# ENGINEER

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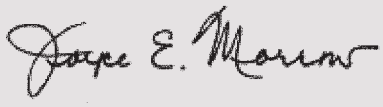
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# ENGINEER

The Professional Bulletin of Army Engineers

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# Clear the Way

*Brigadier General Bryan G. Watson*
*Commandant, U.S. Army Engineer School*




This is my final *Clear the Way* article as your commandant. For my wife Kris and me, this has been the honor of a lifetime, serving this Regiment in service to Army and nation. Thanks for giving me this privilege.

In this last article, I want to issue you a challenge. It begins with a simple question: Are you a professional leader within this Engineer Regiment or just a member of the team? Put another way, are you passionate about making sure that this Regiment is ready to win tomorrow's fight, retains its hard-earned legacy of excellence in combat, and continues to enjoy the trust of the ground commander? Or are you simply a player on the team, focused on one game at a time, who only gives of self when called onto the field, and who is solely motivated by a paycheck and the potential of getting a trophy?

One of the most important lessons I've learned over my career is the vital importance of the work that goes on at the engineer regimental headquarters and school. They truly are the keepers of our profession and the ones charged with ensuring that we win, learn, adapt, and remain ready to win again in our next fight. Unfortunately, 10 years of combat and repeated deployments have undervalued the role of drill sergeants, course instructors, doctrine writers, equipment developers, and unit designers. Today's generation of young leaders feel an extraordinary sense of service. They seek to get in the fight, accomplish the unimaginable in battle, and accomplish the most difficult missions. But they do not feel the same sense of moral obligation to our profession and the business of constantly improving the way we meet the Army's changing needs. Today's young leaders—and the senior leaders who coach them—avoid assignments as instructors in our officer and noncommissioned officer (NCO) courses or as combat developers shaping the Regiment for the future and improving our stance for battle. The prevailing trend is to avoid a job in the U.S. Army Training and Doctrine Command and stay in operational assignments. We do so at our peril as a Regiment.

To survive change, to remain the best, and to remain ready for the future, we must reverse the current culture. It is paramount that we instill a sense of profession in our young leaders. It begins with giving them a sense of ownership—as professionals—to use their experiences in combat to make this Regiment better prepared for the next fight. Leaders should encourage subordinates to write articles, participate in regimental blogs, attend lessons-learned forums, and provide input to doctrinal-manual updates. If a young NCO comes up with a new tactic, technique, or procedure; best practice; or equipment modification, a leader's first response should be, "Have you told other units?" "Get that idea to the NCO Academy," or "Call the Engineer School so that we can institutionalize this change." It is essential that junior leaders—officers and NCOs—feel that they have a moral stake in the future success or failure of Army engineers beyond their own unit.

Second, we must take immediate measures to restore the duty title of "Instructor" at the U.S. Army Engineer School and NCO Academy to a place of prominence within our profession. Leader education and development are so vitally important to our future that we have an obligation to ensure that only our very best are selected to be drill sergeants, instructors, and small-group leaders in our military schools. Moreover, we must put assignment policies in place that reward service to the Regiment as an instructor in terms of follow-on assignments, key leadership positions, and promotion potential. If we are going to bring only our best to the schools, we must manage them as the best. I will do my part in establishing the right system of personnel management policies to ensure that we have the highest quality instructors possible.

However, change starts with you emphasizing our responsibility to "teach our own with our best leaders" and altering the perception that the road to success is paved only with operational assignments. Leaders need to emphasize the importance of duty as an instructor and to coach their best to consider assignment to Fort Leonard Wood as a part of their career aspirations. Most important I need leaders to help identify our top 10 percent among engineer officers, warrant officers, and NCOs so that we can get them involved in shaping our future as instructors or combat developers. If we don't make this investment, we put at risk the capability of our Regiment and Army to meet future challenges.

Finally, for the senior leaders, you might consider leading by example. This Regiment depends on lieutenant colonels, colonels, and command sergeants major who understand force structure management, capability development and integration, personnel management, and associated Army level processes. We simply can't move this Regiment forward

*(continued on page 3)*

# Lead the Way

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




I am truly humbled by the opportunity to serve. I told my brothers who are not in the military about this position, and one of them took the liberty of researching the position. He called and told me of all the things that go along with this position. He described the responsibility and the heavy weight that lies on the shoulders of the regimental command sergeant major and said, "You will be 16!"

"You will be the 16th Engineer School command sergeant major," he told me. Immediately it hit me that I will be standing on the shoulders of 15 giants who held this position before me. At that moment, an overwhelming feeling struck me that I will have some huge shoes to fill. I believe that I am up to the task, and I will do my very best for this awesome Regiment. I want to thank Command Sergeant Major Robert Wells for everything that he has done for the Regiment, and I wish him the best of luck in his new position as the Maneuver Support Center of Excellence command sergeant major.

Just a short synopsis of where I have served in the military: I was born in Amarillo, Texas, on 29 June 1965. I joined the active duty military on 30 October 1983 and attended basic combat training and advanced individual training here at Fort Leonard Wood, Missouri. Throughout my 27-year career, I have served in a variety of leadership positions from team leader to command sergeant major. My assignments include the 5th Engineer Battalion, Fort Leonard Wood; 547th Engineer Battalion, Darmstadt, Germany; 4th Engineer Battalion, Fort Carson, Colorado; 317th Engineer Battalion, Camp Eschborn, Germany; 5th Battalion, 10th Infantry Regiment, Fort Leonard Wood; 91st Engineer Battalion, 1st Cavalry Division, Fort Hood, Texas; 44th Engineer Battalion, Camp Howze, Republic of Korea; first sergeant of Headquarters and Headquarters Company, 317th Engineer Battalion, Fort Benning, Georgia; sergeant major of the Training and Doctrine Command Systems Manager and the Counter Explosive Hazards Center at the Maneuver Support Center of Excellence, U.S Army Engineer School, Fort Leonard Wood; command sergeant major of the 20th Engineer Battalion, 36th Engineer Brigade, Fort Hood (the Army's first modular combat effects engineer battalion); and command sergeant major of the 36th Engineer Brigade. My deployments include Reforger 1987; Operations Desert Shield and Desert Storm; three deployments to Operation Desert Spring in Kuwait; one year as data noncommissioned officer and noncommissioned officer in charge at the Bosnia Herzegovina Mine Action Center; mission training team to Chad, Africa; Foal Eagle 1998, Republic of Korea; Operation Iraqi Freedom 1, 06-08, and 09-10; and Operation New Dawn, Iraq.

Since I joined the military, I have done many different things. However, this is not about me; it is about something bigger. In the coming years, this Regiment will move farther forward with new initiatives and ideas that will make it stronger. This summer, we will also say farewell to the Watsons, who have absolutely placed their hearts and souls into our Regiment. Brigadier General Bryan Watson will move on to another position and deploy in support of Operation Enduring Freedom. We will welcome a new commandant, Brigadier General Mark Yenter and his family, another strong and truly dedicated engineer Family who aspire to take this Regiment to even greater heights.

Once again, I thank God and everyone in the Regiment for the trust and confidence in me to do this job; and I look forward to seeing Sappers during my travels.

Essayons.

*("Clear the Way," continued from page 2)*

without senior leaders in key positions around the Army who have the combination of operational experience, force management skills, and passion for the Regiment. It's time to learn the family business; see me for your next assignment!

As I said at the outset, this is my last *Clear the Way* article as your commandant. Brigadier General Mark Yenter will replace me in September. He is the perfect leader for the job, my No. 1 choice as a replacement. He is fresh out of the fight in Afghanistan and brings that insight to the job as he prepares us for the future. He is a leader of incredible vision with the tenacity to make it a reality. When you get a chance, welcome him and his wife Lisa to the best job there ever was; and pledge the same unconditional support you gave me.

Lead to Serve—Essayons.

# Show the Way

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




What a tribal gathering it was! The memory of this year's ENFORCE will stay strong in my mind for many years to come. They said it couldn't get better—It did. They said it couldn't get bigger—It did. And they said the weather couldn't be finer—It was. It was an absolutely fantastic week and a fitting tribute to the dedicated engineers who made the ultimate sacrifice during Operation Iraqi Freedom, Operation Enduring Freedom, and Operation New Dawn. If you didn't have the honor of attending the unveiling of the Sapper Memorial Wall at your Memorial Grove, find a way to get to Fort Leonard Wood and connect with this magnificent tribute to our fallen heroes.

The gathering of the tribe included many engineer, ordnance, and other branch warrant officers from around our Regiment. The word continues to get out that ENFORCE is ***the*** place to be for engineer warrant officers as the number of participants continued to grow for the third consecutive year. Commanders see the value in warrant officers being part of the Regiment's key event; and if you have not jumped on the bus, get with your commander today and start planning for the next ENFORCE opportunity.

Now for some of the updates and news from ENFORCE. First, I am glad to report that your senior warrant officers were invited to participate in the Regimental Command Council and were well represented. Second, for the first time in the three-year history of the Outstanding Engineer Warrant Officer of the Year Award, winners were selected from the Regular Army, U.S. Army Reserve, and Army National Guard. Congratulations to each of these fine officers. The winners were—

- *Regular Army*—Chief Warrant Officer Two Larry K. Butterworth, U.S. Army Forces Command, Headquarters Company, 92d Engineer Battalion, 36th Engineer Brigade, Fort Stewart, Georgia.
- *U.S. Army Reserve*—Warrant Officer One Jon D. Arnold, 463d Engineer Battalion, 411th Engineer Brigade, 412th Theater Engineer Command, Wheeling, West Virginia.
- *Army National Guard*—Chief Warrant Officer Two Anthony L. Clark, 212th Engineer Company, 230th Engineer Battalion, Tennessee Army National Guard, Paris, Tennessee.

We held this year's Council of Engineer Warrant Officers at the new U.S. Army Prime Power School at Fort Leonard Wood. Many thanks to the commander of the school, Chief Warrant Officer Four Phillip C. Mowatt, for opening up his "house" for the council and the professional development opportunity it afforded our ENFORCE attendees. During the council, I announced the completion of the most comprehensive adjustment to warrant officer grading since the beginning of modularity. The proposal revises the standards of grade tables for military occupational specialties 120A (construction engineering technician) and 125D (geospatial engineering technician) to comply with the directive from the Office of the Deputy Chief of Staff to bring the specialties within the average grade distribution matrix grade caps. The result is that commanders get the right warrant officer, with the correct rank, appropriate professional military education, and experience levels to support the fight. This change will also provide a logical and sequential career path for our warrant officers, from platoon formations to Army Service Component Command, joint, and table of distribution and allowances positions, from warrant officer one to chief warrant officer five. The personnel changes are effective immediately, while the documentation will be effective 1 October 2013. The complete package of documents has been posted to the Engineer School Knowledge Network site, and they can be accessed at <*https://www.us.army.mil/suite/files/29221995*>. The changes to Department of the Army Pamphlet 611-21, *Military Occupational Classification and Structure*, implemented by this notice of future change are posted to the electronic version at <*https://smartbook.armyg1.pentagon.mil/*>.

I have two final points to make. The Army Chief of Staff's senior warrant officer recently spoke to more than 100 warrant officers, and he shared a couple of observations about that event. There were a number of warrant officers who were not aware of the "Profession of Arms" campaign and a number of warrant officers who were not members of Warrant Officer Net (WO Net) at <*https://wonet.army.mil*>. I challenge you to get informed and get involved today. Start with "An Army White Paper—The Profession of Arms." You can access it and the entire campaign plan at <*http://cape.army.mil/ProfessionOfArms.html*>. Then check out, or continue to use, your professional collaboration site, WO Net, as you strive to live up to the ninth stanza of the Soldier's Creed—"I am an Expert and I am a Professional."

For more information about how to become an engineer warrant officer, log on to the Army warrant officer recruiting Web site at <*http://www.usarec.army.mil/hq/warrant*>. Until next time, stay safe.

Essayons et Faissons!



# Dedication

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

| | | |
|---|---|---|
| Specialist Nathan B. Carse | 595th Sapper Company, 2d Engineer Battalion | White Sands Missile Range, New Mexico |
| Staff Sergeant Joshua S. Gire | 541st Engineer Company (Sapper), 54th Engineer Battalion | Bamberg, Germany |
| Private First Class Michael C. Mahr | 541st Engineer Company (Sapper), 54th Engineer Battalion | Bamberg, Germany |
| Specialist Justin D. Ross | 863d Engineer Battalion, U.S. Army Reserve | Wausau, Wisconsin |
| Staff Sergeant David D. Self | 2d Stryker Cavalry Regiment | Vilseck, Germany |
| Private Two Cheizray Pressley | 73d Engineer Company, First Stryker Brigade Combat Team | Fort Wainwright, Alaska |
| Specialist Bradley L. Melton | 73d Engineer Company, First Stryker Brigade Combat Team | Fort Wainwright, Alaska |
| Private Lamarol J. Tucker | 73d Engineer Company, First Stryker Brigade Combat Team | Fort Wainwright, Alaska |

# Fallen Engineers Memorial Unveiled




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




# INNOVATION AND PEOPLE: THE CHIEF OF ENGINEERS DESCRIBES THE REGIMENT'S STRENGTHS

*By Ms. Tesia D. Williams*

Standing at approximately 100,000 strong, engineer Soldiers are versatile, innovative, and ready to meet the challenges they face in a changing economy and force structure. Innovation and people—the Soldiers and their civilian counterparts—were the major themes of Lieutenant General Robert Van Antwerp's speech at the 2011 ENFORCE Conference at Fort Leonard Wood, Missouri, on 8 April 2011. Van Antwerp is the 52d Chief of Engineers and commanding general of the U.S. Army Corps of Engineers (USACE).

Technical adeptness and fortitude to complete the mission do not solely define engineer Soldiers these days. They understand the importance of relationships, turning social ineptitude into the reverse—"social aptitude," Van Antwerp called it during his speech.

"You've got to have it in spades to do what we do," he said.

Army engineers are building and strengthening those relationships overseas with tactical and technical teams working to complete $3.2 billion in construction projects in Afghanistan (including 13 brigade combat team complexes) and approximately 300 police stations in Iraq, while adhering to the culture and customs of those countries. In addition, in order to provide the right resources at the right time, engineer units are deploying in modular fashion so that capabilities are in line with mission requirements. And they are versatile, drawing down in Iraq by nearly 30 percent, but still completing their identified tasks.

The Chief of Engineers called on audience members to contribute during his speech. Major General Paul E. Crandall, commander of the 416th Theater Engineer Command, explained that his unit provides training readiness oversight of more than 12,000 Soldiers and prepares them to deploy overseas. The 416th is fairly symmetric with the 412th Theater Engineer Command in that both have about 10 forward engineer support teams–detachment and a forward engineer support team–main. Consequently, there is always a combination of tactical and technical engineers deployed at all times.

***We've got to get innovative if we're going to make it this next century . . . . We can do this.***

Next, Van Antwerp called on Colonel Kent D. Savre, commander of the 36th Engineer Brigade, who described some of his unit's missions overseas.

"We had prioritized engineer missions for [United States Forces–Iraq], and then got route clearance, construction, and bridging assets to the right place on the battlefield at the right time to support the entire team," said Savre.

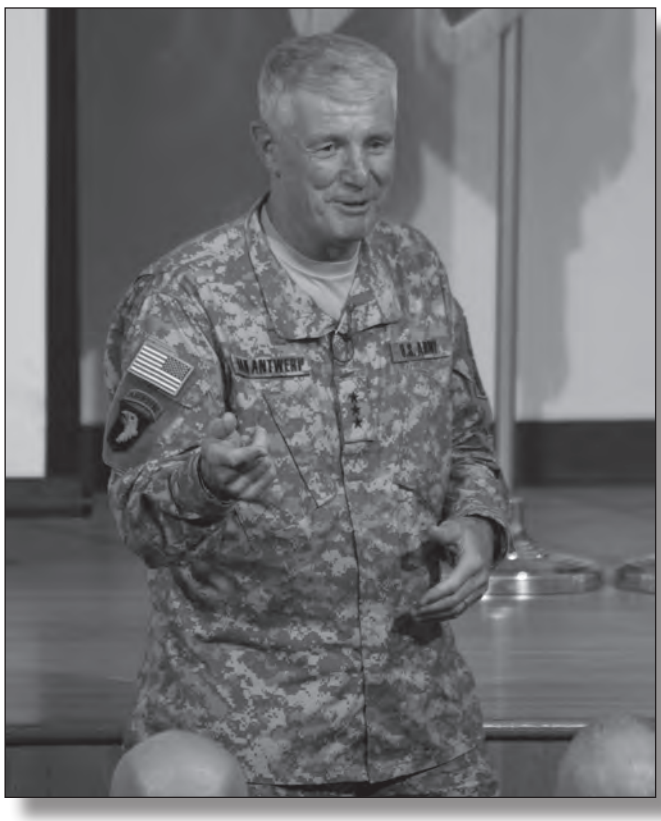
Civilian engineers are in the same tactical fight—deploying overseas and adapting to meet mission requirements, said Van Antwerp. He pointed out that USACE recently passed a milestone, having deployed about 10,000 civilians to date, some of them deploying four or five times. He had high praise for the civilian engineers.

