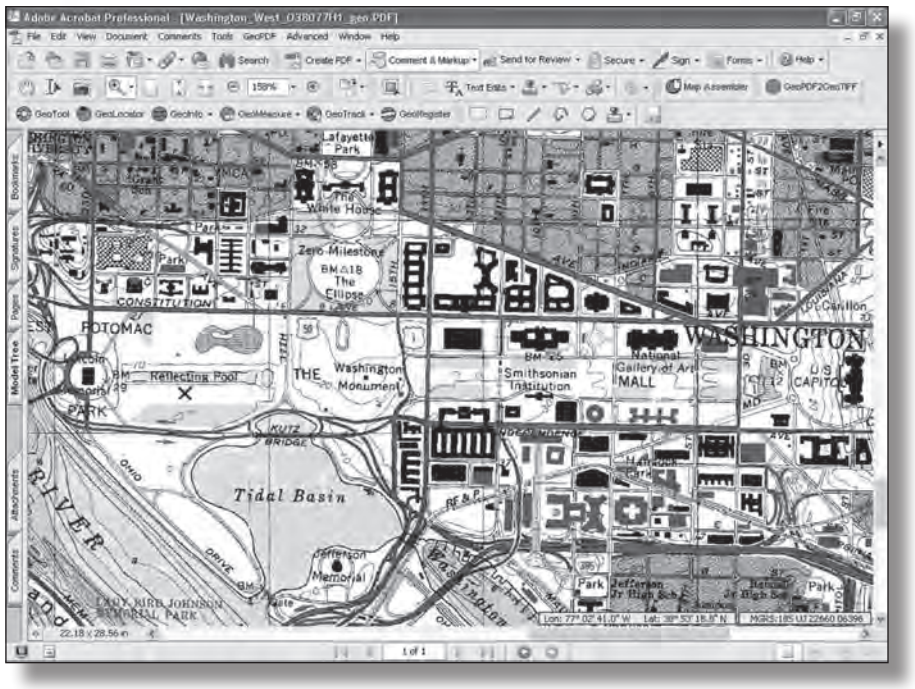
[5]Joint Engineer Operations Course Memorandum of Understanding, September 2008.

[6]Chairman of the Joint Chiefs of Staff Manual 3500.03B, 31 August 2007.

The GeoPDF Project: Creating Maps for the Non-Mapper

By Mr. Raymond G. Caputo

Organizations that use geospatial data have valuable information locked inside complex applications that only a small number of professionals understand and know how to use effectively. This poses a significant challenge to those attempting to transfer this information to less-skilled end users. United States Army operational and humanitarian missions rely heavily on such data, but many of its Soldiers do not have the time, training, or resources to translate it into actionable information. The United States Army Geospatial Center (AGC) (formerly known as the Topographic Engineering Center), Alexandria, Virginia, discovered and embraced an innovative means of converting complex, intricate National Geospatial–Intelligence Agency (NGA) and United States Geological Survey (USGS) geospatial information system (GIS) and map data into the portable document format (PDF) developed by Adobe® that lets users understand and exploit data without requiring advanced training in GIS applications.



A GeoPDF of the National Mall in Washington, D.C.

Easy Map Sharing

The Georeferenced PDF (GeoPDF), developed by TerraGo® Technologies, lets GIS professionals share georeferenced maps and data in PDF documents. A GeoPDF can be sent to field personnel from engineers on the scene of natural disasters such as Hurricane Katrina or to Soldiers in the field who can use Adobe Reader® to manipulate maps. Most computers are equipped with Reader as part of their baseline software, and each Army geospatial engineering team has the full assortment of TerraGo tools to produce mission-specific products as GeoPDFs. A free, user-friendly plug-in from TerraGo, known as the TerraGo Desktop, is the only requirement to view GeoPDFs. This plug-in has been added to the Army Golden Master disk, the standard software load for Army desktops and servers. Files are small and nimble, yet are embedded with powerful capabilities that allow engineers to work in connected or disconnected modes.

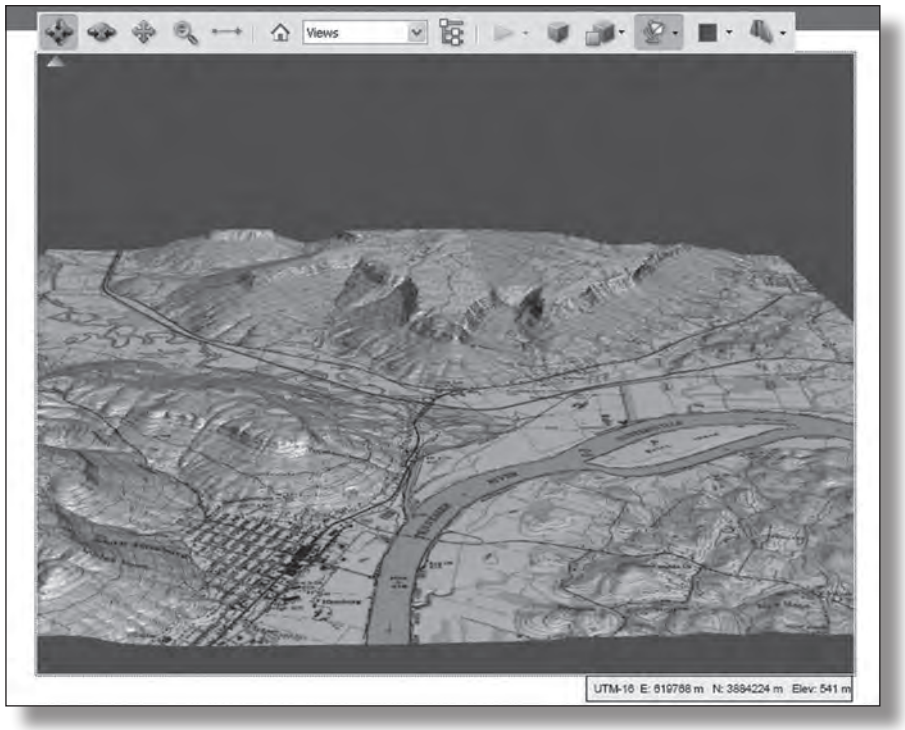
Both types of GeoPDFs, raster and vector, provide a scalable display of the digital map or image with crisp, clear delineation of roads, rivers, contour lines, and other features as the user zooms in for a closer look. The raster files are composed of paper maps that are scanned or developed from existing electronic map files saved as PDFs and georeferenced using the TerraGo Composer® solution. The vector files have an added function that enables users to turn data layers on or off to help clarify analysis of map displays. The use of TerraGo applications for GIS software, such as ArcGIS™ and Intergraph GeoMedia®, creates these vector GeoPDFs.