"They are Soldiers all the way, they are expeditionary, and they will bring it," Van Antwerp said. "The only thing they don't do is carry guns. But the rest of it, they do. They're alone and unafraid to go out to projects and do the heavy lifting for the Corps."

Heavy lifting and innovation are required in USACE districts, which are dealing with a changing budget landscape. The districts operate in ways similar to businesses, with money for projects authorized and appropriated through Congress. In 1992, the USACE budget was $12 billion; in 2009, $45 billion; in 2010, $41 billion; and this year, $38 billion, with an expected decline over the next five or six years.

Van Antwerp said that for USACE to succeed, "We've got to get innovative if we're going to make it this next century . . . . We can do this. But we're going to have to bring it, every one of us." He sees several challenges for USACE:

- Ensuring that ports and harbors are at their authorized width and depth without the funding necessary to complete all the dredging projects.





**Above and left:**

**Innovation and people—the Soldiers and their civilian counterparts—were the major themes of Lieutenant General Robert Van Antwerp's speech at the 2011 ENFORCE Conference at Fort Leonard Wood, Missouri, on 8 April.**

- Maintaining the 12,000 miles of levees that it manages along inland waterways.
- Protecting the public's safety as sea levels rise in areas such as Florida.

USACE engineers—or "solutioneers"—are stepping up, developing innovative solutions for repairing dams that need work and forging ahead with inventions to solve some of the nation's more complex issues even when naysayers claim "you can't do it that way," Van Antwerp said. Though individual talent is often at the root of many successful solutions, hard work and dedication to the task are essential as well.

"I've seen a lot of great visions, and I've seen them executed, but never without people that perspire. They really work to get it done," he said. Van Antwerp explained that people admire USACE and want to work for the agency when they see the employees and their leaders working hard. And it is meeting adversity and adapting to ever-changing environments that prepare engineers for the future.

"Everything you're doing every day prepares you so that you're positioned for whatever is next," he said.

*Ms. Williams is a public affairs officer in the office of the Chief of Engineers.*




# ENFORCE 2011 Discussion Groups

*By Mr. Michael A. Dascanio*

During ENFORCE 2011, some of the most well-attended and productive events were the ENFORCE working groups. This year's working groups focused on three specific areas of the U.S. Army Engineer School regimental campaign plan. The plan has become the centerpiece of all actions at your regimental headquarters and is integral to improving engineer support to the Army. This year's discussions focused on three topics—

- Group 1–Army force generation (ARFORGEN) training support overview.
- Group 2–Knowledge management.
- Group 3–Engineer University.

These discussion groups are closely related to the three main effort decisive points of the campaign plan—

- Decisive Point 3-12: Execute functional training supporting ARFORGEN.
- Decisive Point 5-05: Regimental knowledge management.
- Decisive Point 2-06: An engineer leader university.

**Group 1**

The purpose of this group was to identify specific Engineer Branch gaps or shortfalls in training, leader development, and training support and resource requirements, and to recommend improvements to the ARFORGEN process. Group 1 was to provide an overview of ARFORGEN, identify and prioritize training and resourcing gaps, and recommend solutions while identifying lead and supporting agencies to enable improvement of supporting engineer units deploying into theater. Colonel Christopher Martin, U.S. Army Forces Command engineer, presented an overview of the ARFORGEN process as it applies to engineers and the challenges of meeting the demands for engineers in theater.

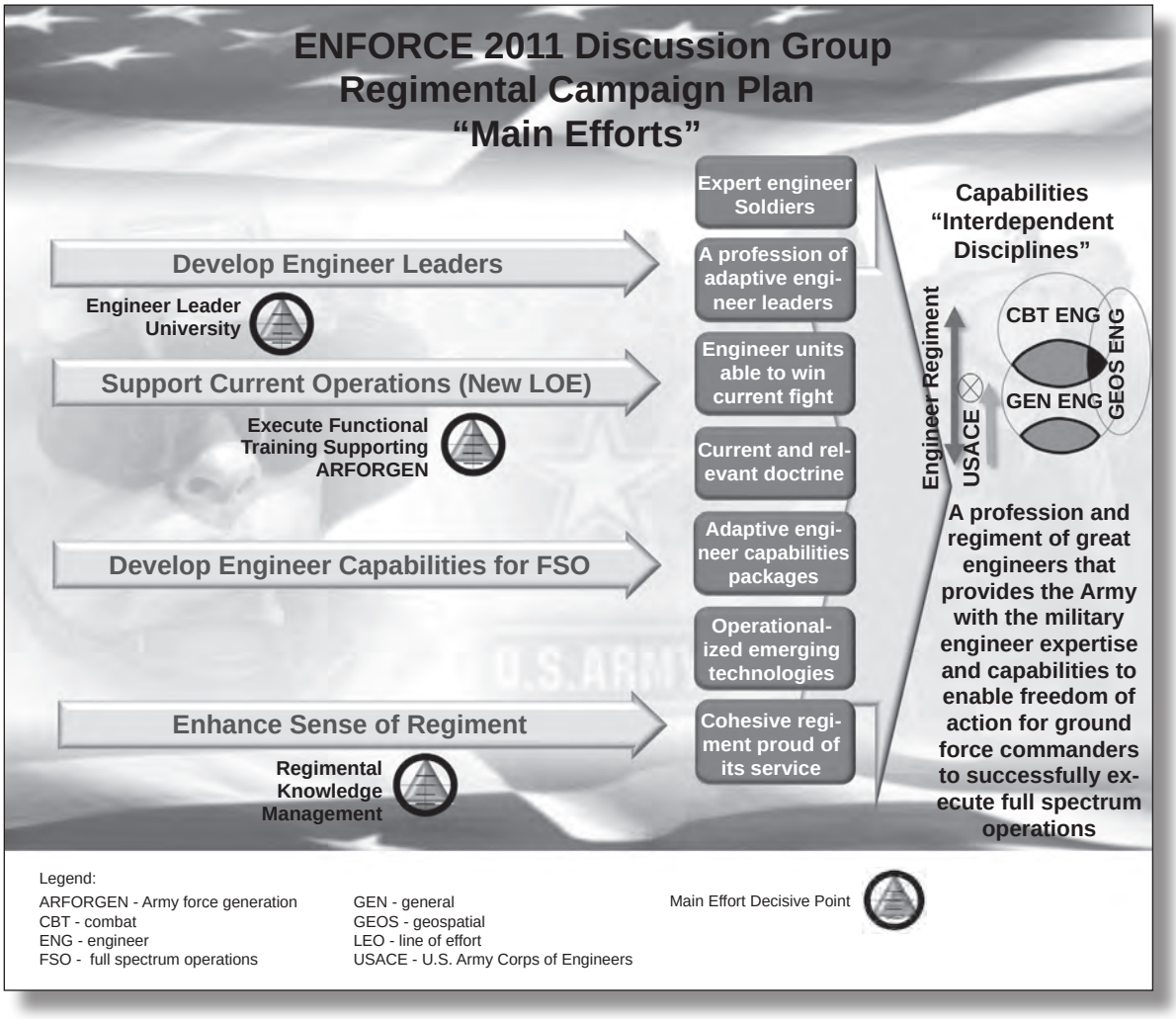
The discussion after the briefing identified shortfalls in training/resourcing and training support requirements. The group, with representatives from the Regular Army, U.S. Army Reserve, Army National Guard, First U.S. Army, combat training centers (CTCs), and training divisions and other training organizations, recommended ways to improve functional training and support requirements in a briefing to the Regimental Command Council.

While the group's consensus was that route clearance and improvised explosive device defeat are a top priority, the problem ranked highest—especially by representatives from CTCs and other trainers from all components—was training management. The group also commented that there is a need for synchronization of the training effort. Since CTCs fall under the U.S. Army Forces Command, they have the lead responsibility, with U.S. Army Engineer School support. One proposed solution, which would require unit participation, was the reinstatement of worldwide videoteleconference discussions of training issues. Another recommendation to improve the relevancy of training was to require that redeploying units provide CTC observer-controller/trainers within a set time frame, perhaps 6 months or a year after redeploying. All these solutions will be further developed as recommendations for inclusion in the regimental campaign plan to improve the ARFORGEN process.

***The [campaign] plan has become the centerpiece of all actions at your regimental headquarters and is integral to improving engineer support to the Army.***

**Group 2**

This work group was to discuss current and emerging regimental knowledge management processes, their




context, and possible improvements. Briefings in the first half of the session included Engineer School presentations, the Engineer Warfighter Forum, the Army Lessons Learned Information System, and the Army Chief Information Officer/G-6 enterprise efforts. The discussion that followed the briefings included the following recommendations:

- Knowledge management should be incorporated into training, rather than being presented separately.
- The Advanced Leaders Course and Senior Leaders Course need to demonstrate how to access the Engineer School Knowledge Network (ESKN) and how to set the page as a favorite.
- ESKN should have a single place to upload and find information.
- The request-for-information system should be improved.
- The Engineer School should provide a quick, basic instructional Web page on the ESKN site.

Other Regimental Command Council concerns about knowledge management were the time needed to check out online forums and the quality of input from the field, since not all commanders are participating. It was suggested that a monthly newsletter summarize the top posts from all Engineer School-sponsored forums. (The newsletter suggestion has already been implemented, with the first issue sent out on 11 May 2011.)

**Group 3**

The purpose of this working group was to provide updates on Army Learning Concept 2015 implementation and solicit field and command input to mapping directed junior leader self-study for engineer additional skill identifiers. These identifiers tie resident and distance learning "elective" courses to engineer lines of support. To achieve these goals, the working group was further divided into three subgroups.

- *Officer Education System:* The focus of this subgroup was the shift of the Engineer Captains Career Course to the Midgrade Learning Continuum 2015 to align with ARFORGEN and the Army Learning Concept. It crosswalked engineer additional skill identifiers to lines of engineer support in order to develop post-Midgrade Learning Continuum 2015 "elective" courseware for Military Education Level Certification (Officer Self-Development, Phase 2).

*(continued on page 60)*

# Combatant Command Engineer Professional Development Seminar

*By Major Robert R. Phillipson*

A key junior leader event at ENFORCE 2011 was the professional development seminar hosted by the U.S. Army Engineer School Directorate of Training and Leader Development. The purpose of the seminar was twofold. One was for combatant command (COCOM) engineers to explain their role to junior officers and noncommissioned officers. The other was to describe how they align their operations with the lines of engineer support. The desired effect was for attendees to become familiar with the different COCOMs and how those engineers support their commanders. The lines of engineer support served as a valid bridge to ensure that the audience could process strategic concepts and correlate them to something familiar and applicable to the tactical level.

The seminar began with area overviews from each of the COCOM engineers. Lieutenant Colonel Timothy P. Amoroso highlighted some of the responsibilities of the U.S. Northern Command, including the role engineers would play in disaster response within the United States. As an example, he used a response to crisis at the New Madrid Fault Line. He emphasized the need for training and education in disaster response and crisis management and noted the challenge of operating within the borders of the United States, where state and federal collaboration is critical. He showed that the crisis response roles and responsibilities of the various entities are sometimes not readily apparent.

For most of the audience, the briefing by Navy Captain Christopher H. Kiwus was their introduction to the U.S. Africa Command. As a nascent organization, the command is still developing processes and procedures that are found in other COCOMs. Africa is unfamiliar to many in the audience and they were surprised to learn the number of missions executed in Africa by so few people. The command is currently conducting 140 missions in 40 countries.

Lieutenant Colonel Dominic J. Sparacio also generated some surprise when he discussed the responsibilities of the U.S. Pacific Command. Many in the audience did not consider that keeping the world's sea lanes open is a mobility concern. He noted that the U.S. Pacific Command is one of the few COCOMs with forces assigned directly by the Secretary of Defense. Revelations about the U.S. Africa Command and the U.S. Pacific Command generated discussion among the audience, since most were not aware of the scope of either command.

The briefing changed a bit as the U.S. Central Command Engineer, Colonel Judson Cook, described his role and responsibilities. Many in the audience had tactical level experience with the U.S. Central Command, but most were unfamiliar with strategic level operations. Colonel Cook's briefing illuminated what strategic engineer input looks like. One of his key points was the importance of environmental baseline surveys as part of capacity building. He highlighted the challenges of conducting these surveys—and the cost of not conducting them—before occupation. He also discussed the development of cooperative security locations.

***The desired effect was for attendees to become familiar with the different COCOMs and how those engineers support their commanders.***

Colonel Kent D. Savre, 36th Engineer Brigade commander, then tied much of the COCOM engineer discussion to the tactical level with his firsthand account as a brigade commander in Iraq. He described the change in the nature of conflict in Iraq from Operation Iraqi Freedom into Operation New Dawn and highlighted some of the challenges he and his staff faced, such as transferring U.S. Army bridges to the Iraqis. He mentioned the importance of staff training and the use of collaborative systems to enable operations. The expert use of these systems was critical, since the brigade assumed responsibility for clearing routes through multiple brigade areas of operation. He described some of the challenges of modularity and the need to assess a unit's strengths and weaknesses in response to requirements. Colonel Savre also reinforced the need for units to receive theater-specific training before deployment.

*(continued on page 19)*

# 2011 BEST SAPPER COMPETITION



*By Mrs. Nicole J. Black*

The competition included 3 days, 21 events, 37 teams, and only 1 mission—to become the Army's best sapper. Engineer Soldiers traveled from across the Engineer Regiment to Fort Leonard Wood, Missouri, to compete in the seventh annual Best Sapper Competition. The six-phase competition kicked off at 0400 on 7 April 2011 with an unusual physical fitness test that featured push-ups; sit-ups; a 3-mile buddy run while wearing individual body armor with small arm protective insert plates and carrying a dummy M-4 carbine; and "heel hooks," which made their debut at the competition. In this exercise, Soldiers hang from a pull-up bar, raise their legs to lock their feet on the bar, and then return to the starting position.

Teams got a short break to pack up their gear and prepare for Phase 2—helocasting and round-robin events. Competitors were flown by helicopters of Company C, 1st of the 106th Aviation Regiment, Missouri Army National Guard, to Training Area 250, where they jumped into the 55°F water and swam to shore with rucksacks in tow. Teams were allowed to change out of their wet clothing and boots; and by 0900, they were loaded into trucks to begin the long list of round-robin events, including—

- Casualty evacuation.
- Call for fire.
- Thermal breaching.
- Improvised explosive device destruction.
- Expedient demolitions.
- Hybrid demolition systems.
- Ford reconnaissance.
- Helocast.

During this series of challenges, teams walked to each event, which gave them little time to rest up for Phase 3—land navigation. This phase kept them busy plotting points on the map until the early hours of Day 2. Only the top 20 teams continued on to Phase 4—the sapper stakes.





**Above: First place winners, Captain John R. Chambers and Captain Joseph P. Riley (554th Engineer Battalion), participate in the casualty evacuation event.**

**Left: Second place winners, First Lieutenant Jonathan E. Kralick and First Lieutenant Tyler W. Knox (Company A, 3d Brigade Special Troops Battalion, 82d Airborne Division) compete in the knots event.**

These events, while not as physically demanding as some others, required that competitors display mental sharpness to succeed. They tested sapper skills such as—

- Field-expedient explosive charges.
- Weapons assembly.
- In-stride breaching.
- Room entry and clearing.
- Knots.
- Three types of urban breaching.
- Reflexive fire.
- Unoccupied search.

By nightfall, the remaining teams set out on Phase 5—the X-mile road march. After two strenuous days with little rest, teams had just 4 hours to cross the finish line without knowing how far they had to march.



**Third place winners, Captain Douglas D. Droesch and Staff Sergeant Jacob D. Matson (425th Brigade Special Troops Battalion), flip a truck tire during the X-mile run.**

With all but the top 10 teams eliminated from the competition, only Phase 6—the X-mile run—remained. Teams fought through pain and fatigue to finish the unknown distance, running while wearing protective masks, flipping 350-pound tires end over end, carrying 400 pounds of concertina wire, and pulling the dead weight of a high-mobility, multipurpose, wheeled vehicle. After approximately 9 miles of this effort, competitors were met by the roar of fellow sappers, family, and friends cheering them across the finish line. Weeks and months of physical and mental preparation are not always enough for a sapper team to make it through the grueling competition. Yet for those who finish, the sense of pride and accomplishment is like no other.

Captain John R. Chambers and Captain Joseph P. Riley from 554th Engineer Battalion, Fort Leonard Wood, experienced the pride of being named this year's Best Sappers. They received Army Commendation Medals, the Army Engineer Association's Bronze deFleury Medal, commemorative plaques, and a trophy they can keep until next year's competition.

Second place went to First Lieutenant Tyler W. Knox and First Lieutenant Jonathan E. Kralick, Company A, 3d Brigade Special Troops Battalion, 82d Airborne Division, Fort Bragg, North Carolina. They were awarded Army Commendation Medals and the Steel deFleury Medal and received commemorative plaques.

Third place winners were Captain Douglas D. Droesch and Staff Sergeant Jacob D. Matson, Headquarters and Headquarters Company, 425th Brigade Special Troops Battalion, Joint Base Elmendorf-Richardson, Alaska. They were awarded Army Achievement Medals and the Steel deFleury Medal and received commemorative plaques.

*Mrs. Black is a public affairs specialist with the Fort Leonard Wood Public Affairs Office.*




Photos by Fort Leonard Wood Visual Information Center

# Regimental Awards

Each year, we recognize the best engineer company, lieutenant, warrant officer, noncommissioned officer, and enlisted Soldier in each component for outstanding contributions and service to our Regiment and Army. Every engineer unit in the Regiment can submit the name and achievements of its best to compete in these distinguished award competitions. Only the finest engineer companies and Soldiers are selected to receive these awards. The Soldiers and leaders will carry throughout their careers the distinction and recognition of being the Engineer Branch's best and brightest. Following are the results of the 2010 selection boards for the Itschner, Outstanding Engineer Platoon Leader (Grizzly), Outstanding Engineer Warrant Officer, Van Autreve, and Outstanding Civilian of the Year Awards and the Sturgis Medal:

**Regular Army**

*Itschner Award:* Company A, 2d Brigade Special Troops Battalion, 2d Brigade Combat Team, 101st Airborne Division, Fort Campbell, Kentucky.

*Outstanding Engineer Platoon Leader (Grizzly) Award:* First Lieutenant Christopher M. Gensler, 65th Engineer Battalion, 130th Engineer Brigade, U.S. Army Pacific Command.

*Outstanding Engineer Warrant Officer Award*: Warrant Officer Two Larry Butterworth, Headquarters Company, 92d Engineer Battalion, 36th Engineer Brigade, Fort Stewart, Georgia, U.S. Army Forces Command.

*Sturgis Medal:* Staff Sergeant Jeremiah C. Thomas, 585th Engineer Company, 864th Engineer Battalion, Fort Lewis, Washington, U.S. Army Forces Command.

*Van Autreve Award:* Corporal Eric D. Covert, 585th Engineer Company, 864th Engineer Battalion, Fort Lewis, Washington, U.S. Army Forces Command.

*Outstanding Civilian of the Year Award:* Mr. Thomas G. Launchard, Headquarters and Headquarters Detachment, 35th Engineer Battalion, 1st Engineer Brigade, U.S. Army Corps of Engineers.

**U.S. Army Reserve**

*Itschner Award:* 328th Engineer Company, 854th Engineer Battalion, 411th Engineer Brigade, 412th Theater Engineer Command, Kingston, New York.

*Outstanding Engineer Platoon Leader (Grizzly) Award:* First Lieutenant Jason T. McKnight, 328th Engineer Company, 854th Engineer Battalion, 411th Engineer Brigade, 412th Theater Engineer Command, Northfield, New Jersey.

*Outstanding Engineer Warrant Officer Award:* Warrant Officer One Jon D. Arnold, 463d Engineer Battalion, 411th Engineer Brigade, 412th Theater Engineer Command, Wheeling, West Virginia.

*Sturgis Medal:* Staff Sergeant Nathan T. Ryckman, 739th Engineer Company, 863d Engineer Battalion, 372d Engineer Brigade, 416th Theater Engineer Command, Granite City, Illinois.

*Van Autreve Award:* Specialist Jose L. Rivera, 328th Engineer Support Company, 854th Engineer Battalion, 411th Engineer Brigade, 412th Theater Engineer Command, Wheeling, West Virginia.

*Outstanding Civilian of the Year Award:* Mr. Joshua Richardson, 844th Engineer Battalion, 926th Engineer Brigade, 412th Theater Engineer Command, Knoxville, Kentucky, U.S. Army Corps of Engineers.

**Army National Guard**

*Itschner Award:* 957th Engineer Company, North Dakota Army National Guard, Bismarck, North Dakota.

*Outstanding Engineer Platoon Leader (Grizzly) Award:* First Lieutenant Dustin W. Pack, 577th Engineer Company, 201st Engineer Battalion, Prestonburg, Kentucky.

*Outstanding Engineer Warrant Officer Award:* Warrant Officer One Anthony L. Clark, 212th Engineer Company, 230th Engineer Battalion, Tennessee Army National Guard, Paris, Tennessee.

*Sturgis Medal:* Sergeant First Class Ronald W. Stenger, 850th Engineer Company, 682d Engineer Battalion, Minnesota Army National Guard, Cambridge, Minnesota.

*Van Autreve Award:* Specialist Jacob E. Benitz, 1141st Engineer Company, 203d Engineer Battalion, Missouri Army National Guard, Kansas City, Missouri.

All of the nominees represented their major commands with the highest professionalism and dedication to the Engineer Regiment's vision and deserve our highest praise. The award recipients were recognized during ENFORCE 2011 at Fort Leonard Wood, Missouri.

# The Development of Army Engineer Officer Construction Skills: *Where Do You Say the Gaps Are?*

*By Major Karl Hatala*

*"If there is one thing that is very clear in my mind, it is this: When a commander calls for his or her engineer to solve a complex problem, we do not have the luxury of saying, 'Well, I wear castles, but I'm not really an engineer.' We absolutely must breed great engineers."*

—Brigadier General Bryan Watson[1]

This article supports the U.S. Army Engineer Regiment's continuous efforts to develop the construction competency needed to support full spectrum operations. It provides data that indicates the level of preparedness of senior Army engineer captains and majors to perform specific construction activities. It also describes the perceived level of impact that specific variables had on the development of their construction skills. The input from this population is significant because these engineer officers are the population most likely to have recently completed all required Army institutional engineer training, and they have recent experience performing construction activities supporting Operation Enduring Freedom and/or Operation Iraqi Freedom. The article is meant to contribute to continued dialogue and stimulate further study that will more clearly define the problem and help the regiment refine its vision for improvement.

## Sample Population

The information in this article is drawn from an April 2010 electronic survey of 856 Regular Army engineer officers, of whom 221 responded.[2] More than 75 percent of respondents were majors, more than half had engineering degrees, and more than 80 percent had a year or more experience performing construction in support of operations.

## Survey Questions

The survey asked 28 close-ended questions and 2 open-ended questions. Fourteen of the close-ended questions pertained to the respondent's level of preparedness to perform specific construction activities. There was no clearly defined list of construction activities needed to support joint and Army capability requirements, which could then presumably serve as the minimum credentialing requirements for Army engineer officers. But the author drew several broad construction activities from Army and joint doctrine that generally apply to any given project. The first 14 close-ended questions were based on these types of activities. Fourteen additional questions pertained to the level of impact that specific variables had on the development of the respondent's construction skills. The 2 open-ended questions asked, "What construction skill(s) did you need—but did not have developed—to the level needed to support military operations?" and "What training was most effective at developing your construction skills to support military operations?"

## Level of Preparedness to Perform Construction Activities

Approximately 76 percent of the respondents felt that they were prepared to access technical engineering expertise from the U.S. Army Corps of Engineers (USACE) (see Table 1, page 16). This was the only activity that 75 percent or more of the respondents felt they were prepared to perform. However, the study results did not indicate how frequently the respondents actually sought such technical engineering advice from USACE or for what types of projects.

Fifty to 70 percent of the respondents felt that they were prepared to—

- Perform quality assurance checks of construction projects.
- Perform project management using an automated system.
- Determine the construction standards that applied to a specific theater of operations.

- Develop a performance work statement to contract construction support (see Tables 1 and 2).

Less than 50 percent of the respondents felt that they were prepared to—

- Determine the appropriate funding source for a construction project.
- Develop base camp master plans.
- Execute the programming process for projects intended to support U.S. military requirements.
- Assess public works to determine requirements for repair or improvement.
- Assess public utilities to determine requirements for repair or improvement.
- Execute the programming process for projects intended to support host-nation requirements.
- Produce a design using automated systems (see Tables 1 and 2).

Unfortunately, I was not able to determine from this survey the number of respondents who actually performed these activities, how frequently they performed them, for what types of projects they performed them, or to what type of organization participants were assigned. Additional study in this area may be worthwhile to further understand the meaning of these responses and to develop a better understanding of the problem. For example, the experiences and the meaning of responses from an officer who served on an engineer brigade staff and focused on projects for which military expeditionary standards applied are likely to differ from those of an officer who served as a USACE project manager and focused on projects for which more technical civilian engineer standards applied.

Similarly, the experiences and meaning of responses from an officer who served as a brigade combat team engineer who generally had to rely on other organizations to provide construction support would likely differ from either of the two previous examples. An additional consideration is the possibility that the results of a study that asks a sample pool if they are prepared to perform an activity could differ from the results of a study that actually tests the sample pool's ability to perform.

**Table 1: Summary of Responses to Preparedness Questions**

| I am prepared to . . . | Percentage of favorable responses |
|---|---|
| Access technical engineering expertise available from the U.S. Army Corps of Engineers. | 76% |
| Perform quality assurance checks of construction projects. | 70% |
| Perform project management (such as sequencing activities, monitoring progress) using an automated system. | 67% |
| Determine the construction standards that apply to a specific theater of operations. | 60% |
| Develop a performance work statement to contract construction support. | 52% |
| Determine the appropriate funding source(s) for construction projects required to support an operation. | 47% |
| Develop a base camp master plan. | 45% |
| Execute the programming process (acquire both the authority and the necessary resources) for construction projects intended to support U.S. military requirements (such as operating base projects). | 44% |
| Assess public works (such as bridges, railroads, roads, canals, dams, airports) to determine what repairs or improvements are required. | 44% |
| Assess utilities (such as electrical power systems, water treatment and distribution systems, sewage systems) to determine what repairs or improvements are required. | 42% |
| Execute the programming process (acquire both the authority and the necessary resources) for construction projects intended to support host-nation requirements (such as restoration of essential civil services or the repair of infrastructure). | 39% |
| Access technical engineering expertise available from the U.S. Air Force Civil Engineer Support Agency. | 32% |
| Access technical engineering expertise available from the U.S. Naval Facilities Engineering and Services Center. | 29% |
| Produce construction designs using automated systems (such as AutoCAD®). | 13% |
| | Margin of error ±5% |

**Table 2: Summary of Skills Not Adequately Developed for Responses to Open-Ended Question No. 1**

| What construction skill(s) did you need—but did not have developed—to the level needed to support military operations? | Percentage of respondents who mentioned this |
|---|---|
| Execution of the contracting process | 18.2% |
| Production of designs | 15.3% |
| Assessing infrastructure | 14.2% |
| Performance of quality assurance/quality control inspections | 14.2% |
| Execution of the project management process and use of project management software | 13.1% |
| Execution of the project funding process | 8.5% |
| Application of technical knowledge pertaining to electrical power and distribution | 6.8% |
| Performance of base camp planning | 5.1% |
| **Other comments of interest** | |
| Experienced long periods during service of not performing construction activities | 11.4% |
| Need hands-on training or real-world experience to truly understand fundamentals/ principles of construction | 4.0% |
| Need sustainment training or I forget fundamentals/principles | 2.8% |
| Need training focused on making the transition to field grade engineer officer rank | 0.2% |
| | Margin of error ±5.5% |

## Contributors to the Development of Construction Skills

The survey respondents overwhelmingly considered practical experience gained during deployments to be the most effective source of training to develop their construction skills (see Tables 3 and 4, page 18). This could be a source of concern. Considering the Army engineer officer's general lack of preparedness to perform construction activities described in the previous section, if the most effective source of training is experience gained during deployments, is it possible that the officers are learning merely to "get by," rather than learning to perform construction activities in a professional manner? Although not conclusive, two additional results indicate that this may be the case. The first is the survey assessment that institutional training had only a moderate impact on the development of construction skills (see Tables 3 and 4). The second is that only 20 to 40 percent of the sample population believed that home-station work and training contributed to the development of their construction skills (see Table 3). I could not determine how many of that group had been assigned to construction units or USACE duty positions. Regardless of who provided the favorable responses, I believe these results indicate that the Army, in general, is not effectively preparing its Army engineer officers to perform construction activities before deployment. Furthermore, if Army engineer officers are primarily learning on the job during deployments, then what exactly are they learning? To what level are they really performing, and is that level good enough?

## Conclusion

I believe the survey results indicate gaps in both the technical knowledge that Army engineer officers possess and the level of understanding of construction processes that they have developed. Less than half of the survey respondents believed they were adequately prepared to perform the construction activities of assessing infrastructure requirements, determining the appropriate funding source for a project, and executing the programming process (see Table 1). Only 50 to 60 percent believed that they were adequately prepared to determine the construction standards that apply to a project and to develop a performance work statement (see Table 1). Considering that more than 80 percent of the respondents indicated that they have a year or more of experience

***Evidence from this study indicates that Army engineer officers learn best from practical experience, or 'learning by doing.'***

| Table 3: Summary of Responses to Self-Development Questions | |
|---|---|
| **The following contributed to the development of my construction skills:** | **Percentage of favorable responses** |
| My work experience while deployed | 79% |
| Assistance I received from peers | 65% |
| Assistance I received from subordinates | 64% |
| My graduate degree program | 60% |
| My service's institutional training (Engineer Basic Officer Leader Course and Engineer Captains Career Course) | 58% |
| My undergraduate degree program | 53% |
| Coaching/mentoring I received from senior military engineers | 51% |
| My work experience in the military while at home station | 41% |
| My work experience outside the military | 28% |
| Home station training | 23% |
| My completion of the Defense Acquisition University's online contracting officer's representative training | 39% |
| My completion of U.S. Army Corps of Engineers prospect courses | 32% |
| My completion of U.S. Navy Civil Engineer Corps Officer School specialty courses | 29% |
| My completion of U.S. Army Air Force Institute of Technology courses | 13% |
| | Margin of error ±5% |

| Table 4: Summary of Most Effective Sources of Training Per Responses to Open-Ended Question No. 2 | |
|---|---|
| **What training was most effective at developing your construction skills to support military operations?** | **Percentage of respondents who mentioned this** |
| Deployment experience | 29.8% |
| Assignment to a construction unit or construction-focused duty position | 16.2% |
| Engineer Captains Career Course | 14.6% |
| Assignment to the U.S. Army Corps of Engineers | 14.1% |
| Graduate degree program | 14.1% |
| Engineer Basic Officer Leader Course | 14.1% |
| Undergraduate degree program | 12.0% |
| Military experience (unspecified type) | 9.4% |
| None/have not received effective training | 7.3% |
| Civilian experience | 6.8% |
| U.S. Army Corps of Engineers courses | 4.2% |
| | Margin of error ±5.5% |

performing construction activities supporting Operation Enduring Freedom and/or Operation Iraqi Freedom, these indicators are disturbing. Further investigation to confirm the specific construction activities that Army engineer officers at each organizational level need to perform in support of full spectrum operations may help the regiment pinpoint where to focus its development efforts. It may also help determine which activities to focus on at various stages of officers' careers.

As important as it is to determine what gaps exist, it is equally important to determine how to bridge these gaps. Evidence from this study indicates that Army engineer officers learn best from practical experience, or "learning by doing" (see Tables 3 and 4). It may help to further adjust the teaching methods used during institutional and operational training, not only during engineer-specific courses early in officers' careers, but also during intermediate level education and unit training throughout their careers. The incorporation of practical exercises—preferably with subject matter experts observing and coaching—that require site assessments followed by construction planning, programming, and management processes to satisfy a series of scenario requirements may help improve the level of preparedness.

Perhaps the most significant thing this study indicates is that there are still a lot of questions which need to be investigated and discussed as the Engineer Regiment seeks to improve its construction competency. It is hoped that this article has added information that will help focus these questions and spark additional studies that will lead to a better understanding of the problem and a more refined vision for improvement.

**Endnotes**

[1]Watson, Bryan, Brigadier General, *Leader Profile*, The Military Engineer, March–April 2010, pp. 43–44.

[2]Hatala, Karl, *The Development of Army Engineer Officer Construction Skills: Where Are the Gaps?* U.S. Army Command and General Staff College, Fort Leavenworth, Kansas, 2010.