AGC created GeoPDF digital versatile discs (DVDs) for most countries of the world through its partnership with the NGA Research Center, which has produced GeoPDFs of most of its standard map sheets. AGC distributes these files, but is working on an agreement with NGA to produce, maintain, replicate, and disseminate them via the Defense Logistics Agency's map catalog. The center will continue to use Army resources to create new and updated NGA map sheets as GeoPDFs until this goal is accomplished. Updated DVDs are expected to be made available by fall 2010. For copies of GeoPDF country DVDs, go to <*http://www.agc.army.mil/cmb/index.html*> for the "Data request form." To see the GeoPDF map data that is the basis for the DVDs, go to <*https://cac.agc.army.mil/Products/MapArchive/*>

(common access card [CAC] required). AGC will create GeoPDF DVDs for all 50 states and work with USGS to maintain, replicate, and disseminate them.

Aiding Other Soldier Needs

While working with the Army geospatial engineering team, AGC personnel realized that GeoPDFs could address other facets of Soldier mapping efforts, including the creation of map backgrounds. This could be accomplished if more mainstream GIS software could read and write GeoPDFs and multiple sheets could be combined into a map background. Therefore, AGC funded the creation of a software application called TerraGo Map Assembler®, which is included in TerraGo Composer®, and the capability to view GeoPDFs in Environmental Systems Research Institute's™ ArcGIS™, which is included in TerraGo Publisher® for ArcGIS.



A GeoPDF of a three-dimensional map of the Tennessee River Valley

AGC also had a hand in converting all the nearly 60,000 USGS Digital Raster Graphic GeoTIFF files (based on the tagged image file format) into GeoPDF using TerraGo Publisher for Raster. USGS posted the files on its store website, where an average of nearly 250,000 GeoPDF files have been downloaded each month, compared to the 4,000 monthly downloads before the availability of GeoPDFs.

AGC will convert all NGA's Arc Digital Raster Graphics (ADRGs) into GeoPDFs. ADRG covers most the world at different scales—1:1,000,000 scale for most of the world, down to 1:25,000 for small areas around the globe. ADRG is the basis for NGA's creation of the Compressed Arc Digital Raster Graphics (CADRG). AGC is also working with NGA to get all of NGA's geospatial intelligence products (maps, charts, and images) into GeoPDFs and to update current files to support the import and export of geospatial data with Reader for data exchange, or round-tripping as it is called by Adobe. It has also developed its Urban Tactical Planner™ (UTP) in GeoPDFs, along with engineering route studies, urban water graphics, country overviews, GeoPDF BuckEye map books, cultural maps, and the AGC library's non-NGA maps and atlases.

GeoPDFs Available at Websites

AGC also disseminates GeoPDFs via its websites. The following were recently added to its GeoPDF webpages:

- Unclassified Haiti GeoPDF country coverage and miscellaneous GeoPDFs of Haiti
- GeoPDF UTPs for Bolivia, Brazil, Colombia, Cuba, Haiti, Iran, Iraq, Morocco, Panama, Peru, and Somalia
- Country overviews for Benin, Bissau, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Haiti, Liberia, Mauritania, Namibia, Senegal, Sierra Leone, Tunisia, Western Sahara, and Yemen
- Camp Swift, Texas
- NGA image base maps of Mexico

AGC continues to work with TerraGo Technologies to ensure that its handheld Windows® Mobile GeoPDF software meets Army requirements. The center is also assisting TerraGo Technologies in its efforts to market a three-dimensional GeoPDF prototype.

GeoPDF data sets are available at the following websites:

- PKI (common access card required): <*https://tsunami.tec.army.mil/Products/MapArchive/*>
- SIPRNET: <*www.agc.army.smil.mil/Products/MapArchive/*>
- JWICS: <*http://www.agc.army.ic.gov/Products/MapArchive/*>

For more information about the Army GeoPDF program or to order copies of GeoPDF country DVDs, visit the websites above or contact the author at <*raymond.caputo@us.army.mil*>. Readers are also encouraged to contact Mr. Caputo if they know of any GeoPDFs being produced by other organizations.

Mr. Caputo is a geographer with AGC's Geospatial Requirements Integration Branch, United States Army Corps of Engineers, Alexandria, Virginia.

Welcome Addition:

210A Warrant Officers in Modular Engineer Companies

By Captain John A. Dills III

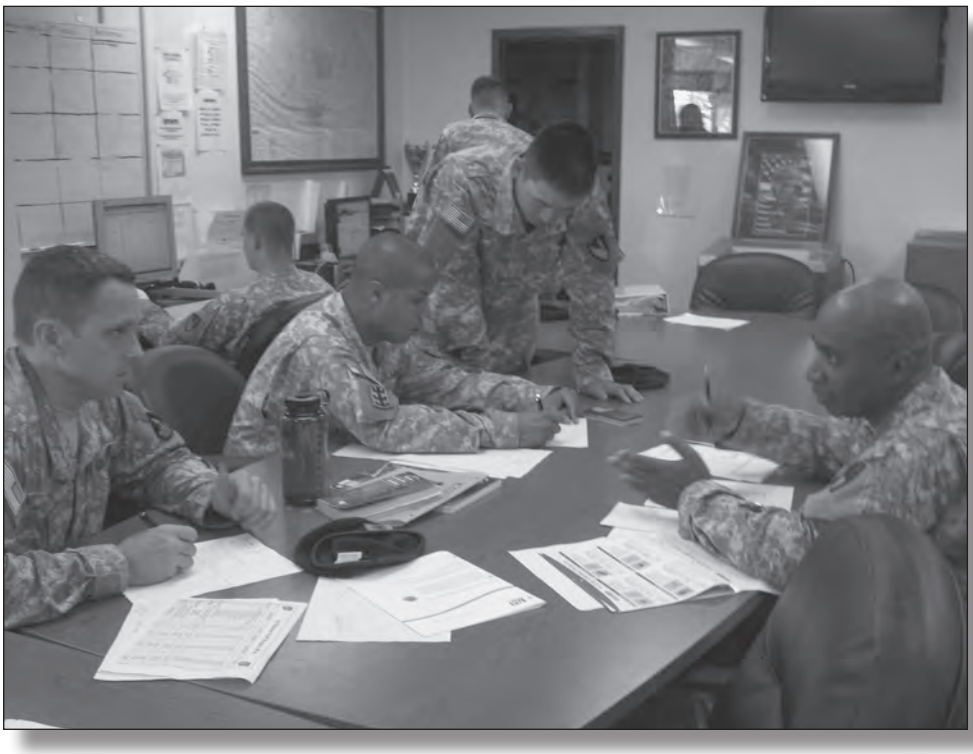
In recent years, our Engineer Regiment and Corps have undergone transformation, and this transformation has been especially profound for construction units. One of the most significant changes was the addition of a military occupational specialty (MOS) 210A Construction Engineering Technician[1] to vertical construction companies. With this addition comes the question: What is the best way to integrate a warrant officer into those companies? The 554th Engineer Company considered this question in early 2008 and employed a plan that effectively integrated and synchronized these construction experts.

Prepare to Receive

It was important to consider two issues when integrating 210As into the company's command structure. The first issue was related to leadership and responsibility. By adding a warrant officer to a platoon, there was the potential for conflict with the platoon leader and platoon sergeant. Furthermore, Soldiers who were accustomed to the established chain of command could become confused about the role of the warrant officer. The 554th avoided this conflict by placing the warrant officers under the direct supervision of the company commander. Likewise, the warrant officers' rating chain did not include the platoon leaders; instead, it was linked to the company and battalion commanders.