*Major Hatala is serving with the 10th Mountain Division (Light Infantry) in Afghanistan. This article is based on the thesis he completed in the spring of 2010 while attending the U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.*




*("Professional Development," continued from page 10)*

Next came a question-and-answer period, giving junior leaders a chance to have the joint panel elaborate on some of their points. Some of the audience focused their questions on strategies to illuminate hybrid threats and ways that an engineer could respond to those threats. The theme of improvised explosive devices (IEDs) and their continued prevalence was a discussion point. The panel responded with some potential strategies involved in the IED fight, especially in areas where they are not yet widely used. In areas free of conflict, the role of the engineer is to help the commander prevent conflict and, therefore, prevent danger from IEDs. Another theme introduced was land mines and their role in future conflict. This led to dialogue between the panel and the audience. As land mine proliferation by other countries continues, collaboration with international organizations can help remove them as threats. One conclusion was that finding a role for land mines in future wide-area security operations could present a challenge to U.S. policy.

Many members of the audience were experienced in tactical operations, but were mostly unfamiliar with joint operations. For them, the COCOM engineer briefings shed new light on the variety and breadth of engineer operations, allowing them to hear firsthand how an Army engineer could be responsible for myriad tasks that ranged from the obvious to the obscure. They revealed to the audience the need to seek different and challenging assignments to ensure that when engineers serve at the joint level, they are prepared to support the commander with expert knowledge and capability. The educational and professional opportunities, such as the Joint Engineer Operations Course (available to them later in their careers) are keys to gaining this joint experience. The course, which introduces joint capabilities and operating concepts, is part distributed learning and part small-group classroom work. Once leaders are introduced to the scope of joint operations, they realize the unique challenges of operating as a joint engineer. Future joint engineers must understand that all environments are unique and that all responses to those environments are also unique.

The COCOM engineers provided the audience with an outstanding overview of their respective areas and the challenges they face and reinforced the need for joint operational knowledge and professional education. The 36th Engineer Brigade commander provided the linkage of the COCOM engineer to the tactical level so that the audience could readily grasp the flow of tasks and requests that support operations. The panel helped ensure that our engineer professional development remains fluid and that our instruction keeps pace with the dynamic operational environment and emerging doctrine so that we can continue to develop adept engineer leaders.

*Major Phillipson is an instructor with the Engineer Captains Career Course.*

# ENGINEER DOCTRINE UPDATE

**U.S. Army Maneuver Support Center of Excellence**
**Capabilities Development and Integration Directorate**
**Concepts, Organizations, and Doctrine Development Division**
**Doctrine Branch, Engineer Division**

| Publication Number | Title | Date | Description (and Current Status) |
|---|---|---|---|
| **Publications Currently Under Revision** | | | |
| FM 3-34 | *Engineer Operations* | Apr 09 | This is the engineer keystone manual. It encompasses all engineer doctrine; integrates the three engineer disciplines of combat, general, and geospatial engineering; and introduces the four lines of engineer support to full spectrum operations.<br>**Status:** Estimated publishing date is 4QFY11. |
| **Combat Engineering** | | | |
| FM 3-90.4<br>(*FM 3-34.2)<br>(*FM 3-90.12) | *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,* and FM 3-90.12, *Combined Arms Gap Crossing*. 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 (MAGTAF) Breaching Operations*.<br>**Status:** To be published 4QFY12. |
| ATTP 3-34.55<br>(FM 5-103) | *Survivability* | Jun 85 | This is a full revision of FM 5-103, *Survivability*.<br>**Status:** Initial draft staffing in 3QFY11. |
| **General Engineering** | | | |
| TM 3-34.48 1/2<br>(*FM 5-430-00-1) | *Design of Theater of Operations Roads, Airfields, and Helipads* | Aug 94<br>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.<br>**Status:** Estimated publishing date is 1QFY12. |
| 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.<br>**Status:** Estimated publishing date is 1QFY12. |
| TM 3-34.43<br>(*FM 3-34.451)<br>(*FM 5-472) | *Materials Testing* | 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 laboratory facilities are unavailable or impractical to use. The Marine Corps and Air Force plan to adopt this manual as well.<br>**Status:** Estimated publishing date is 4QFY11. |

# ENGINEER DOCTRINE UPDATE

**U.S. Army Maneuver Support Center of Excellence**
**Capabilities Development and Integration Directorate**
**Concepts, Organizations, and Doctrine Development Division**
**Doctrine Branch, Engineer Division**

| Publication Number | Title | Date | Description (and Current Status) |
|---|---|---|---|
| **General Engineering (continued)** | | | |
| TM 3-34.65 (*FM 3-34.465) | *Quarry Operations* | Mar 05 | 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. There will be a focused staffing only for this manual.<br>**Status:** Estimated publishing date is 1QFY12. |
| TM 3-34.49 (*FM 5-484) | *Multi-Service Well Drilling Operations* | 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.<br>**Status**: Estimated publishing date is 4QFY12. |
| TM 3-34.56 | *Waste Management* | New | This new manual will address issues not currently integrated into FM 3-34.5, *Environmental Considerations*. It 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.<br>**Status:** Estimated publishing date is 4QFY12. |

**Notes:**

**1. Current engineer publications can be downloaded from the Army Publishing Directorate at <*http://www.apd.army.mil*>. The manuals discussed in this article are currently under development and/or recently published. Drafts may be obtained during the staffing process by contacting the Engineer Doctrine Branch at commercial (573) 563-0003, DSN 676-0003, or <*leon.cdid-codddengdoc@conus.army.mil*>. The development status of these manuals was current as of 3 Jun 11.**

**2. Due to the doctrine reengineering effort, some field manuals (FMs) are being realigned as general subject technical manuals (TMs). These manuals will be numbered as TMs. FMs dealing with Army tactics, techniques, and procedures (ATTP) will be renumbered as ATTPs.**

***Publication number of the current publication, which will be superseded by the new number at the top. Multiple manuals in parenthesis indicate consolidation into one manual.**

**U.S. Army Engineer School History Office.** This Office maintains a multimedia collection of historical materials on the Engineer School and the Engineer Regiment. The collection—which consists of more than 17,000 manuals, 21,000 photos, 800 videotapes, and three million pages of documents on engineer history—includes information on units, equipment, organizations, and operations that can support mission requirements and analysis efforts. The office is seeking to expand its holdings on engineer units and requests that a copy of photographs, videos, or documents that are generated by units be sent to: History Office, U.S. Army Engineer School, 320 MANSCEN Loop, Suite 043, Fort Leonard Wood, Missouri 65473, or to <*leon.usaeshistory@conus.army.mil*>. The History Office also maintains a milBook page at <*https://www.kc.army.mil/book/groups/engineer-historian*> and a Web page at <*http://www.wood.army.mil/wood_cms/usaes/2332.shtml*>.

Any questions should be directed to Dr. Larry Roberts at (573) 563-6109 or Dr. David Ulbrich at (573) 563-6365.

# The Strategy of Mapping

*By Major Michael L. Wood*

Maps provide both the context and the details regarding a specific location. They enable users to understand how things relate to one another from the strategic to the tactical level of planning and operations. This article provides an overview to help Soldiers better understand the roles and responsibilities in methods or strategies when working with maps and geospatial data in the U.S. Army.

## Types of Maps

### Paper Maps

A long-standing requirement in the Army is a basic and simple paper map, which can be ordered through the Defense Logistics Agency (DLA) and traditional Army supply channels. Each unit has a subject matter expert in supply who can quickly order maps. An Internet-based system is available at <*http://www.dlis.dla.mil/fedlog/default/asp*>, which provides a way to receive maps similar to the way parts are ordered for vehicles with national stock numbers. DLA has created compact disc (CD) map catalogs, which allow users to select the area wherein maps are needed —with the desired formats or scale—and then generate a document sent through the DLA Web site to place the order. A wide variety of maps can be ordered for planning and combat operations, including classified products, map books, and digital map data for command and control (C2) systems.

### Direct Digital Data

Digital data, imagery, and products can be downloaded from the National Geospatial–Intelligence Agency (NGA) Web site. Often, the intelligence staff officer (S-2), terrain team, or geospatial intelligence (GEOINT) cell may download the area of interest for all required scales—then work with the knowledge management office or the signal staff



Photo by Sergeant Rebecca Linder

**Geospatial engineers with the Directorate of Public Works, 196th Maneuver Enhancement Brigade, South Dakota Army National Guard, go over a map they made for a customer at Camp Phoenix in Kabul, Afghanistan.**




**NGA tools such as GEOINT Online provide users access to NGA geospatial holdings through keyword, metadata, and geonavigation searches to discover and obtain imagery, maps and charts, and hybrid products which combine imagery and maps.**

officer (S-6) to create a standard repository on the local network for C2 systems to access. Before downloading gigabytes of data, persons should ensure that the data has not already been stored on a local server.

## Identifying Available Resources

### Army Geospatial Center

For data and support when working with mapping, Soldiers should always turn to the Army Geospatial Center (AGC) at Fort Belvoir, Virginia, since the center works with Army units to provide more tailored support to Army operations. The AGC is particularly noted for its work with unique sensors and platforms to collect high-resolution, unclassified imagery and elevation data from a wide variety of providers and then distribute products and resources using various methods. An incredible resource of the AGC is its ability to provide subject matter experts in the areas of water tables, soils, elevation modeling, environmental country studies, data for urban tactical planners, and even map data for commercial global positioning system (GPS) devices.

### NGA Analysts

NGA integrates its analysts throughout all branches of Service and at all levels of command, including combat operations. A civilian NGA analyst can access a wide variety of imagery, reports, and geospatial data from various classified sources to support combat and strategic operations. Geospatial and imagery analysts should always work in concert with an NGA analyst to provide the most reliable and accurate data available for their unit or command.

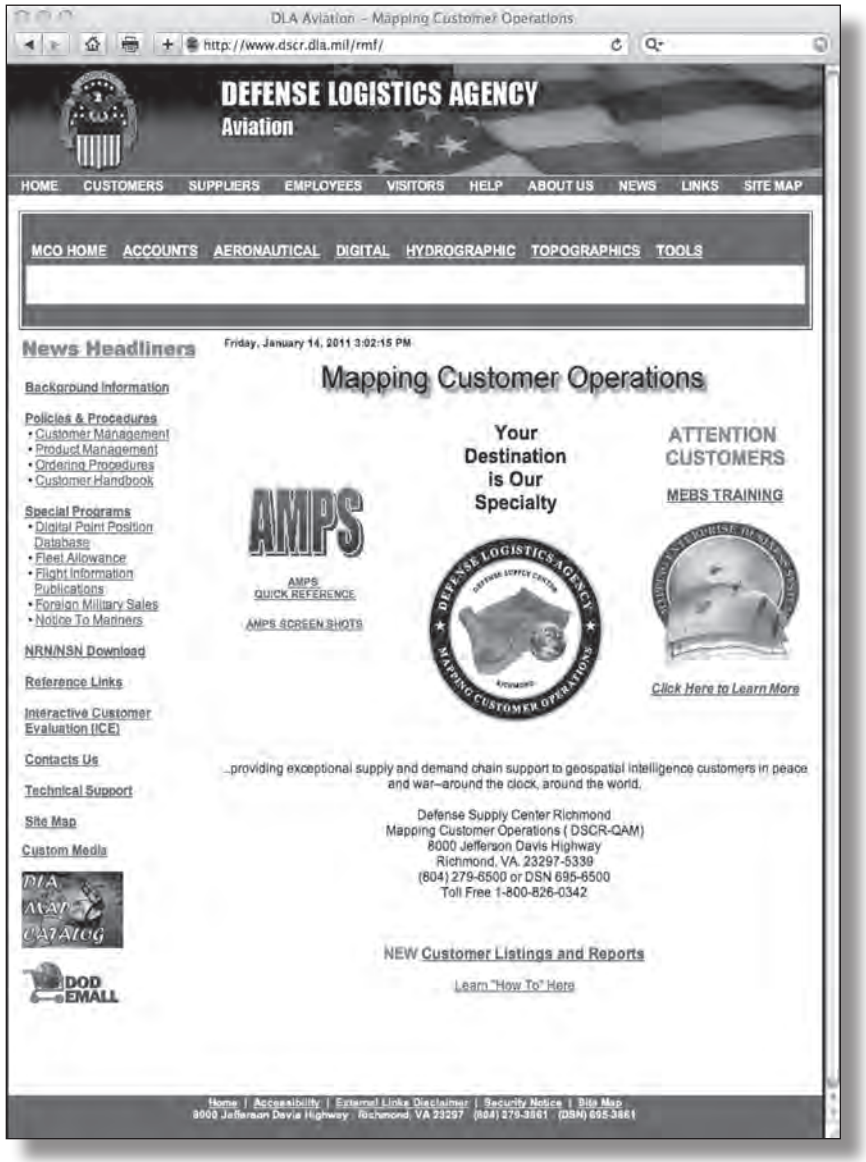
### Army Terrain Teams

Many engineer Soldiers are already familiar with their Army terrain teams, led by an engineer warrant officer—the terrain expert—who provides detailed analysis regarding the physical geography and environment and their impact on operations. The terrain team manages a majority of the nonstandard map requirements for operation orders and briefings. The imagery intelligence (IMINT) cell is headed by an intelligence warrant officer—an imagery expert who uses imagery and unmanned aerial systems to determine size, strength, and capabilities of units. Most commanders have successfully integrated the terrain and IMINT teams to form GEOINT cells, enabling the experience and knowledge of both teams to complement each other as new technologies and capabilities become available. In situations where unclassified imagery or additional imagery support is needed, the U.S. Army Space and Missile Defense Command (USASMDC) is able to provide specialized methods and downlink capabilities to fully exploit commercial satellites and sensors. Many of these new methods and techniques to exploit advanced geospatial intelligence (AGI) or imagery-derived measurement and signature intelligence (MASINT) are rapidly expanding and provide significant capabilities for detecting features, delineating natural and man-made objects, providing new

topographic maps, and creating more detailed and accurate terrain classification. AGI includes, but is not limited to, multispectral imagery, synthetic aperture radar, overhead persistent infrared, and thermal infrared. In addition, the GEOINT cells can identify and coordinate new collections requirements and work in cooperation with AGI nodes and the MASINT portal available on classified networks.

### Geospatial Planning Cells

At the Army Service component command (ASCC) level, a geospatial planning cell (GPC) works to receive data from lower echelons, as well as integrate data and geospatial information from higher levels, such as the AGC and NGA. A GPC has the capability to exploit imagery and geospatial data in order to provide tailored products that can be used for units throughout the combatant command and by other branches of Service. The GPCs can provide data to the GEOINT cells, streamline requirements, and confirm that data has been properly vetted, attributed, and then provided to the AGC for inclusion in new products. GPCs are also able to access and work with other geospatial elements for support, such as the Air Force National Air and Space Intelligence Center (NASIC), the Office of Naval Intelligence (ONI), the Marine Corps Intelligence Activity–Geospatial Analysis Branch (MCIA–GAB), and the U.S. Army Intelligence and Security Command (INSCOM)—which includes the National Ground Intelligence Center (NGIC)—and other elements such as the Central Intelligence Agency (CIA) map library and the Defense Intelligence Agency (DIA).




**The DLA provides support for military forces to establish and order maps for their units.**

## Leveraging Available Resources

This article provides an introduction for users to understand how they might better leverage capabilities and methods in obtaining map data, information, and products. Although not discussed in this article, each branch of Service has geospatial providers and collection elements. In many cases, host nations, other government agencies, and even human terrain teams can provide a wealth of data at the ground level to support humanitarian aid, disaster relief, and reconstruction operations.

Further information is available at the following Web sites:

- Defense Logistics Agency, <*http://www.dscr.dla/rmf*>.
- National Geospatial–Intelligence Agency, <*https://www1.nga.mil*>.
- Army Geospatial Center, <*http://www.agc.army.mil*>.
- United States Army Space and Missile Defense Command, <*http://www.army.mil/smdc*>.
- National Geospatial-Intelligence Agency College, <*http://www.intelink.gov/wiki/Sensors_Department*>.

*Major Wood is a U.S. Army engineer officer, currently at the Command and General Staff College as a Strategic Intelligence Scholar. He has commanded the 320th Engineer Company (Topographic) and the 60th Engineer Detachment (Topographic). He is a graduate of the Royal School of Military Survey in England and holds a master's degree in defense geographic information from Cranfield University in England.*

# PORTABLE BLAST WALL

*By Major Jesse H. Stalder*

Six Soldiers from the 412th Theater Engineer Command spent two days setting up and tearing down a portable blast wall designed to guard against small arms fire and rocket-propelled grenade attacks. The U.S. Army Engineer Research and Development Center (ERDC) configured the structure, which they named the Joint Modular Protective System, so that it can be easily assembled and disassembled in remote locations where concrete barriers are unavailable.

"We wanted something that was lightweight and reusable," said a representative of the ERDC Geotechnical and Structures Laboratory. In conjunction with the U.S. Army Test and Evaluation Command, ERDC photographed and videotaped the 412th Soldiers repeating the setup and tear-down process. The designers plan to use the video and still photographs to create illustrations for an instruction and maintenance manual. They will include copies of the handbook in the 3,000 kits to be delivered to the Office of the Secretary of Defense in June. In the meantime, the 412th Theater Engineer Command Soldiers used the initial instructions available to them.

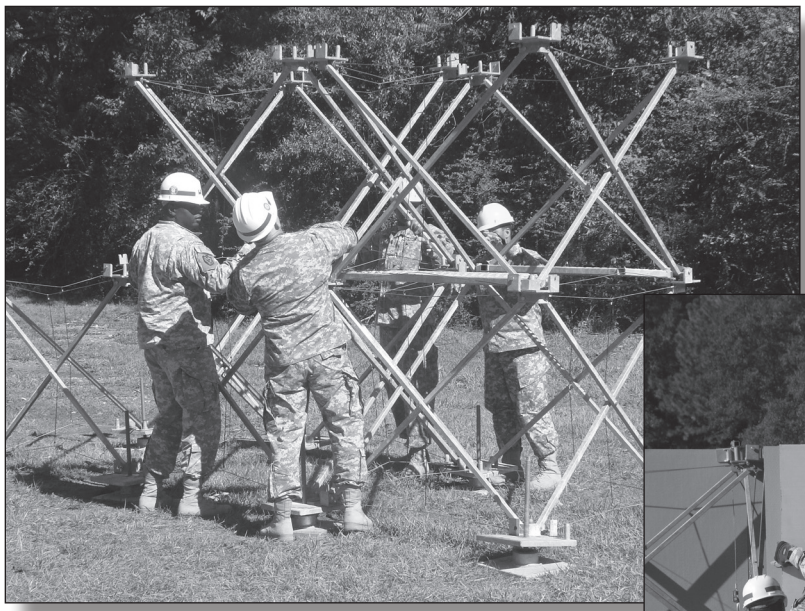



**A Soldier assembles a component of the portable blast wall.**

"I looked at the instructions for maybe five minutes and we started putting it together. It was that simple," said the senior enlisted leader of the 412th Theater Engineer Command deployable command post No. 2. A junior enlisted Soldier echoed that attitude.

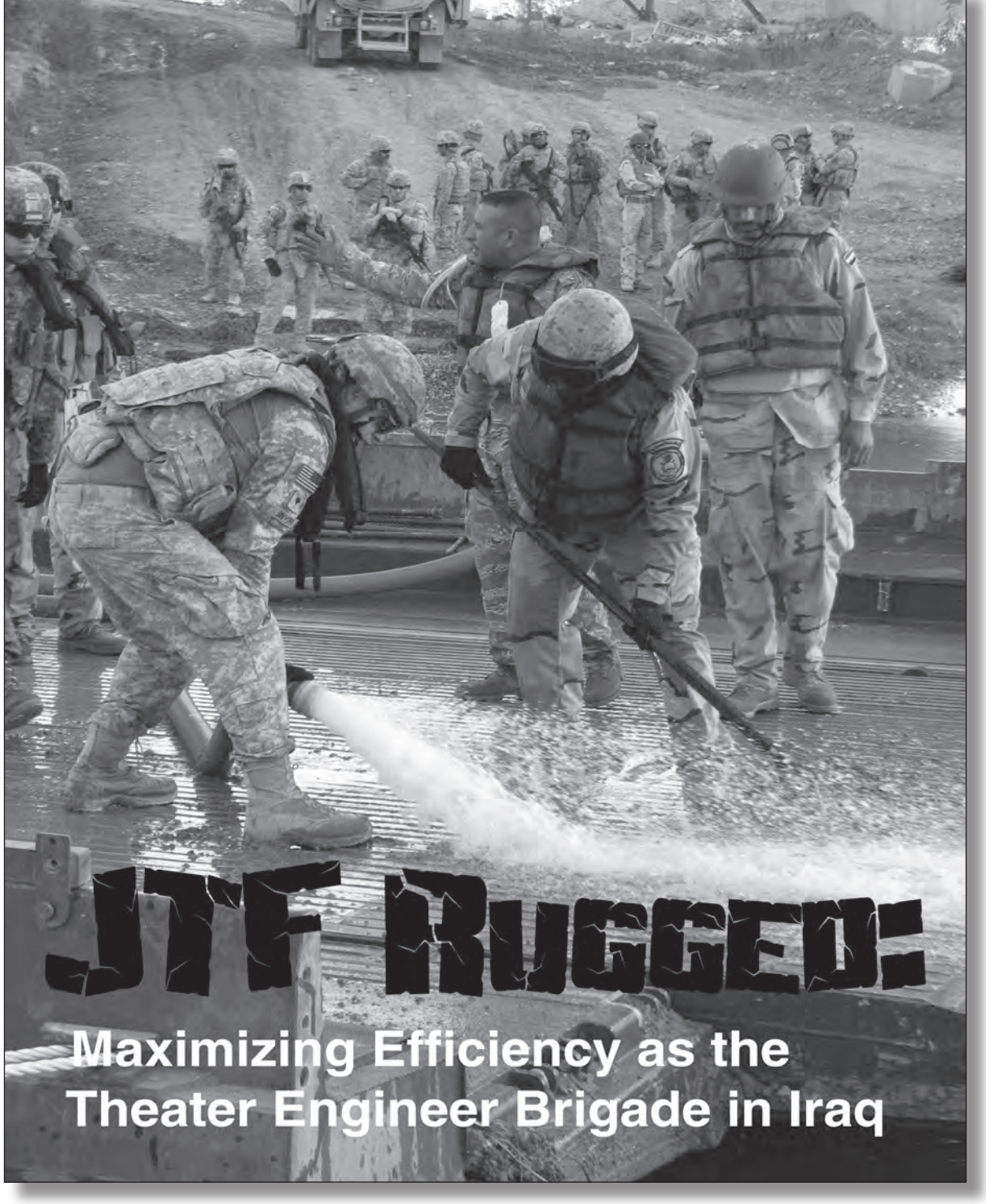
"It is pretty easy to put up and tear down. It's a good piece of equipment," he said. The blasting wall is scheduled to be in use in Iraq and Afghanistan by the end of the year.

*Major Stalder is the deputy public affairs officer for the 412th Theater Engineer Command at Vicksburg, Mississippi. He holds a bachelor's degree in education from Washington State University and a master's degree in educational leadership from City University, Bellevue, Washington.*





**Above and right: Soldiers from the 412th Theater Engineer Command work together to assemble a portable blast wall designed to guard against small arms fire and rocket-propelled grenade attacks.**



# JTF Rugged:

## Maximizing Efficiency as the Theater Engineer Brigade in Iraq

*By Major Thomas L. Galli and Captain Nathan L. Coburn*

Over the past eight years in Iraq, U.S. Army engineers have continuously adapted and improved their tactics, techniques, and procedures (TTP) to meet the evolving threat environment. This process required both flexibility and innovation by engineers to maintain the edge and support the force. In 2010 as well, the theater engineer brigade had to quickly and successfully adapt to change, yet the challenges were clearly distinct. The strategic and operational focus at the theater level changed from conducting combat operations to advising and assisting the Iraqi forces. This shift was concurrent with a reduction of the overall military footprint and force structure to meet the directed military force cap of 50,000 personnel, which marked the transition to Operation New Dawn. Therefore, the focus of the 36th Engineer Brigade—Joint Task Force (JTF) Rugged—as the theater engineer brigade, changed to developing new strategies for greater efficiency with reduced assets. This article highlights changes in both the approach and mind-set needed by the 36th Engineer Brigade to successfully continue supporting stability operations and to advise and train Iraqi engineers. It will also look ahead to the transition of missions and retrograde of forces out of Iraq.

## A Year of Structural Change

Because of previous strategic and operational level efforts (including the surge) to stabilize Iraq and make its institutions and governance enduring and viable, the threat level remained relatively low and stable by Iraqi standards in 2010. The challenge across the force was how to retain the gains of previous years, which meant continuing to provide full support to Iraqi partners and the maneuver forces while mitigating risks caused by the reduction of forces and transition of missions. This challenge illustrates the structural change referred to above. By mid-2010, the number of engineer brigades in Iraq decreased from three to one. The 36th Engineer Brigade had sole responsibility for all engineer assets outside the brigade combat teams (BCTs) and—after August 2010—all advise-and-assist brigades in-theater. In essence, the brigade assumed a much larger area of responsibility with less than one-third of the previous engineer force in country. The number of Soldiers and Airmen in the brigade decreased by almost two-thirds, but they were still responsible for construction and bridging and most of the route clearance along main and alternate supply routes throughout the theater after June 2010. The brigade had to reduce its force structure in adherence with theater directives, yet still accomplish its mission to advise, train, assist, and equip (ATAE) Iraqi engineers and conduct numerous other missions as required.



**A Cougar armored vehicle provides security for Soldiers crossing a bridge during a project reconnaissance.**

## Focusing Efforts, Maximizing Efficiency

With fewer engineer resources available across the Iraqi theater, the brigade acknowledged that the same volume of missions and projects could not be executed. Therefore, expectation management and consensus building on engineer missions and priorities, from the removal of military bridges to general engineering construction missions, was a fundamental element to focus operations and maximize efficiency. This article focuses on the primary engineer brigade mission sets:

- Route clearance.
- General engineering, such as construction, military bridging, and the strengthening of the Iraqi partnership through ATAE.
- Rapid and responsive technical design and construction support.

### Route Clearance

Through 2010, the total number of route clearance teams in theater declined by one-third. While the overall number of U.S. forces also declined, there was still a wide dispersion of U.S.-supported bases and locations. This meant that many routes would receive less pervasive coverage with clearance assets. In other words, the requirement had not decreased in proportion to the resources. The 36th Engineer Brigade leaders understood that the key to avoiding potential gaps and seams in coverage was to fully understand and then target the areas of highest threat.

The first step was to focus on the common operational picture (COP), metrics, and terminology. Previously, the U.S. divisions and some BCTs and advise-and-assist brigades had their own threat metrics and different COPs when it came to employing route clearance assets. That was acceptable when assets were in greater abundance and could be focused on one operating location or employed by a single maneuver unit. With the decline in total assets and the need for route clearance teams to cover disparate areas with greater frequency, the brigade realized that the development and implementation of a theater-wide COP would be the best approach. Therefore, the brigade spearheaded



An Airman conducts a survey for a road project.

a strategy—in close cooperation with various elements at U.S. Forces–Iraq (USF-I) and the U.S. divisions—to develop a more universally accepted COP, with the objective of achieving greater unity of effort and synchronization of route clearance across the theater.

The second step of this approach was a concerted effort to create more clarity and opportunities in intelligence, surveillance, and reconnaissance platforms to actively observe and ultimately provide the maneuver forces with the information required to counter the improvised explosive device networks. While these steps all proved to be beneficial, the challenge still remains as enemy and insurgent elements continue to learn and adapt to friendly TTP, an iterative process in which we now commonly refer to as the enemy "having a vote." Therefore, staying integrated and involved in targeting and analysis meetings from USF-I down to the individual advise-and-assist brigade level is even more critical than some of the technological advantages that U.S. forces employ. These meetings involve discussion of how to develop and implement solutions to an ever-changing problem.

**General Engineering**

***Construction.*** The brigade also had to address a significant decrease in construction assets in 2010. Between March and September, overall construction assets—U.S. Army and Air Force alike—within the theater engineer brigade decreased by approximately 75 percent. As in route clearance, the construction requirements did not decrease in proportion to the reduction of forces and assets. In fact, the potential requirements actually increased with design and troop construction missions to support base closures and the transition to the U.S. Mission–Iraq (USM-I). The brigade mitigated this resource-requirement disparity by working closely with the U.S. divisions and the Engineer Directorate at USF-I to develop a comprehensive standard, through very specific criteria and weights, to prioritize construction projects and requirements throughout the theater. The new criteria were based on a number of factors. For example, projects involving health and safety or theater level assured mobility—or that were directed by USF-I—got higher priority than projects supporting routine base maintenance, sustainment, or upgrades. Also, projects that would affect USF-I or a U.S. division had higher priority than those that would contribute to a lower-echelon unit.

The objective was to ensure that engineer brigade assets were used only on missions identified as essential at the theater command-level and not on jobs that had not been vetted at USF-I and did not meet the specific prioritization criteria. Again, reducing friction among the stakeholders was an essential consideration and by-product of the construction submittal and prioritization process, but it was even more important in the brigade's approach to removing military bridges throughout Iraq.

***Military Bridging.*** After June 2010, there were very few in-theater multirole bridge company assets dedicated to maintaining, conducting emergency emplacements of, and removing military bridges, or advising, training, assisting, and equipping the Iraqi Army's strategic bridge company. Once again, maximizing efficiency with limited resources was the brigade's mantra. The brigade spearheaded an effort early in the deployment by analyzing the military, social, and economic ramifications of all military bridges in Iraq. The removal of any bridge was part of a greater system with numerous, varying impacts on multiple stakeholders. These could include U.S. maneuver forces, Iraqi forces, the Iraqi government, and local people. Utilization rates by each stakeholder and the economic and social implications for surrounding communities had to be considered. Using a systemic approach, the brigade and USF-I could foresee and avoid potential friction points in deciding which bridges were most essential in this complex environment. As with the definition of construction priorities, an open dialogue with all division engineers from the respective U.S. divisions was also essential in eliminating conflicts and gaining concurrence, thus reducing friction among the stakeholders.

***Partnership Strengthening.*** In 2010–2011, JTF Rugged was responsible for providing advice, training,



**Engineers place a concrete pad for a gate construction project.**

assistance, and equipment for the Iraqi Headquarters Field Engineering Regiment and Strategic Bridge Company. Maximizing efficiency, yet doing so with cultural awareness and understanding, was a vital tenet to the brigade's approach to partnering with the Iraqis. The first challenge was to make the mission and training Iraqi-approved. Training objectives could not be dictated by U.S. forces, but instead required agreement and implementation by Iraqi leaders. Because there was limited time to establish a functional strategic bridge capability within the Iraqi Army, little effort could be wasted on debating the structure and format of the training. It became readily apparent that the most efficient way—albeit different in appearance and nature from a traditional U.S. approach—would be an Iraqi method. The brigade facilitated this by specially tailoring an advisor team with the institutional knowledge and understanding to meet this intent. The advisor team assisted the Iraqis by emphasizing basics, working within their standards and boundaries, and focusing on building institutional longevity and systems that could endure long after the U.S. trainers departed. The result may not resemble anything U.S. forces are familiar with, but if it entails Iraqi ownership, leadership, and pride, then it will have a good chance of success.

**Rapid and Responsive Design and Support**

In addition to the many missions already mentioned in direct support of the operational and maneuver forces, JTF Rugged was essential in setting conditions for the transition of the military mission to USM-I through facility master planning and design and technical support associated with base consolidation and closures. The brigade also had to stay engaged by providing continued construction and technical support for base life, health, and safety issues, which the U.S. divisions and various base mayors relied on since most assigned divisional engineer assets departed by midsummer 2010. Both of these challenging missions were accomplished by the brigade's assigned U.S. Air Force Expeditionary Prime Beef Squadron (EPBS), which had elements throughout the Iraqi theater. These Air Force teams—with their senior leadership, technical proficiency, and professionalism—enabled the brigade to provide engineer design, master planning, and construction team support to the U.S. divisions and USM-I. The position and posturing of the EPBS gave the brigade and USF-I great flexibility and helped maximize efficiency and effectiveness.

## Conclusion

The success of JTF Rugged in 2010 did not rely on attempting to fill the void left by three engineer brigades previously in theater, which would not have been possible given the volume of the requirements. Instead, mission success was based on maximizing efficiency by streamlining theater priorities to clearly define the mission focus. This effort was neither designed nor executed in a vacuum, but through close and persistent coordination with USF-I, the U.S. divisions, and other stakeholders. The result was an understanding and approach to provide comprehensive expectation management on what the brigade could support, given the structural limitations of force reduction and mission transition.