The second consideration was the Regiment's intended role of the warrant officer. The 210A Branch Manager provided guidance on the company's plan and the Regiment's intent. After hearing the company's proposed plan to use the warrant officers as technical advisors, the branch manager agreed that the company's plan and suggested rating chain were in keeping with the Regiment's intended use of the 210As in the modular force.

Having determined how to best use the warrant officers, the company turned its attention to the integration of these welcome additions. To accomplish this task, the company commander contacted the warrant officers identified on the unit's "Gains Roster" to welcome them and to gather their expectations of how they would fit into the company's command structure.



Members of the 554th Engineer Company go over plans for a new project.

Then the company developed a detailed initial counseling to enable the warrant officers to assume their role and responsibilities with a clear understanding. The counseling expressed requirements far beyond their technical title. They were charged with assisting in mentoring, guiding, and developing the lieutenants and Soldiers in their platoons. In addition, they serve as a unique source of advice and influence within the platoons. As such, they report directly to the commander with their recommendations on ways to resolve prolonged conflicts.

Integration

During a "Leader's Luncheon," the company commander stressed

that the 210As are the company's technical expertise placed within the platoons to enhance the platoon's construction efforts. Additionally, the 210As within the platoons were not to assume or serve in supervisory positions, but to assist, guide, and mentor the platoon on engineering and construction tasks. Furthermore, the commander explained that the 210As were the company's internal quality control and quality assurance points of contact. The 210As would serve as the initial points of contact for outside entities as the platoons pressed forward with their missions. This would enable the lieutenants to focus on the administration and project management of their respective platoons while allowing their platoon sergeant to dedicate more time to personnel management and mentoring the unit's future noncommissioned officer leadership.

Key to Success

By having this distinct division of labor, the company not only created an efficient system of checks and balances but also laid the foundation for effective cooperation and communication within the platoons' leadership and clearly defined the positions and responsibilities of all involved. In retrospect, this was the key to success.



Captain Dills is a project engineer for the United States Army Corps of Engineers, Tulsa District, with duty at Fort Sill, Oklahoma. Previously, he was commander of the 554th Engineer Company; assistant operations officer, construction officer, and logistical officer in the 92d Engineer Battalion; and sapper platoon leader, brigade engineer, and theater construction officer in the 3d Infantry Division—all at Fort Stewart, Georgia—and was Chief of Facilities and Plans, Multinational Corps–Iraq. He holds a bachelor's in architectural design from Morris Brown College and a master's in architectural planning from Florida Agricultural and Mechanical University.

Endnote

[1]Effective 1 February 2010, the 210A MOS title changed from Utilities Operation and Maintenance Technician to Construction Engineering Technician.

Note: The author wishes to thank the following people for their contributions to the article: LTC Diana Holland, Commander, 92d Engineer Battalion; CW4 Lee Morris, 210A Branch Manager, Human Resources Command; MAJ James Schultze, Operations Officer, 92d Engineer Battalion; MAJ Andrew Kelly, Executive Officer, 92d Engineer Battalion; WO1 Larry Butterworth, 210A, 554th Engineer Company (Vertical); and WO1 Tyrone White, 210A, 554th Engineer Company (Vertical).

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 photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint®. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a website must be accompanied by copyright permission.

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

Articles submitted to *Engineer* must be accompanied by a written release by the author's unit or activity security manager prior to publication. All information contained in the article must be unclassified, nonsensitive, and releasable to the public. *Engineer* is distributed to military units worldwide and is also available for sale by the Government Printing Office. As such, it is readily accessible to nongovernment or foreign individuals and organizations.

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

Send submissions by e-mail to <*leon.engineer@conus.army.mil*> or on a CD in Microsoft Word, along with a double-spaced copy of the manuscript, to: Managing Editor, Engineer Professional Bulletin, 464 MANSCEN Loop, Suite 2661, Fort Leonard Wood, Missouri 65473-8926.

Note: Please indicate if your manuscript is being considered for publication elsewhere. Due to the limited space per issue, we usually do not print articles that have been accepted for publication by other Army professional bulletins.

USACE Projects Impact Iraq's Environment

By Mr. Ronald A. Reeves and Mr. Scott D. Harris

The Army's focus on environmental sustainability is evident in projects in the Iraq theater of operations where the United States Army Corps of Engineers (USACE) Gulf Region District (GRD) manages construction.[1] Solar-powered street lights installed in Fallujah, for example, use the sun's renewable energy, balancing the needs of the environment and communities by providing power, conserving natural resources for other uses, and improving air quality through reduced air emissions.

Greater Environmental Ethic

Environmental conservation is not something that was practiced during Saddam Hussein's regime, but in visits by USACE team members to more than 200 project sites throughout Baghdad and Al-Anbar provinces, many Iraqis indicated that they were in survival mode—worried about feeding their families, having a roof over their heads—and found it difficult to get excited about other issues. However, as the Iraqi security situation has improved, citizens are able to focus on other needs and may embrace a greater environmental ethic as time goes on.

Since no one wants to live in an environment strewn with trash—or where children walk in open sewer drainage ditches, or where the purity of water or air is questioned—projects that are built in partnership with the government of Iraq, the U.S. government, and GRD are providing essential services that many Americans take for granted, such as clean water and sewage removal.

Of significance is the Sadr City Water Treatment Plant, which provides 200,000 Sadr City residents with clean, potable water—and employs numerous local Iraqis for facility operations, maintenance, and administration. The three-year, $65 million endeavor supplies water to 27 sectors in Sadr City at a rate of 4,000 cubic meters per hour. Also completed is the restoration of the Khark Water Treatment Plant north of Taji, which contributes 43 percent of the potable water to Baghdad. Three neighborhoods, or *mahallas*, in south Baghdad received nearly 41 miles of water mains, ranging from 4- to 12-inch pipe. The dearth of potable water supply networks in Baghdad and elsewhere has been addressed by projects that have helped double the number of people on potable water systems throughout Iraq.



GRD photo by Kendal Smith

Fallujah Wastewater Treatment Plant under construction by USACE Gulf Region District

USACE sewer projects that serve citizens include the $30 million project in Kamaliya, in which approximately 36 miles of sewer pipe and 10 pump stations were installed. In partnership with the government of Iraq, GRD is completing other sewer improvement projects throughout the central region in Doura, Adhamiyah, Mansour, New Ubaydi, and Fallujah.

Major Reconciliation Project

Begun in 2004 and approximately 90 percent complete, the Fallujah Wastewater Treatment Plant's revised design will treat 40,000 cubic meters of water per day, projected to serve 200,000 residents. U.S. State Department officials call it a major reconciliation project that will discharge disinfected water into the Euphrates River, where residents downstream take their drinking water. The design allows for future expansion as the government of Iraq grows its infrastructure. This project of vast scope has involved retrofitting—in extremely close quarters—Baghdad and Fallujah with sewer systems.

One element often overlooked is waste management; landfills are the USACE contribution to that, both on forward operating bases and in the city of Baghdad. Northeast of Baghdad in Rusafa, GRD will build a sanitary landfill—not like those in the temperate regions of the United States, but designed for Iraq's arid climate. GRD has also built incinerators to more effectively handle solid, medical, biological, and routine waste.



Photo courtesy Office of the Secretary of Public Affairs

Street in Kamaliya before sewer system construction began

Joint Environmental Effort

USACE and the government of Iraq are committed to improving conditions throughout Iraq. GRD, headquartered in Baghdad, is a joint effort comprising civilians, Soldiers, Sailors, Airmen, and contractors and provides high-quality and sustainable engineering in support of civil and military construction in Iraq. GRD and its Iraqi partners are building a strong foundation for Iraq's future.

In everything USACE has done—whether a road project, school project, or police station—there has been an environmental component. Whenever their established forward operating bases, post camps, and stations are closed out, USACE makes it a point to leave them as clean as—or cleaner than—when they arrived. As Iraq continues to grow as a secure, stable, and self-governing nation, GRD has finished hundreds of projects in the public works and water sector. Since 2004, USACE has completed 896 water and sewer projects throughout Iraq and 44 others are ongoing. These projects directly benefit more than 5 million people.

Mr. Reeves served as a public affairs specialist for the USACE Gulf Region District, based near Baghdad, Iraq, until October 2009, when he redeployed to pursue other opportunities in his home state of Texas. He served in the United States Army Reserve as a journalist and broadcaster from 2003-2008 before joining the USACE reconstruction effort in Iraq last year.

Mr. Harris is Public Affairs Chief for the USACE Gulf Region District, based near Baghdad, Iraq. He served in the United States Submarine Force for ten years before becoming a public affairs specialist in 1995. He holds a master's in communications from the University of Oklahoma.

Endnote

[1]The Gulf Region Division (GRD) inactivated in September 2009 and no longer exists. Presently the Gulf Region District (GRD) and Gulf Region South (GRS) both report to Transatlantic Division, based in Winchester, Virginia. In April 2010, GRS will inactivate, leaving Gulf Region District as the only USACE organization in-theater.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publications Currently Under Revision

Publication Number	Title	Date	Description (and Current Status)
FM 3-34	*Engineer Operations*	Apr 09	This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer functions of combat, general, and geospatial engineering; and addresses engineer operations across the entire spectrum of operations. **Status:** Revising manual to incorporate the Engineer Framework. Expect the manual to be published 2QFY11.
Organizational Manuals			
ATTP 3-34.22 (FM 3-34.22) (FM 3-34.221) (FM 5-71-2) (FM 5-71-3) (FM 5-7-30)	*Engineer Operations –Brigade Combat Team and Below*	Pending Feb 09 (Jan 05) (Jun 96) (Oct 95) (Dec 94)	This new manual encompasses engineer operations in support of brigade combat teams (BCTs) (heavy, infantry, and Stryker–the armored cavalry regiment) and their primary subordinate units (infantry battalion, Stryker battalion, combined arms battalion, and the reconnaissance squadron). This manual will supersede FM 3-34.221, FM 5-7-30, FM 5-71-2, and FM 5-71-3. **Status:** To become an Army Tactics, Techniques, and Procedures (ATTP) manual 3QFY10.
ATTP 3-34.23 (FM 3-34.23) (FM 5-116) (FM 5-100-15) (FM 5-71-100)	*Engineer Operations –Echelons Above Brigade Combat Team*	Pending Pending (Feb 99) (Jun 95) (Apr 93)	This is a new manual that will encompass engineer operations in support of all engineer operations above the BCTs (division, corps, and theater). The intent is to consolidate and revise three engineer FMs that provide doctrinal guidance for the entire spectrum of engineer operations supporting echelons above the BCT level. This manual will supersede FM 5-71-100, FM 5-100-15 and FM 5-116. **Status:** Expect the manual to be published as an ATTP manual 3QFY10.
Combat Engineering			
FM 3-90.4 (FM 3-34.2)	*Combined Arms Mobility Operations*	Aug 00	This is a full revision, to include the renaming and renumbering of FM 3-34.2, *Combined Arms Breaching Operations*. Changes in the force structure have required adjustment of the tactics, techniques, and procedures (TTP) associated with breaching and clearance operations. The Marine Corps is dual-designated on this manual, which will replace their Marine Corps Warfighting Publication (MCWP) 3-19.3, *Marine Air-Ground Task Force (MAGTF) Breaching Operations*. **Status:** To be published 2QFY11.
FM 3-90.8 (FM 5-102) (FM 90-7)	*Combined Arms Obstacle Integration*	Sep 94; Mar 85	This revised manual will contain the basic fundamentals associated with countermobility operations and will incorporate aspects of the contemporary operating environment (COE). The Marine Corps plans to adopt this manual also. **Status:** On hold for release of FM 3-90, Tactics.
General Engineering			
TM 3-34.48 1/2 (FM 3-34.410 Volumes I & II) (FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields, and Helipads*	Pending Aug 94; Sep 94	This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force. The Air Force (as well as the Navy and Marine Corps) plans to adopt the new manual also. **Status:** Expect the manual to be published 4QFY10.
TM 3-34.41	*Construction Planning and Estimating*	NEW	This new manual is being produced by the Navy, in coordination with the Army and Air Force. The manual will provide the TTP and planning factors for conducting construction planning at the crew leader level. The manual will also provide useful expeditionary construction planning factors for use by planners at all levels. **Status:** Expect the manual to be published 2QFY11.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Training and Doctrine Development Department
Doctrine Division, Engineer Branch

Publication Number	Title	Date	Description (and Current Status)
General Engineering (continued)			
TM 3-34.43 (FM 3-34.451) (FM 5-472)	*Materials Testing*	Pending Dec 92	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. The Marine Corps and Air Force plan to adopt this manual as well. **Status:** Expect the manual to be published 3QFY10.
FM 3-34.65 1/2 (FM 3-34.465) (FM 3-34.465 & FM 3-34.468)	*Quarry Operations*	Pending Mar 05; Dec 03 (Apr 94)	This manual outlines the methods and procedures used in the exploration for and operation of pits and quarries. It provides information on equipment required for operating pits and quarries and for supplying crushed mineral products, but does not cover the operation of the stated types of equipment. This is a collaborative effort with the Navy and Air Force and includes the newest technologies and current practices. **Status:** Preparing Volume II. Initial draft staffing of both volumes 3QFY10.
TM 3-34.49 FM 3-34.469 (FM 5-484)	*Multi-Service Well Drilling Operations*	Pending Mar 94	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This collaborative effort with the Navy, Air Force, and Marine Corps includes the newest technologies, current practices, and revised formulas. **Status:** Expect the manual to be published 3QFY10.
FM 3-34.5 (FM 3-100.4)	*Environmental Considerations*	Pending Jun 00	This manual provides environmental protection procedures during all types of operations. It states the purposes of military environmental protection, a description of legal requirements, and a summary of current military programs. It also describes how to apply risk management methods to identify actions that may harm the environment and appropriate steps to prevent or mitigate damage. **Status:** Estimated date for posting to Army Knowledge Online (AKO) is 3QFY10.
TM 3-34.56	*Waste Management*	NEW	This manual addresses issues not currently integrated into FM 3-34.5, *Environmental Considerations*. The manual will address the role of waste management in support of deployed forces, as well as the integration of waste management throughout the operations process, including its critical linkage to the composite risk management process. **Status:** Expect the manual to be published 4QFY10.
Geospatial Engineering			
ATTP 3-34.80 (FM 3-34.600) (FM 3-34.230)	*Geospatial Engineering*	Pending 3 Aug 00	This full revision of FM 3-34.230, *Geospatial Operations*, will incorporate changes as a result of FM 3-34, *Engineer Operations*, and FM 3-0, *Operations*. Geospatial engineering consists of engineer capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and service to commanders and staffs. **Status:** Estimated date for posting to AKO is 3QFY10.