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*Captain Coburn is the assistant brigade plans officer for the 36th Engineer Brigade. He holds a bachelor's degree from the University of Alabama and a master's degree from the Missouri University of Science and Technology.*


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Photos by Fort Leonard Wood Visual Information Center










# USACE Offers Training to Army Divers

*By First Lieutenant Michael S. Jappe*



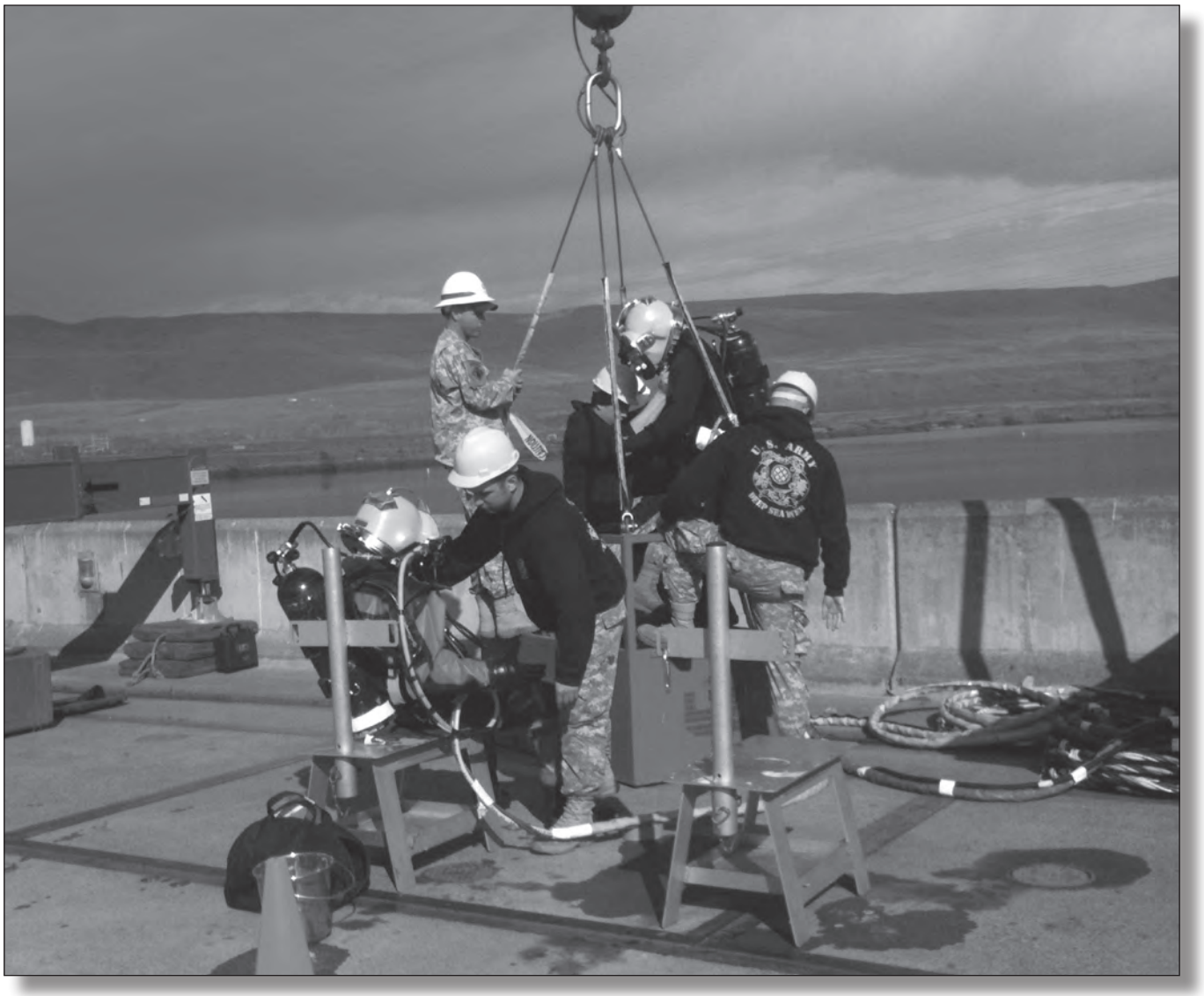
*"Red Diver, using proper line-pull signals, let us know when you have left surface and reached bottom, and give us okays on the way down," commands the dive supervisor over the radio.*

*"Understand, Topside," responds Red Diver, tugging twice on his air hose to signal that he is ready to be lowered to the project site. The dive supervisor signals to the crane to lower the diver, at a steady rate, to 120 feet below the surface. As Red Diver's helmet disappears below the water line, stopwatches chime to mark the start of the dive. Then, all that is heard over the communications box is the steady breathing of Red Diver.*

For five weeks in February and March 2011, the 86th Engineer Dive Detachment, stationed at Joint Base Langley-Eustis in Virginia, provided underwater construction support to the U.S. Army Corps of Engineers (USACE) in Oregon and Washington. Most of the trip was spent diving on eight major dams scattered across the Willamette, Columbia, and Snake River basins. This mobilization offered an excellent training opportunity to the Soldiers of the detachment, who recently returned from a 12-month deployment to Kuwait Naval Base. The Army engineer divers strive to conduct training in real-world environments through opportunities with USACE, the Joint Prisoner of War/Missing In Action Accounting Command, and other federal and state agencies.

"The opportunity to take Soldiers fresh out of dive school and place them in the challenging and threatening environment of a dam creates an invaluable training evolution. At the same time, the team can be proud knowing that it has contributed to the Corps's homeland mission in an extremely cost-efficient joint exercise," said the mission's noncommissioned officer in charge.

As the man basket scrapes down the face of the dam, Red Diver stands in the center of the platform, careful not to expose limbs to crushing injury. At the same time, he is careful not to let the umbilical air hose become entangled by any obstructions. On this dive, Red Diver's job is to inspect the trash racks for any major structural damage caused by logs and other debris moving downstream. The trash racks work like massive strainers, protecting the intake opening to the hydroelectric turbines. During the descent to the bottom of the trash rack, Red Diver counts on the hot-water hose connected to his wetsuit to combat the 38°F water temperature. In extreme cold-weather dives, the Army uses a portable pump that forces 130°F water down to the working diver. By the time that water reaches the diver, it has cooled to a more comfortable temperature. For the rest of the dive, Red Diver will constantly move the hose from his chest, to his feet, to his hands, silently praying that the heater keeps pumping.



**A diver climbs into the man basket.**



**Soapy water is applied to helmet and hose connections to check for leaks.**

This year, the 86th Dive Detachment mobilized for 36 days and conducted more than 120 hours of complex underwater work. The divers trained on various aspects of their mission-essential task list, including—

- Underwater cutting.
- Hydraulic drilling.
- Engineer reconnaissance.
- Strategic positioning of sonar equipment.
- Remote vehicle operation.
- Minor salvage operations.

Diving supervisors conducted in-water decompression and altitude diving so that they could maximize available working time. Due to some remote dive locations and the high-risk nature of the training, the unit mobilized its flyaway, U.S. Navy standard, double-lock recompression chamber for emergency treatments. The team's platoon sergeant emphasized the importance of a cross-country mobilization, citing the repeated adaptations and reconfigurations the detachment had to make during its deployment to Kuwait. By traveling to eight dive sites in five weeks, the detachment's leaders were forced to adjust in a manner similar to the deployment experience.

At 124 feet, Red Diver's basket contacts debris at the bottom of the project site and begins to tip over. The diver calls out "On bottom, Red Diver okay," over the communication box. The communication operator repeats commands verbatim from the dive supervisor.

"Understand, Red. Give us a bottom report."

Red Diver relays, "Understand, Topside. Visibility is one foot. Water temperature is cold. No current. Bottom type is wooden debris."

"Understand, Red. Get to work," commands the supervisor. Red Diver opens the swinging steel door of the basket and takes a cautious step out on to the debris. At this depth, the dive supervisor planned for the diver to have 20 minutes of inspection time. Upon ascent to the surface, the diver will stop at 20 feet to decompress. The dive seems simple, but even the simplest dives can be ineffective or hazardous when visibility is poor on a massive project such as a hydroelectric dam. Using the umbilical hose tension, the diver orients himself toward the dam face and approaches the trash racks. At this point, the diver is standing in front of a massive metal grate about 30 feet wide and 70 feet high. Beyond these bars is the cavernous intake space leading toward the turbine, which is located farther inside the concrete structure. The grating is designed to protect the turbine from large logs and other major debris that could damage the hydroelectric unit. The diver's job when conducting inspections is to sweep the entire structure, locate and record major damage or blockages, and remove as much loose debris as possible. If a large log or other object is pinned against the trash rack, the diver will attach straps and use a secondary crane on the surface to remove the obstruction. As Red Diver grabs the bars and begins to clear them, he contemplates the eeriness of standing in front of an intake that sucks thousands of cubic feet of water per second through a giant turbine when it's operating. He thinks about the first rule Army divers follow when diving on dams: "If there is flow, we don't go." It means that the presence of even a faint flow should be considered a serious threat of unsecured hazardous energy and result in an aborted dive.

Providing underwater support to USACE projects in the Northwest Division has been a longstanding priority for the Army's engineer dive detachments. "This mission makes sense for the dive field. Army divers have the opportunity to work on Army Corps of Engineer projects in support of our homeland mission. Being able to place our supervisors and junior divers in an important homeland mission with a wide scope of technical requirements creates an exceptional real-world training experience," said the first sergeant of the 86th Engineer Dive Detachment. That unit's latest rotation was the fifth major and eighth overall training mission supporting the USACE Northwest Division's Office of Dive Safety since 2006.

During its five weeks in the USACE Northwest Division, the team split time between the USACE Portland and Walla Walla Districts. The Portland District dive coordinator said, "The planning began in early October and was subject to many changes leading up to the operation. The fact that the mission accomplished so much is a testament of the attention to detail the Army's dive supervisors put into their missions." The district's deputy dive coordinator, a retired Navy diver, added, "The first two weeks of the operation involved complex dives that required patience and delicacy with extremely important research equipment. The next three weeks offered a wide scope of work at six different dams. Regardless of inclement conditions, these Soldiers showed up focused and ready to work; and because of that, we were able to safely achieve our goals for this rotation."

As Red Diver sweeps across the trash rack, he reports any inconsistencies in the structure and removes loose debris and small logs ensnared in the grate. Topside, the dive supervisor confirms Red Diver's reports with the video display from his helmet-mounted camera. In the sediment-laden waters on the






**Above: A diver uses an underwater cutting torch to remove derelict research equipment.**

**Left: A diver emerges after conducting an erosion inspection of the downstream spillway.**



**A U.S. Navy vessel provides a versatile work platform for Army divers.**

dam's face, the camera provides an extremely faint image. If it were not for the high-intensity light on Red Diver's helmet, he would be in total darkness. Early on in training, great importance is placed on the dive trainee's ability to take apart and reinstall heavy equipment without sight. This skill not only gauges the demeanor of the diver in an uncomfortable situation, but also his ability to complete complex tasks under austere conditions.

Red Diver completes his inspection 18 minutes into the dive. Then the dive supervisor instructs Red Diver to move back to the crane basket, square himself away, and prepare to travel to his decompression stop at 20 feet. The crane steadily pulls the basket toward the surface at a rate of 30 feet per minute. The diver relaxes and focuses on exhaling to allow the nitrogen he has taken into his tissue while under pressure to freely escape through his lungs. Meanwhile, the dive supervisor meticulously tracks every second of the diver's ascent, careful to ensure that he reaches his first decompression stop on time. Any delay, such as a diver's umbilical hose getting fouled on an obstruction, must be factored into the dive time and can result in an alternative decompression schedule.

This dive, however, goes according to plan. And, after completing his decompression time at 20 feet, Red Diver safely ascends to the surface. The diver's tender moves quickly to sit Red Diver down and remove his helmet to conduct a postdive safety check. Giving the okay signal, Red Diver sounds off to the dive supervisor—"Diver on deck, diver okay!" The supervisor studies the diver's pupils to ensure that they are the same size, while listening to the diver's voice for any slurred speech. For the next 10 minutes, the diver will be watched for any neurological or other abnormal symptoms. A host of pressure-related conditions can arise from diving, the most serious being an arterial gas embolism, a possibly life-threatening complication that requires immediate treatment in the recompression chamber. After ten minutes, the dive supervisor asks, "How do you feel?" Red Diver again holds up the okay sign and says, "Dive supervisor, I feel fine." The dive supervisor alerts the dive station, "On the side, last diver is clean!"

Red Diver is finished diving for the day. He strips out of his wet suit and begins the slow process of getting blood to circulate back into his icy extremities. The next dive has already been put into motion, with the divers busily breaking down the station and preparing to move 50 feet down the road deck to a new position in front of the next trash rack. Red Diver gives the next diver a quick backbrief of his dive and then takes over as the air console operator with primary responsibility for monitoring the next diver's air supply. Army divers place the utmost emphasis on working as a team and continuously cross-train on every requirement of a working dive station. The ability to trust in your fellow Soldiers while being suspended by an umbilical hose in 100 feet of freezing water comes from the knowledge that every diver intimately knows every job on the dive side. USACE Northwest Division's annual training opportunity this past winter provided a challenging and much-needed repetition that resulted in safe diving evolutions for the Soldiers of the 86th Engineer Dive Detachment.

*First Lieutenant Jappe is the executive officer and platoon leader of the 86th Engineer Dive Detachment. He holds a bachelor's degree in international security and conflict resolution. He has attended the Engineer Basic Officer Leader Course and the Marine Engineer Dive Officer Course.*

# Wildlife Returns to Jamaica Bay...



# ...And So Does USACE

Photo by USACE New York District

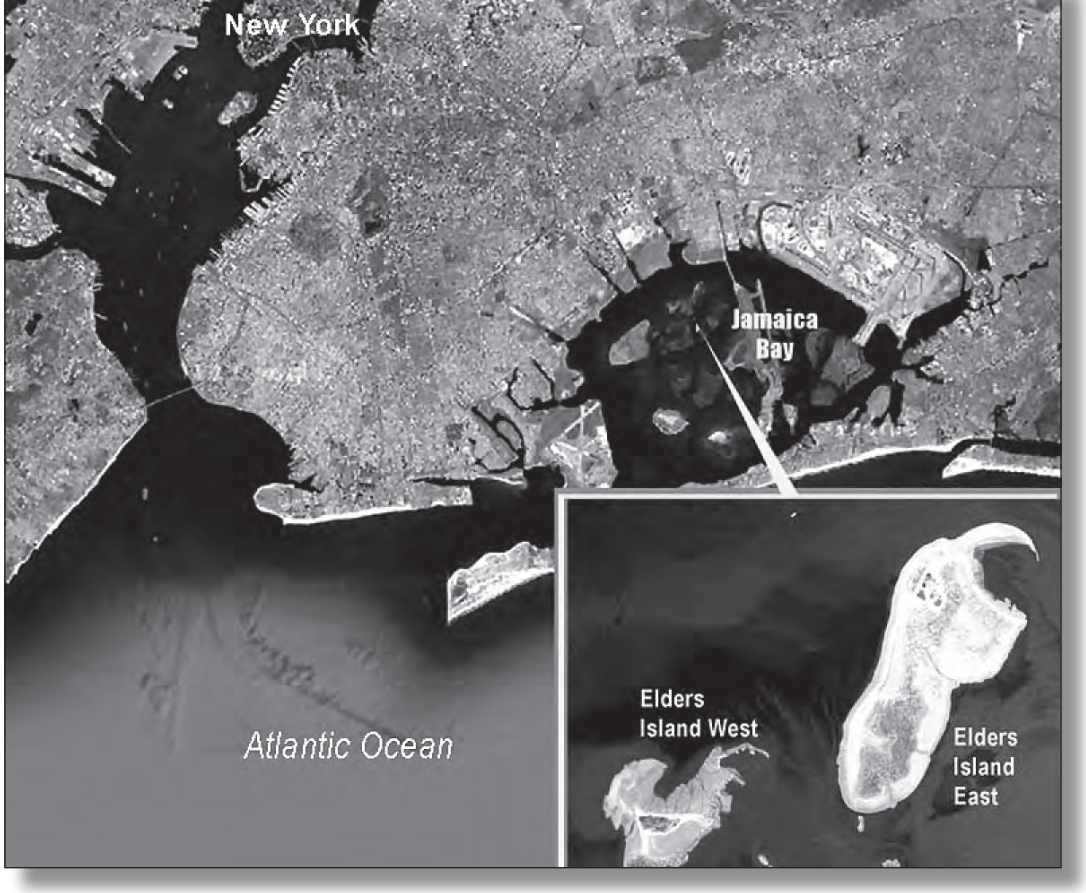
***By Dr. JoAnne Castagna***

A few years ago, the United States Army Corps of Engineers (USACE) and partnering agencies restored the degrading Elders Point East, a marsh island in Jamaica Bay, New York ("Environmental Restoration is Possible," *Engineer*, July–September 2007). In the summer of 2009, a senior project biologist with the USACE New York District was inspecting the island when she saw movement in the water as the tide was draining one of the creeks. Looking more closely, she saw something she'd never seen there: dozens of juvenile horseshoe crabs swimming in the tidal creek. They were the size of a quarter, but this meant so much more—that the restored island was providing successful breeding for horseshoe crabs.

Later that year, she also found a nest of diamondback terrapins, a New York State-protected turtle species, once again representing the success at Elders Point East that would soon transfer to the neighboring island—Elders Point West. This new restoration effort by USACE and partnering agencies not only sustains the environment but also saves taxpayers money.