NOTEs: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN website at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development. Drafts may be obtained during the staffing process or by contacting the engineer doctrine branch at: Commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*>. The development status of these manuals was current as of 10 February 2010.



Route Reconnaissance and Clearance: A Marine Aircraft Wing Future Capability

By Major Nick I. Brown and Major Taylor P. White

The United States Marine Corps invests in the Marine Wing Support Groups and its subordinate Marine Wing Support Squadrons (MWSSs) to provide sustained aviation ground support to the aviation combat element (ACE) of the Marine Air-Ground Task Force (MAGTF). The primary mission of the MWSS is to enable sortie generation and expeditionary operations by Marine aviation. Marine aviation must constantly push the objective to be the extended fighting arm of the rifleman, available at a moment's notice. The ability to swiftly create temporary, expedient helicopter landing zones; leapfrog forward arming and refueling points with the advancing force; conduct replenishment combat logistics operations; or rapidly construct expeditionary airfields and airbases permits Marine aviation to be in the front pocket of the MAGTF commander. Therefore, mobility of the MWSS on the battlefield is essential, and the route reconnaissance and clearance (R2C) capability coming to the MWSS will multiply the ACE's expeditionary ability and continue to set it apart from the aviation organizations of the other Services.

Maintaining Mobility

Mines and improvised explosive devices (IEDs), also known as roadside bombs, remain the No. 1 killer of U.S. troops in Iraq and Afghanistan. In addition to inflicting casualties, these explosive hazards restrict MAGTF maneuver and mobility, therefore shaping our operations. R2C capability is of vital importance to maintain the commander's freedom of maneuver and protect Marines.

The strategic and operational effects of employing explosive hazards have been high, with a relatively low risk and investment for our enemies. The current operational context in United States Central Command's area of operations and projected enemy tactics, techniques, and procedures (TTP) prove that IEDs will be a real and foreseeable threat to our military for years to come. As a result, there will be a high demand for route clearance equipment and personnel throughout the MAGTF, creating competing demands on limited assets and resources.

General William L. "Spider" Nyland, former Assistant Commandant of the Marine Corps, once said, *"The demands of expeditionary maneuver warfare require the MAGTF commander to have assured access, an ability to conduct movement and maneuver, and an ability to retain the initiative with high operational tempo. The asymmetric nature of the mine threat and its increasing sophistication and proliferation combine to make the attainment of adequate countermine, counter-IED, and counterunexploded ordnance capabilities critical to the future of our Corps and its role as our nation's most responsive force in readiness."*[1] To ensure flexible and responsive aviation ground support to the ACE, R2C must be an integral part of the MWSS and an assured capability of the Marine aircraft wing. This article discusses how the R2C concept was

implemented by the MWSS supporting the 2d Marine Aircraft Wing (Forward) during Operation Iraqi Freedom, the benefits and challenges R2C presents to the ACE, and the way ahead for R2C within the wing.

Providing Aviation Ground Support

Upon arrival in Al Anbar Province in support of Operation Iraqi Freedom, MWSS-271 (Reinforced) began providing aviation ground support to the 2d Marine Aircraft Wing (Forward). This support included the following:

- Aircraft and ground refueling
- Aircraft rescue and firefighting
- Weather services
- Motor transport support, to include convoy operations and maintenance
- Explosive ordnance disposal (EOD)
- Utilities support
- Heavy equipment support
- Expeditionary airfield services, to include airfield marking and lighting, arresting gear support, and certification of expeditionary landing zones and lighting systems

To help with these support missions, the MWSS has an organic platoon of combat engineers who provide general and combat engineering support to 2d Marine Aircraft Wing (Forward).



The MWSS R2C team stages equipment for movement in Al Anbar Province. Pictured is the Husky Metal Detecting and Marking Vehicle.

The United States Army relocated several route clearance teams to Afghanistan and other areas in Iraq. This shift in forces meant that Multinational Forces–West (MNF–W) had to field its own route clearance teams from Marine engineer units already in-theater. After assuming the aviation ground support mission, the MWSS explored the feasibility of retasking its combat engineer platoon to conduct route clearance in support of MNF–W operations.

The new R2C was a daunting challenge for MWSS-271. Having recently relieved two squadrons, the unit was fully engaged as the only MWSS in Al Anbar Province. Now it would have to prepare in-theater for a mission never before assigned to an MWSS. The combat engineers in the platoon had spent the past year preparing to conduct airfield repairs and honing their vertical construction skills, but now would train on equipment and techniques none of them had ever seen before. However, they also had to be prepared to provide mobility, survivability, and countermobility support to the ACE. Since most vertical construction was being handled by contractors, the combat engineers were able to support the ACE mission. Also, knowing that the MWSS would eventually inherit this capability, coupled with the number of convoys required to support outlying airfields, it was obvious that a route clearance team would benefit the ACE and the entire MAGTF. The limited number of combat engineers in the support squadron might have prevented fielding a dedicated R2C team in a more expeditionary environment or in a setting demanding more general engineering projects.

Task-Organizing for Route Clearance

The combat engineer platoon was task-organized for this specific mission. The nominal requirement for a route clearance platoon was about two dozen Marines with limited specialties. The combat engineer platoon at Al Asad was busy and had small detachments of engineers at other locations in the area, performing runway repairs at Al Taqaddum, vertical construction at Al Asad, general engineering tasks at Sahl Sinjar, and dust abatement throughout the area of operations. As a result, the support squadron assigned Marines of various specialties from other platoons to complete the team. The route clearance team consisted of Marines with additional specialties that proved valuable for maintaining equipment, providing security, and enabling combat engineers to focus on the technical aspects of the route clearance duties.

Due to the task organization of multiple Marine units into route clearance teams, the MNF–W counter-IED cell arranged for in-theater training by a mobile training team from the United States Marine Corps Engineer Center of Excellence that focused on vehicle employment, sweep



An MWSS Marine inspects the Buffalo Mine-Protected Clearance Vehicle (MPCV).

formations, and IED interrogation and identification. The newly formed MWSS R2C team also conducted mine-resistant, ambush-protected vehicle licensing, demolitions training, day and night live-fire shoots, IED training lanes, combat lifesaver training, and communications training for seamless close air support coordination. Because of MNF–W needs, the coordination, standup, and training of the teams was greatly accelerated. The R2C program of record was devised in 2009 and continues to move toward maturity in both training and TTP. Furthermore, as enemy TTP change, our training and preparation will continue to evolve.

Assuming the Mission

Upon completion of training, the R2C team began transition training with the outgoing Army unit and assumed responsibility for the route clearance mission. The team conducted numerous missions searching the main supply routes for IEDs. Trash or debris determined not to be an IED was cleared away so that later convoys would not have to interrogate it for potential hazards. When IEDs were identified, MWSS EOD specialists were called to neutralize the devices. With the closure of several outlying airfields, flight line EOD requirements were reduced and the MWSS-271 EOD team was eventually embedded with the R2C team. However, it would be difficult in the future to dedicate an EOD team from the ACE to full-time route clearance missions. Having dedicated EOD teams from the ACE perform the full-time route clearance mission depends on airfield requirements and ACE priorities.

The R2C team was in general support to MNF–W but remained under the control of MWSS-271. To provide effective command and control of the route clearance mission, MWSS-271 designated an officer in the operations section who focused exclusively on route clearance operations. This dedicated resource in the Aviation Ground Support Operations Center was critical for coordinating R2C missions with higher headquarters, requesting and coordinating air coverage where needed, and coordinating necessary support with adjacent units. The R2C team remained in close contact with maneuver battalions in the regimental combat team's area of operations to ensure proper coordination for movement, EOD support, quick-reaction force support, and seamless communication and intelligence feedback. Additionally, the team submitted joint tactical air requests to provide overwatch and escort of route clearance missions. The team's innovative use of communication to coordinate its moves helped the squadron in its daily operations and served as a template for direct support of the ACE.

MWSS-271 conducted convoys and missions throughout Al Anbar Province involving helicopter landing zone installation and removal as well as the retrieval of gear and equipment. Route clearance teams inspected and cleared routes before convoy movements, removing possible hazards from main supply routes and enabling unimpeded movements. The squadron demonstrated the flexibility of its combat engineers and support personnel while proving the concept of mobility support to the ACE.

The ability to clear a route of any length requires a huge investment in time, manpower, and resources. High-demand, low-density capabilities such as R2C invariably (and justifiably) go to support the ground combat element or its supporting units. Organic R2C assets for the MWSS granted flexibility to the ACE commander and benefitted airfield and airbase support functions by increasing responsiveness and maintaining ground mobility to forward areas that required support.

The advantages of having an R2C team in the ACE are not limited to support for convoy movement. The ability to detect explosive hazards would provide the following advantages:

- Enhance air base security
- Protect personnel by clearing tactical areas such as forward arming and refueling points
- Enable road movement essential to support highly mobile and flexible helicopter and fixed-wing operations
- Improve tactical recovery of aircraft and personnel
- Assist in base recovery after attacks by allowing assessments of the airfield and facilities, detecting and mitigating unexploded ordnance, and clearing explosive hazards

Facing New Challenges

The R2C capability will present new challenges and compete for the general engineering services necessary to support the ACE during operations. As an emerging mission for the MWSS, R2C will require the following considerations:

- Employment and maintenance of the capability
- Additional burdens on a limited number of combat engineers organic in the MWSS
- Additional training requirements
- Possible mission creep to support the MAGTF route clearance requirement

As demonstrated by MWSS-271, the ability to conduct route clearance missions outside the ACE required flexibility and creativity. The task list for combat engineers in the ACE is long and diverse. Engineering services necessary to support the ACE during expeditionary operations include, but are not limited to, the following:

- Airfield surface repair (rapid runway repair)
- Expeditionary structure construction (SEAhuts, strongback framing)
- Assembly and construction of prefabricated shelters and K-spans
- Force protection and survivability construction
- Limited combat engineering services (countermobility, obstacles), construction, improvement, and maintenance of helicopter landing zones

Supporting all these requirements, plus providing a full-time R2C team in general support of MNF–W, with just one platoon requires careful prioritization. MWSS engineers have a diverse and demanding task list when supporting the ACE in an expeditionary environment. Adding a full-time R2C mission will compound the challenge while enhancing the squadron's ability to support airfield operations. The squadron's combat engineers are required to provide limited mobility and mine detection support and the R2C capability would enhance their ability to accomplish these tasks.

Aviation ground support directly extends and expands the employment of Marine aviation. It is a decisive component that gives Marine aviation its expeditionary ability. With an organic R2C capability, the MWSSs will provide better support to the ACE. MWSS-271 proved the value and benefits of an R2C capability during Operation Iraqi Freedom. R2C presents many advantages as well as aviation ground support challenges, but the expeditionary enabler capability within the MWSS is an assured force multiplier to Marine aviation.

Major Brown is the Aviation Ground Support Coordinator, Headquarters, Marine Corps Department of Aviation, Washington, D.C. He graduated from the Combined Logistics Captains Career Course, Fort Lee, Virginia; the Weapons and Tactics Instructor Course, Yuma, Arizona; and the United States Army Command and General Staff College, Fort Leavenworth, Kansas. He holds a bachelor's in political science from Stony Brook University, Stony Brook, New York; and a master's in public administration from Central Michigan University.

Major White is the executive officer of MWSS-271 and has been selected to attend the United States Marine Corps Command and Staff College, Quantico, Virginia, in the fall. He graduated from the Basic School and the Combat Engineer Officer Course, United States Marine Corps Engineer School, Camp Lejeune, North Carolina; the Expeditionary Warfare School, Marine Base Quantico, Virginia; and holds a bachelor's in political science from Tennessee Technological University.

Endnote

[1]*Marine Corps Gazette*, "The Engineer Center of Excellence," November 2008, *<http://www.mca-marines.org/gazette/nov08-prickett.asp>,* accessed 4 March 2010.



Battle of Dara

By Captain Andrew J. Dornstadter

Each session of the Engineer Captain's Career Course (ECCC) is required to write an article analyzing a historical battle, and the best overall professional article receives the Thomas Jefferson Writing Excellence Award. This article was judged the best article of ECCC 1-09.

In the early 6th century A.D., the Eastern Roman—or Byzantine—Empire's eastern boundary was continuously tested by the Persian Empire's aggressive expansion and growing influence. Dara was a fortified city and strategically important Byzantine military post that overlooked a major route between Persia and Mesopotamia. At the Battle of Dara in June 530 A.D., 25,000 Byzantine soldiers led by Flavius Belisarius routed a Persian expeditionary force of 50,000. The Byzantine victory substantially weakened Persia's westernmost army, halting Persian efforts to mount an overwhelming offense across the eastern boundary of the Byzantine Empire and leaving Persia's western border region vulnerable to seizure. Persia was therefore forced to negotiate terms for an enduring peace, and the Byzantine Empire's integrity was preserved.[1]

The Byzantine victory was largely due to Belisarius's effective intelligence preparation of the battlefield (IPB) and his employment of the principles of surprise and unity of command. Superior IPB helped Belisarius anticipate the Persian formations and actions and understand the effects of the terrain on a Persian attack on Dara. The Byzantine use of surprise contributed to a shocking counterattack that unbalanced the Persians and disintegrated their command and control. Finally, the unified Byzantine command structure enabled coordination and defensive flexibility to overcome Persian mass.