## Island Complex

A marsh is a low-lying wetland with grassy vegetation that is usually in an area transitioning between land and water. Elders Point East and Elders Point West comprise a marsh island complex located in the 26-square-mile Jamaica Bay Park and Wildlife Refuge—the country's first national urban park and one of the Gateway National Recreation Areas. The refuge is located in an urban area that includes portions of Brooklyn, Queens, and Nassau Counties in New York. The area's shorelines are bordered by heavily developed lands, including John F. Kennedy International Airport, the Belt Parkway, and several




**Area map of Jamaica Bay, New York, and its marsh island complex**

landfills. The island complex was once a single, 132-acre marsh island named Elders Point, but years of degradation split it into separate islands that are now connected by muddy land. Today, a restored East is 49 acres and West approximately 40 acres.

The once-vibrant marsh islands in Jamaica Bay have degraded extensively over the last century, disappearing at a rate of 44 acres per year—and faster in the last decade. Much of this degradation is believed to be due to regional urbanization which, if not halted, could cause the elimination of the marsh islands by 2012. Maintaining the health of the marsh islands is critical to the well-being of indigenous wildlife and the 20 million people who live and work in this urban region, according to a certified professional wetlands scientist. She says that the benefits of the Jamaica Bay marsh island ecosystem vary, depending on scale. From a smaller-scale perspective, the marsh islands are a home for a variety of wildlife, including fish and shellfish—important food sources for birds—which help improve water quality by removing substances like nitrogen and phosphates. From a larger perspective, the marsh islands provide stability and water storage during storm and flood events. The islands also act as filters or natural cleansers as the plants capture and cycle different nutrients and particles out of the water. The restoration of Elders Point and other marsh islands may protect the more interior islands and slow their erosion. For the public, this means less erosion to personal property, more species available for recreational fisheries, better water quality, and the preservation of the Gateway National Recreation Area that is visited by millions of people each year.

## Elders Point Restoration

The benefits afforded to the surrounding region by the marsh islands make them an irreplaceable natural resource. To restore these islands, the USACE New York District has teamed up with partnering agencies, including the U.S. Department of the Interior National Park Service, U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS), New York City Department of Environmental Protection, Port Authority of New York and New Jersey, and New York State Department of Environmental Conservation. In 2006, the agencies restored Elders Point East by pumping 250,000 cubic yards of dredged sand on the island, shaping the sand to simulate the proper elevations of a marsh island, and hand-planting native plant species that included salt marsh cordgrass, salt hay, and spike grass grown from seed collected in Jamaica Bay. The sand they placed on the island came from the USACE beneficial reuse program that takes dredged sand from the New York District's New York Harbor Program and area waterways, using it to rebuild habitats. In the past, this sand would have been dumped into the ocean, so the program is a win-win effort for the environment and taxpayers.

## Lessons Learned: East to West

Elders Point West has been restored in a similar manner, but with much improvement, because the team applied the important lessons they learned from East. In the fall of 2009, the team began work on West and pumped 240,000 cubic yards of beneficially used,



Photo by Galvin Brothers, Inc.

**Native grasses being transplanted by hand out of historical marsh on Elders Point West**

dredged sand onto the island—which is primarily composed of mud—and graded the island to the appropriate elevations for a marsh. One thing the team learned from East is that when sand is placed on the island, it settles differently in various areas, based on the composition of the mud in these areas. If there is more sand in a sand placement area of the island, the placed sand settles less. Because of this, different amounts of sand were placed throughout the island to achieve proper planting elevations.

The team also learned from East that the side slopes of the placed sand needed to be more gradual to prevent movement and loss of sand, since steeper slopes resulted in continuous erosion. To build up East, the team placed sand around existing plants and hand-placed the newly grown nursery plants in this new sand. However, they learned that this was not good for a number of reasons. Besides the time-consuming and expensive nature of the process, the island was muddy and the new sand was not thick enough for the newly grown nursery plants and existing plants to grow successfully. The roots of new plants grew deeper than the new sand layer, thereby choking the plants.

On West, the team decided to handle the planting differently. Their plan was to remove three acres of existing vegetation on the island, place enough fresh sand to ensure plant survival, and then transplant these plants back into the fresh sand on the island's new, higher elevations. At East, the team learned that relocating existing plants is just as effective as purchasing and planting vegetation grown in a nursery. They also learned that these transplants did better when removed from the muddy bay bottom and placed in clean sand. Consequently, on the higher elevations of the island, high marsh was established by using plant vegetation that had been collected locally from surrounding islands within Jamaica Bay and grown at the Cape May Plant Materials Center, which is a part of the NRCS.

On Elders Point East, seeding was successful, so the concept was expanded to a larger scale on West in the hopes of developing a large-scale commercial method that can be replicated on future marsh island restorations, with the potential to save money and make marsh restoration more efficient. On West, they transplanted more salt grass instead of seedlings and placed the transplants farther apart—saving money by using fewer plants. Work on West was completed in August 2010.

## Future Marsh Island Restoration

Will USACE and its partnering agencies return to Jamaica Bay again? The project manager for the New York District, Harbor Branch, believes that with additional experience and funding, restoration—as well as future building of other marsh islands—will continue. Marsh island restoration in Jamaica Bay advances the goals of the Hudson Raritan Estuary Comprehensive Restoration Plan, whose primary goal is to develop a mosaic of habitats that provides maximum ecological and societal benefits to the region. This plan was developed in partnership with the USACE New York District and a diverse group of more than sixty organizations and stakeholders. To learn more about the Hudson Raritan Estuary Comprehensive Restoration Plan and the Elders Point Restoration projects, visit <*www.TheWatersWeShare.org*>.

*Dr. Castagna is a technical writer-editor for the USACE New York District. She can be reached at <joanne.castagna@usace.army.mil>.*

# USACE Helps Pakistan Recover From Monsoon Season

*By Ms. Alicia M. Embrey*

In July 2010, monsoon rains of historical magnitude caused catastrophic flooding throughout Pakistan. Approximately one-fifth of the country was submerged by floodwaters. The flood wiped out livestock, homes, crops, and critical infrastructure (such as roads, bridges, and railways). According to Pakistan's Natural Disaster Management Authority (NDMA), more than 20 million Pakistanis have been affected by this catastrophic event—the country's worst monsoon season in 80 years. Damages have been estimated in the billions.

The United States responded to Pakistan's international plea for assistance by standing up several task force organizations under the command of the Office of the Defense Representative to Pakistan (ODRP) to support the relief efforts. As floodwaters began to sweep downstream and overrun riverbanks, the United States immediately ramped up to deliver much-needed humanitarian assistance. According to the U.S. Army Corps of Engineers (USACE) Transatlantic Division's Office of the Deputy (G-3) Contingency Planner, the unprecedented amount of rain and floodwater in the region triggered a U.S. Central Command request for forces for the Division. This initiated USACE involvement in the effort, with the task to develop a rough order of magnitude for the damage and potential reconstruction of Pakistan.

ODRP initially requested the assistance of one engineer officer with experience in engineer planning, bridging, and ground lines of communication assessments. Later, USACE was asked to provide a five-man team of consultants to help the Asian Development Bank with their damage and needs assessment. Due to his diverse engineering background and experience in conducting engineer reconnaissance as



55th Signal Company (Combat Camera)

**A Soldier from the 16th Combat Aviation Brigade hands out candy to Pakistani children in Swat Valley.**



Photo by Marine Lance Corporal Johnson Simeon

**A Soldier verifies grading for helipad improvements at Ghazi Air Base.**

an Army engineer, the commander of the 565th Engineer Detachment Forward Engineering Support Team (Honolulu District) was requested by name and chosen to represent USACE in this effort. His mission was to help ODRP with planning and design requirements for the temporary forward operations base camps from which the humanitarian missions were staged.

## Keys to Success

As with most catastrophic events, no one knows what to expect until reaching ground zero—yet being well trained and flexible and having a good support network are all keys to success. The chosen commander, who didn't know what to expect when he got the call to support flood relief efforts in Pakistan, was originally billeted as a planner/ground lines of communications/bridging assessor supporting ODRP. Once in theater, where the requirements became clear, he saw flood victims suffering and desperately needing fresh water, food, and medical supplies. Forward operating bases were required for fixed- and rotary-wing aircraft to deliver these crucial basic needs—and an engineer's forte is the planning, design, and construction of these bases.

Because of the flood's devastation, road access to remote villages in the mountainous north and floodplain in the southern part of Pakistan was cut off. Fixed-wing aircraft provided humanitarian assistance by flying supplies to forward operating bases; then rotary-wing aircraft moved those supplies to the U.S. Agency for International Development (USAID) and World Food Program distribution locations in isolated parts of the country. During his assignment in support of the humanitarian assistance mission, the commander was responsible for the construction and oversight of three major forward operating bases located at existing Pakistan military bases—Chaklala Air Base, Pano Aqil Army Cantonment, and Ghazi Air Base. These forward operating bases were used by more than 500 U.S. military personnel conducting fixed- and rotary-wing operations as they delivered relief supplies to flood victims. The development of these bases included airfield and road improvements, troop billeting and work spaces, sewer systems, water supply and distribution, electrical upgrades, and other critical facilities required for successful operations.

Since the 15th and 26th U.S. Marine Expeditionary Units (MEUs) and the U.S. Army 16th Combat Aviation Brigade (CAB) needed facilities to conduct their operations in one forward operating base, they constructed two wells and a water tower to supply water for their latrines on the flight line. To mitigate hazards to rotary-wing assets, they relocated overhead electrical lines. Although they didn't have their own engineer units on the ground, they were able to accomplish more than 21 infrastructure improvement projects with an engineer, contingency contracting officers, the local labor force, and a partnership with the Pakistani military.

## Tight Deadline

Just days after arriving in flood-stricken Pakistan, the commander was tasked to conduct an engineer reconnaissance and lay out a base camp for 300 personnel at Chaklala Air Base near the Pakistan capital of Islamabad. The base was used as an intermediate staging area for the 16th CAB before its movement north to Ghazi Air Base. With reachback support from USACE, the commander was able to provide the task force with a base camp design, technical specifications, and contract scopes/statements of work within 48 hours. Immediately afterward, he was tasked to conduct an engineer reconnaissance of Pano Aqil Army Cantonment—home to the Pakistani Army's 16th and 21st divisions and located about 25 miles north of Sukkur in Sindh province. The 15th and 26th MEUs



Photo by Marine Lance Corporal Johnson Simeon

**Pakistani flood victims scramble for food packages brought to Sindh Province by U.S. Marines.**

eventually made Pano Aqil their home for the next few months, while delivering relief supplies to flood-affected areas in southern Pakistan. During the two-day reconnaissance, the commander met with the Pakistani military liaison officers to conduct a feasibility study and to determine the requirements of the forward operating base.

Returning to Islamabad, the commander briefed the engineer findings to the ODRP senior leadership. A day later, he was part of a specialized ten-man quartering party with a mission to stand up the forward operating base and have helicopters deliver relief supplies within days.

The forward operating base at Pano Aqil supported approximately 200 Marines from the 15th and 26th MEUs, ODRP personnel, and 8 Marine aircraft (4 CH-46s and 4 CH-53s). To accommodate the troops, upgrades were required: renovating barracks, upgrading electricity, installing sewer treatment systems, improving the airfield to be AC-130-capable, constructing work spaces, and establishing a dining facility in an existing structure. The team—with support from the Pakistani military—met the tight time frame in getting the base camp stood up.

## Personal Account

While stationed at the cantonment, the 565th commander also helped in the delivery of supplies to stranded flood victims. The 15th and 26th MEUs delivered millions of pounds of food and supplies in the southern Sindh Province, the worst-hit area, covering hundreds of miles. Most of the flood victims in the south were hungry, destitute, and still marooned by a sea of floodwater. It was a horrible sight to see. Mothers, children, and the elderly were stranded on rooftops and on islands with no access to food or fresh water. With people's lives shattered and homes gone, there were hundreds of square miles underwater and much suffering. The commander observed that as the dedicated and hard-working Marines, Airmen, Sailors, and Soldiers worked alongside their Pakistani counterparts, friendships visibly formed day to day.

During the commander's service as an ODRP engineer liaison to the Pakistani government and military, international community, USAID, and the State Department, his contributions also included conducting engineering and ground lines of communications assessments. He generated three major engineering infrastructure reports, numerous computer-aided design and drafting (CADD) plans, and technical specifications. Additionally, the floods wiped out numerous bridges throughout Pakistan, cutting off transportation routes for supplies. The commander made significant and enduring contributions by playing a key role in coordinating the transfer of more than $8 million in bridging assets to the government of Pakistan. The bridges, held in "theater reserves" in Kuwait, were shipped to Pakistan, ground-transported to northern Pakistan, and delivered to the Pakistani military. The bridges were administratively transferred through USAID to NDMA for the Pakistan military engineers to install, and an official bridge turnover ceremony was held at the U.S. embassy in Islamabad on 1 December 2010.

The commander deployed back to the Honolulu District in mid-December 2010 and was one of the honorees at the Honolulu District town hall meeting on 10 January 2011. According to the Honolulu District commander, the outstanding work of the 565th commander under difficult conditions received the attention, praise, and accolades of the vice admiral running the mission in Pakistan.

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# FORMING THE COMPANY INTELLIGENCE SUPPORT TEAM

*By First Lieutenant Daniel E. Harder*

Following a field exercise in May 2010, the 54th Engineer Battalion directed its three line companies to restructure themselves and add a new team—a company intelligence support team (CoIST)—to their headquarters sections. The three companies—the 370th Engineer Company (Sapper), 541st Engineer Company (Sapper), and 535th Engineer Support Company—consolidated line platoons and created CoISTs using Soldiers who were not required to fill the ranks of the other platoons. Each company manned its CoISTs differently, since the team does not yet exist on the modified table of organization and equipment. The 541st built a six-man team consisting of a senior lieutenant, a senior sergeant first class, a sergeant, and three junior enlisted Soldiers.

## New Team, Old Concept

The 541st now had a CoIST, but no one on the team clearly understood what was expected of their newly formed section. Everyone researched technical articles online, talked to members of other units, and read the limited materials the Army published; but it seemed that CoISTs were implemented differently in every unit. The function of other CoISTs varied so greatly—from analysis to photocopying maps—that it seemed there was no official standard. Using a CoIST in an engineer unit rather than an infantry unit further complicated matters. The team's first mission was clear—to decide exactly what the team should bring to the fight to best help the company succeed.

Based on research by the 541st leaders, it was determined that the CoIST should conduct the following tasks:

- Track and plot recent significant activities (SIGACTs) in the company area of operations.
- Collect and study debriefings from route clearance patrols (RCPs) to learn enemy tactics, techniques, and procedures.
- Use unmanned aerial vehicles to observe enemy activity.
- Report enemy activity.
- Recommend named areas of interest and targeted areas of interest to the company commander.
- Provide briefings and pertinent intelligence to RCPs before missions.
- Help the company operations section track the battle.
- Create initial storyboards for RCPs for further refinement upon return from missions.
- Focus existing intelligence gathered for maneuver units in order to keep it relevant to route clearance.

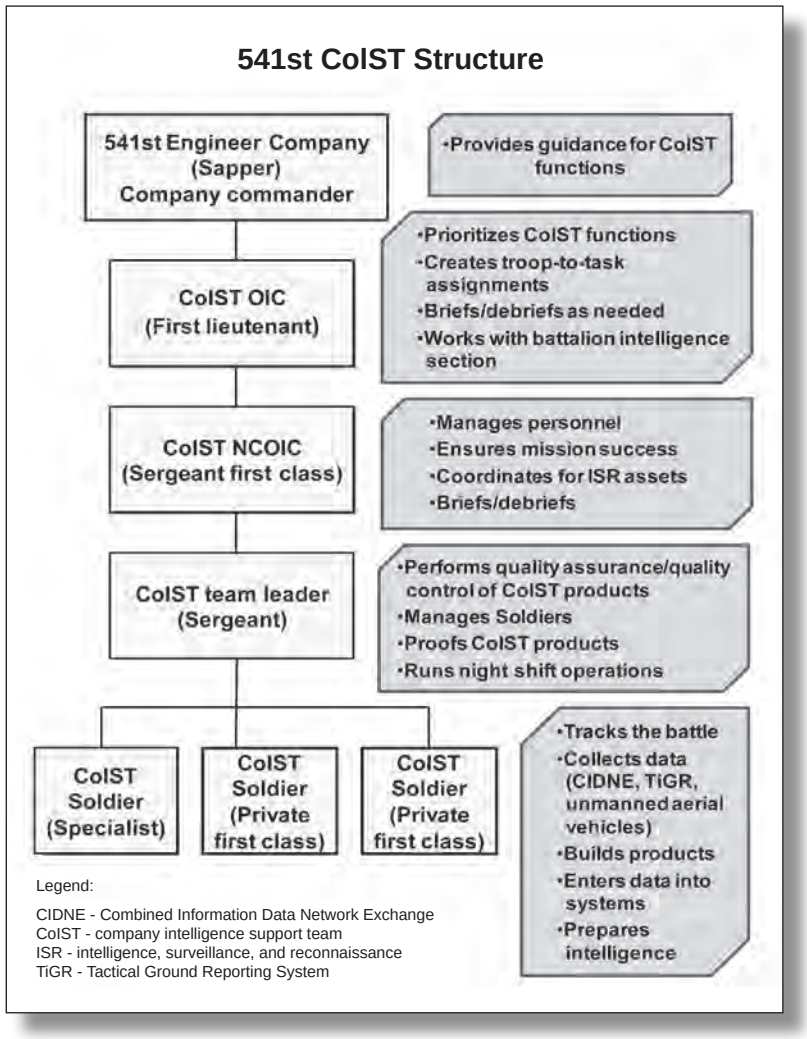
The long list of tasks seemed daunting, but each function was critical to the effectiveness of any RCP. Most of these tasks were already done by the battalion intelligence section, but information flow was slow and RCPs covered such a large area that intelligence could not always provide the details that platoons needed to predict enemy activity—which was necessary to plan and safely accomplish their mission. With the supplemental manning achieved by consolidating platoons, the CoIST members agreed that these previously overwhelming tasks for an operations section were now feasible. In preparation for the battalion mission readiness exercise (MRX) at Hohenfels, Germany, the next priority was to learn systems and build the products needed for success.