Phases of the Battle

The Battle of Dara can be divided into three distinct phases:

- Phase I. Initial formations and first Persian attack
- Phase II. Persian right wing attack
- Phase III. Persian left wing attack

Phase I

On the battle's first day, the two forces placed their formations. Belisarius placed archers and infantry at his army's center behind a considerable trench line, protecting their flanks with light Hun cavalry.[2] Heavy cavalry troops were placed beyond those units to the outside, commanded by leaders named Bousez and John, while Belisarius maintained a heavy cavalry reserve in the rear. The Persian formation consisted of two long lines, each of which had centrally located infantry protected on either side by mixed cavalry.[3] Following a brief correspondence between the opposing generals, Firuz—the Persian commander—sought to determine the Byzantine force's response to an attack on its left. He ordered forward his right wing cavalry, commanded by Pityaxes. The Persian right wing cavalry pushed back the Byzantine left, and Pityaxes observed the possibility that he might be flanked as his Persians achieved depth and exposed their left side. Pityaxes therefore ordered his right wing cavalry to withdraw and avoid a decisive loss.

"...maintaining an unseen and uncommitted force offers a commander the opportunity to surprise an enemy through the application of unexpected combat power..."



Modern regional map of Turkey

Observing the Persian effort against his left, Belisarius determined that the attack was the rehearsal of a likely future effort. He used this information to understand the Persians' strengths and weaknesses and their reaction to his centrally positioned Hun cavalry. Belisarius identified the Persian vulnerability to a flank attack and anticipated a stronger effort against his center on the next such attack. Therefore, he concealed a small cavalry contingent, commanded by Pharas, behind the dominant hill north of the Byzantine defense. This small force could mount a surprise attack against the Persian right's outside flank on their next attempt.

Belisarius's observation of the Persian maneuver led to conclusions that drove a new course of action (COA), demonstrating the importance of IPB. Observation of the enemy helps a commander evaluate the threat and determine threat COAs, a process that helps the commander understand and visualize the enemy's scheme of maneuver and plan friendly COAs accordingly.

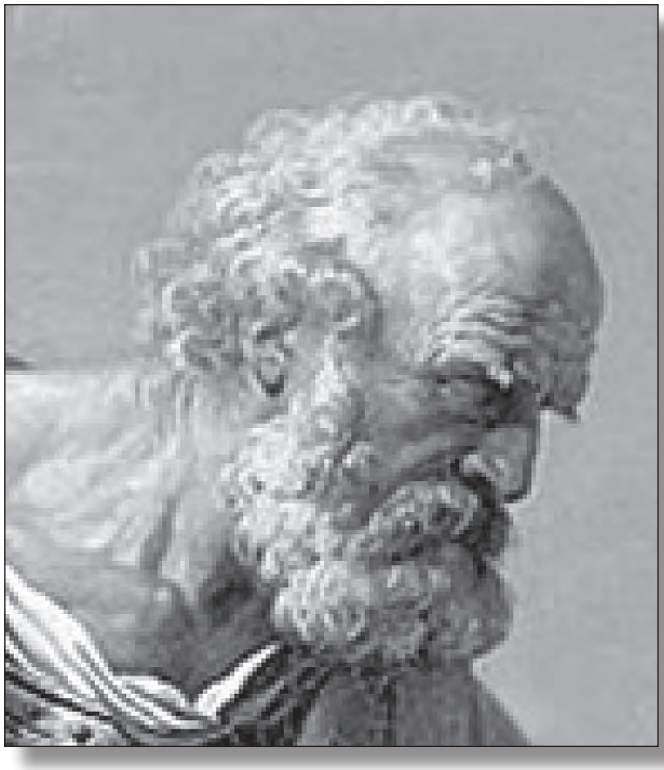
This lesson is captured in modern United States Army doctrine. Field Manual (FM) 5-0, *Army Planning and Orders Production*, defines evaluating the threat as "analyzing intelligence to determine how adversaries normally organize for combat and conduct operations under similar circumstances. Knowing enemy capabilities and vulnerabilities allows the commander … to make assumptions about the relative capabilities of friendly forces."[4] These steps of the IPB portion of mission analysis create or confirm the enemy's doctrinal and situational templates. Commanders may then use those tools to develop and select COAs that accomplish their mission.

Phase II

On the second day of the battle, Belisarius's assumption about the Persian COA was confirmed when the Persian right attacked the Byzantine left for the second time. Belisarius knew the Persians would be unprepared for counterattacks against both sides of their force, and he deployed Pharas's concealed cavalry from behind the north hill. Together, that cavalry and the centrally positioned Hun cavalry flanked both sides of the advancing Persian right, effectively enveloping that force. The Byzantine left's cavalry broke the Persian right's attack, killing roughly 3,000 Persian horsemen and foot soldiers and forcing any remaining soldiers from the Persian right to flee in disarray. This eroded Persian command and control and gave Belisarius an unopposed cavalry unit he could flexibly maneuver to assist other Byzantine units on the battlefield.

Concealing Pharas's cavalry behind the north hill deceived the Persian leadership about the composition, disposition, and strength of forces defending from the Byzantine left, so the Persian force was surprised to find forces arrayed differently on the second attack. Shocked by a double flank, the Persian right wing fell apart, leaving the larger Persian army vulnerable to attacks from the Byzantine left's flexible cavalry. This demonstrates the lesson that maintaining an unseen and uncommitted force offers commanders the opportunity to surprise an enemy through the application of unexpected combat power wherever he sees an advantage.

FM 3-0, *Operations*, lists surprise among the nine principles of war and defines it as "(striking) an enemy at a time or place or in a manner for which he is unprepared."



Detail from the 1776 painting entitled "Belisarius" by François-André Vincent. *Public domain*

It also states that surprise is "the reciprocal of security" and a "major contributor to shock," meaning that effective use of surprise can seriously degrade an enemy's security conditions and reduce the effectiveness of his command and control systems.[5]

Phase III

Also on the second day of the battle, following the Byzantine rout of the Persian right wing, Belisarius maneuvered his left wing cavalry to counter a likely Persian attack against his right. Firuz observed the failure of his attack against the Byzantine left and quickly committed a much stronger force—including the elite Immortals and units drawn from the Persian second line—to attack the Byzantine right wing cavalry commanded by John. This was effective use of shock action, and the Byzantine right initially gave way and withdrew. Belisarius responded quickly by ordering Hun cavalry from his right to attack the long Persian column's inside flank and ordered Hun cavalry from his left to maneuver around the Persian formation's rear and flank the other side.[6]

The two flanks broke the Persian force's advance, and its formation was divided in two. Baresmanes—the Persian left's commander—fell in combat, and John's withdrawn cavalry reorganized and rallied, contributing to the counterattack effort. Together, the flanking Hun cavalry and John's cavalry killed more than 5,000 Persian horsemen and foot soldiers on the Byzantine right. Between this engagement and the rout of the Persian right wing, Belisarius's forces destroyed nearly all of Firuz's cavalry, leaving only the overmatched infantry line, which was exposed and vulnerable.

The Byzantines faced a large, capable Persian force that did not hesitate to mass against their smaller army. By consolidating responsibility and leadership under a single commander, Belisarius overcame a numeric disadvantage. He could quickly and clearly communicate his orders to subordinate commanders, and he could commit resources and apply combat power without confusion or delay. Belisarius's unity of command allowed him to maneuver units where and when they were needed.

FM 3-0 defines unity of command as "(ensuring) unity of effort under one responsible commander" and also that "a single commander directs and coordinates the actions of all forces toward a common objective." [7]

Summary

The Byzantine victory at Dara reestablished the Roman tradition of military excellence on the empire's eastern boundary. Under the command of Belisarius, the Byzantines capably outmaneuvered a much larger force of highly skilled and experienced Persian warriors. The keys to the Byzantine success lay in the commander's mastery of IPB, surprise, and unity of command. Belisarius used these tools and principles to accurately predict the Persian scheme of maneuver and planned his defense accordingly, emphasizing surprise shock action and flexibility under unified effort and leadership. The outcome at Dara guaranteed the Byzantine Empire decades of relative peace along its eastern boundary, and it cemented Belisarius's place as one of the greatest tactical leaders in history.

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Endnotes

[1]John Haldon, *The Byzantine Wars*, History Press, Gloucestershire, 1 November 2008, pp. 28-29.

[2]Lieutenant Colonel Robert R. Leonhard, *Belisarius and Small Force Theory*, <*http://www.armchairgeneral.com*>, accessed 22 July 2008.

[3]Ibid.

[4]FM 5-0, *Army Planning and Orders Production*, pp. 3-17, 3-18.

[5]FM 3-0, *Operations*, p. 4-14.

[6]Simon Goodenough, *Tactical Genius in Battle*, Phaidon Press, London, 1979, p.110.

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By Major Rafael Pazos and Captain Miguel Uc

Against the backdrop of current global military operations, the Korean Peninsula is quietly undergoing a significant transformation. To ensure that the alliance between the Republic of Korea (ROK) and the United States maintains its long-term viability in Northeast Asia, the commander of United States Forces Korea (USFK) has implemented a transformation framework based on three priorities:

- Defend the ROK
- Strengthen the ROK–U.S. alliance
- Improve the quality of life for those defending the alliance

Two tasks derived from these priorities are to relocate all U.S. forces to two major hubs south of Seoul and extend accompanied tours to three years. These two tasks are monumental, requiring engineers at every level in Korea to develop creative solutions to support the commander's vision.

Relocate U.S. Forces

Two major hubs for relocation of U.S. forces will be developed by transforming existing bases, camps, and garrisons into enduring installations, making Korea an "assignment of choice."

Southwestern Hub. Osan Air Base and United States Army Garrison (USAG)–Humphreys will be the centerpiece of the future U.S. Army force structure in Korea. This hub already is home to the headquarters of 7th Air Force and will become home to the headquarters for the future Korea Command, Eighth United States Army, and the 2d Infantry Division as U.S. forces realign south of the Han River.

Southeastern Hub. Facilities at Deagu, Chinhae, and Pusan will function as a logistics and storage center.

Two international agreements between the ROK and United States control the relocation of U.S. bases:

Land Partnership Plan (LPP). Signed in 2002, this agreement consolidates and relocates forces not based within the Seoul metropolitan area, namely the 2d Infantry Division. It also provides U.S. forces with dedicated time on Korean training areas and ranges and ensures that safety easements are provided and enforced.

Yongsan Relocation Plan (YRP). Signed in 2004, this agreement relocates U.S. forces and United Nations Command activities out of the Seoul metropolitan area. It also calls for a small U.S. force to remain in Seoul to support the United Nations Military Armistice Commission's rear operations, facilitate communications, and maintain existing partnerships with the ROK government and other governmental and nongovernmental agencies in Seoul.

The execution of the ROK–U.S. agreements is a two-phase process that began in 2002 when U.S. forces were stationed in more than 104 installations with substandard infrastructure.

Phase I: Consolidation. This phase is nearly complete. The United States has consolidated its forces in Korea by closing 37 camps and installations and reducing its force by 8,000 personnel. To demonstrate its commitment and to strengthen the alliance, the United States has returned 35 of the 37 closed camps and installations, totaling more than 12,800 acres, to its ROK allies. In turn, the ROK government has purchased more than 2,700 acres of land to support U.S. relocation directly. The ROK government has begun transferring that land to the United States with an



Part of the massive construction underway at USAG–Humphreys

initial grant of 205 acres at USAG–Humphreys, allowing the ROK–U.S. alliance to begin designing, planning, and coordinating more than $10 billion to construct new infrastructure inside and outside that facility.

Phase II: Relocation. During this phase, nearly 15,000 U.S. Service members will move, and the planned construction program will be executed. The most significant component of the relocation will be the expansion of USAG–Humphreys, located south of Seoul. The installation will be the location of the most intense construction efforts. Outside infrastructure development includes the construction of new roads; a rail extension; and an increase in communication, electricity, natural gas, water, and wastewater capacity in the surrounding communities to support the growth at USAG–Humphreys. Inside infrastructure includes new capacity to support increased facilities and population growth as well as modernizing existing facilities. It will be constructed in conjunction with land development that began in December 2006. So far, 821 acres are under development, with another 1,500 acres still to be developed.

Facility construction has begun and will continue over the next several years. The major facilities to be constructed are the headquarters for Korea Command; Eighth United States Army; 2d Infantry Division; Installation Management Command–Korea; medical facilities, family housing, and schools; communication centers; and the operational and support facilities necessary to relocate the 2d Infantry Division.

Of course, the success of the planned relocation is based on U.S. forces sustaining the readiness to "Fight Tonight," which is both the motto and the mentality of the armed forces in the ROK. To do this, the United States will prioritize unit movements by balancing the maintenance of unit operational linkages and necessary construction efficiencies. Unit moves will be packaged and conducted in manageable components and placed where their locations would maximize their unit operations.

Extend Accompanied Tours

Traditionally, the majority of U.S. forces in Korea have been there on one-year unaccompanied tours, while accompanied tours lasted two years. Originally, U.S. families would have faced undue hardships during tours of Korea. However, changes in Korea and a desire to give Service members more time to spend with their families have led the move to more accompanied tours of longer length.

Throughout the realignment, units will maintain their full spectrum of operational and support capabilities. Efficiencies will be obtained by minimizing swing spaces (unit moves into temporary quarters pending final construction) and relocating units into their final facilities at their eventual enduring installations. The end goal will be a winning result for the alliance as it optimizes the use of ROK–U.S. land and enhances U.S. force protection, readiness, quality of life, safety, and ROK–U.S. mutual defense.

Summary

In summary, U.S. priorities remain focused on transforming USFK to meet future security demands and to strengthen and maintain the ROK–U.S. alliance. The transformation and consolidation of U.S. forces is a major signal of continued U.S. military commitment to the ROK and the alliance, providing increased training opportunities and a less intrusive presence. The consolidation of U.S. forces increases readiness, provides efficiencies and cost savings, and enhances the quality of life of our Service members.

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