## Refining the Team

The 541st Engineers arrived in Hohenfels ready for the MRX, and the CoIST was prepared to do its part. A group of intelligence contractors gave a one-week class to all CoISTs on the proposed missions, the conduct of basic analysis, and the use of tools needed to track activity. Lessons included computer systems such as the Tactical Ground Reporting System (TiGR) and Combined Information Data Network Exchange (CIDNE)—programs used to track SIGACTs in an area of operations—and the One System Remote Video Terminal, which accesses video feeds from all unmanned aerial vehicles in an area. Most of the class provided details on what the team already knew—the need to run CoIST operations 24 hours a day had not been considered. This required the team to be split into day and night shifts. Initial plans were to split the team evenly, but members soon realized that day and night functions were very different. While RCPs were conducting operations during the day, the CoIST needed to track movement, provide updates to the patrols instantly, and build initial storyboards. At night, the team would have to conduct pattern and frequency analysis, prepare route intelligence packets for future missions, enter data into the TiGR, and perform other higher-level tasks. The plan was to man the night shift with the more experienced personnel—the officer in charge (OIC), the noncommissioned officer in charge (NCOIC),

and a junior enlisted Soldier. This would leave a junior noncommissioned officer (NCO) and two junior enlisted Soldiers to take care of daytime operations while more experienced Soldiers performed analysis and difficult tasks during nighttime operations.

This plan, while great in concept, changed the moment the MRX started. The team had too many administrative tasks to complete; and since the exercise was fictional, there was little SIGACT history to study and allow the prediction of trends. It was decided that the OIC and NCOIC had to work during the day to accomplish the mission. The end result was a heavy 14- to 18-hour day shift, with a single Soldier covering the night shift. This system worked effectively for the four-day MRX, but would probably not be sustainable for longer periods. Once a team gets settled downrange, it should be able to set up a day shift to provide tracking and a night shift to provide analysis.




## Lessons Learned

Several critical lessons were learned during the short MRX.

***Battle Tracking.*** During RCP missions, CoIST Soldiers monitored radios and Force XXI Battle Command Brigade and Below (FBCB2) alongside the operations section and provided up-to-date information for analysis as situations developed. This accomplished three major functions:

- The CoIST could build initial storyboards containing the framework of events to brief them to adjacent and higher-level units. Once RCPs returned, platoon leaders could update and quickly submit a final version to the battalion.
- The CoIST continuously built and developed specific information requirements which could be requested immediately from the RCPs.
- The CoIST was able to push SIGACTs and trends to the RCPs in the middle of their missions. This analysis alerted RCPs to dangerous situations or impending ambushes.

*Recommendation:* That the CoIST have easy access to the radio and FBCB2. The size of the team would have to increase to support this, since the Soldier on the radio would be unable to provide other CoIST functions.

***Storyboards and Debriefings.*** The CoIST was responsible for building storyboards and conducting debriefings before and during RCP operations. A CoIST Soldier manned the radio and relayed information to the rest of the team so that SIGACT information was immediately fed into the storyboards and debriefings. Once team members completed as much as they could on these products, they identified the information that was still required. When the RCP returned, the section would work with the platoon leader to gather the missing data and complete the products for submission.

*Recommendation:* That building storyboards remain a CoIST function to provide timely information and ensure that initial reports are not lost. However, the final product needs to remain the responsibility of the RCP platoon leader in order to verify the information, add pictures, and provide any missing data.

***Battle Rhythm.*** During the MRX, the CoIST maintained a battle rhythm that provided a fast turnaround time on products, rapid pushes of information to RCPs, and constant mission tracking. Team members worked long days and rarely left the company command post (CP) for more than meals and rest. While effective for the four-day MRX, this tempo is not sustainable and Soldiers' performance would rapidly decline over longer operations.

*Recommendation:* That the CoIST develop shifts which provide 24-hour battle tracking, push information, and produce products while providing team members with enough

rest to maintain operations for a year-long deployment. This could best be accomplished by assigning the OIC to the day or night shift and the NCOIC to the other.

***File Organization.*** The CoIST produces a high volume of products, in draft and final forms. While team members could keep track of their own documents briefly, their workspace quickly became cluttered. The high volume of paperwork and lack of organization caused delays in retrieving information from reports and activity logs. There was also a risk of losing information as old documents were destroyed. One of the most critical issues with keeping these materials organized—and one often overlooked—is that disorder makes it more likely that documents will end up in the trash instead of in a burn box. This creates a significant operational security problem since classified documents could find their way into enemy hands.

*Recommendation:* That the CoIST be allotted more office assets than other sections. Wall space, shelves, file cabinets, folders, binders, document protectors, and a well-stocked printer are critical to the sustained operation of the CoIST. The CoIST needs to coordinate with the company supply section to ensure that sufficient supplies are on hand for the duration of the mission.

***Cross-Training.*** The CoIST has several key functions, each of which requires several Soldiers to support it. A radio operator is necessary to stay up to date on current activity, push information to the RCPs, and collect specific information requirements as needed. At least one Soldier is required to build storyboards and debriefings as SIGACTs and missions develop. One or two Soldiers are needed on TiGR and CIDNE at all times to input SIGACTs; track SIGACTs from other units; analyze routes and areas for enemy trends and tactics, techniques, and procedures; and prepare intelligence packets for the RCPs. Additional Soldiers are needed to review products; track unmanned aerial vehicle assets; prepare intelligence, surveillance, and reconnaissance plans; make recommendations to the commander; coordinate with the intelligence section; work with the Handheld Interagency Identity Detection Equipment and Biometrics Automated Toolset System; and maintain control of the team. While any CoIST Soldier could perform many of these tasks (such as operating TiGR), other tasks became the sole responsibility of a single team member. One of these critical tasks is building storyboards. The Soldier who starts this product must finish it or risk losing valuable information.

*Recommendation:* That the CoIST build redundancy by training team members on all tasks and systems. Once shifts are instituted, it is critical that operations continue smoothly if a key individual is removed.

## CoIST Downrange—A Practical Approach

Several months after the MRX, the 541st deployed to Afghanistan and started conducting route clearance operations in Logar Province. The CoIST evolved from what it was during the MRX, but retained its key functions. The CP as a whole evolved, with the operations section merging with the CoIST. While Soldiers still identified themselves as "operations" or "CoIST," they performed many of the same functions. The company divided the CP into a day shift and a night shift. An NCO led the day shift, overseeing the CP. Several Soldiers from the operations section helped the NCO conduct battle tracking; and one CoIST-trained Soldier supported the RCPs, the CP, and the commander by providing real-time intelligence and imagery. Additionally, the day shift CoIST Soldier produced route background checks when the RCP received orders to travel down a route that they had not reconnoitered. At night, a CoIST-trained sergeant ran the CP, and two CoIST-trained Soldiers assisted.

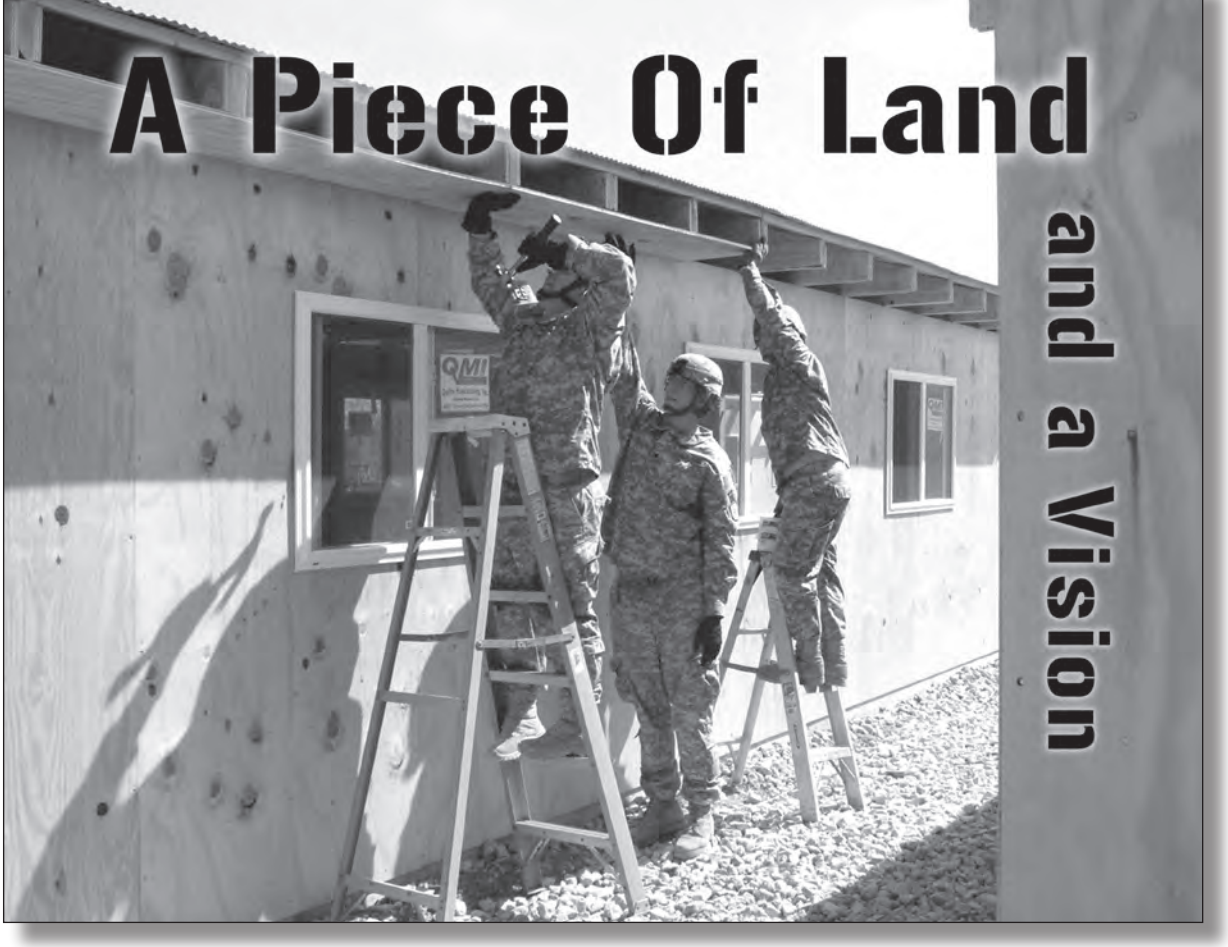
Battle tracking at night is typically minimal, since RCPs do not usually conduct nighttime operations. The primary focus of the night shift is to gather information. Night shift workers should complete three central tasks:

- Perform route background checks for the RCP concept of operations (CONOP). The CoIST used TiGR, CIDNE, and other available data to pull information on routes and look at SIGACTs or spot reports from the past 30 days and those that occurred on the same day a year earlier, plus or minus 30 days. This information provided leaders with current activity and also experiences at the same time the previous year.
- Update the company intelligence summary. The 541st created a product—updated nightly—that showed all activity and spot reports in Logar Province for the previous 49 days. This product provided situational awareness to leaders on the entire area of operations, acted as a backup of information when the computer networks were temporarily unavailable, and gave platoon leaders another method of pulling information in case of an order to change the mission.
- Prepare mission prebriefings. When the platoon leader briefed his platoon before a mission, a CoIST Soldier was present to provide information on weather, activity in the previous few days, any changes in activity from the time the CONOP was issued (normally the previous 48 hours), the commander's critical information requirements, and any other information the RCP needed.

The 541st Engineer Company (Sapper) CoIST proved effective at providing RCPs with the information they needed, coordinating with the battalion intelligence section, and collecting information from RCPs to distribute to appropriate sections. As the company completes its yearlong deployment, the CoIST will continue to evolve to meet the needs of the company and provide Soldiers with the best intelligence support possible.

*When he wrote this article, First Lieutenant Harder was the OIC of the 541st Engineer Company (Sapper) CoIST. The company is one of several that recently deployed to Afghanistan to conduct route clearance operations. He is now the executive officer of the 535th Engineer Support Company.*

# A Piece Of Land and a Vision



*By First Lieutenant Joseph R. Balvanz*

The 1st Engineer Brigade at Fort Leonard Wood, Missouri, wanted its own tactical training base (TTB), a training area (TA) large enough to hold 42 Southeast Asia (SEA) huts, 6 guard towers, and 3 sand tables. The completed project would train thousands of Soldiers annually in an environment reflecting the contemporary operating environment. It would allow training company cadres more flexibility in maintaining their field training exercises during inclement weather by providing shelter from the elements. It would also give initial-entry Soldiers a better opportunity to hit the ground running in theater by illustrating what one version of "right" should look like.

While this plan briefed well, it would test the mettle of the engineers assigned to the task. The initial reconnaissance of the site by the "Wolverines" of the 94th Engineer Battalion revealed 14 acres of prime Ozark Mountain real estate, densely populated with mature trees and thick undergrowth. All Soldiers were briefed, the chainsaws were pulled out, and the heavy equipment came to life.

Soldiers of the 156th Engineer Detachment started the project off by surveying the site. They initially determined and staked off the site perimeter, entry control points, motor pool areas, and SEA hut locations. The work they performed was vital in keeping both the horizontal and vertical portions of the site in line with the plans. Without their accurate planning and execution, the project would have failed before the first nail was driven.

## Horizontal Construction

The Engineers of 3d Platoon, 232d Engineer Company (Horizontal) began the horizontal portion of the project by emplacing environmental control measures. Soil, once disturbed by earthworks operations, can destroy local ecosystems if not held in place. A silt fence—a black fabric barrier around the entire perimeter to contain washed-out soil and debris—prevented damage to the surroundings. Once the environmental controls were in place, Soldiers brought out the heavy equipment: bulldozers, bucket loaders, and excavators. The 3d Platoon "Warriors" completed the horizontal portion of the project in five steps, accomplished over roughly 11 months.

### Step One

Step one of the horizontal construction began with tree removal—a huge undertaking. The 14 acres of trees had to be knocked down with a dozer or hydraulic excavator. Every tree then had to be harvested, requiring that huge root balls and all branches be removed by chain saws. Because the trees fell into wet and muddy soil, the frequent sharpening or replacement of chainsaw chains was required. Once harvested, the trees were stacked on the edge of Babb Airfield for use by the surrounding communities as clean firewood. The process required long, grueling hours in less-than-favorable conditions. The winter weather was brutal, with a typical day varying from torrential downpours to freezing temperatures and winds whipping wildly from the unobstructed northern boundary of the airfield.

Although these factors led to a slight decrease in daily productivity, the 232d Soldiers rarely demonstrated anything other than the engineer "can do" attitude. The risk level was high during this part of the project because of the mixture of heavy equipment, chainsaws, poor weather, and many moving parts on the ground. The residual risk was mitigated through the use of a three-front attack: clear safety standards, ground guides, and careful orchestration by noncommissioned officers (NCOs).

**Step Two**

Clearing and grubbing made up step two. Dozers, scrapers, and graders removed all vegetation from the site. Buildings built on organic material that can decompose are susceptible to structural damage when that decomposed material creates sinkholes underneath the structure. The surface layer of topsoil was removed from the vertical construction and motor pool areas. The clearing and grubbing became extremely difficult from December to March as the water from heavy November rains settled in the large holes made by tree removal. The water created enormous amounts of swampy mud that soon became frozen soil. On some days, the weather was so bad that Soldiers could only work outside for 10 minutes before they had to be removed from the cold for 50 minutes. Without complaint, the "Warriors" set the example by safely performing operations in difficult conditions.

**Step Three**

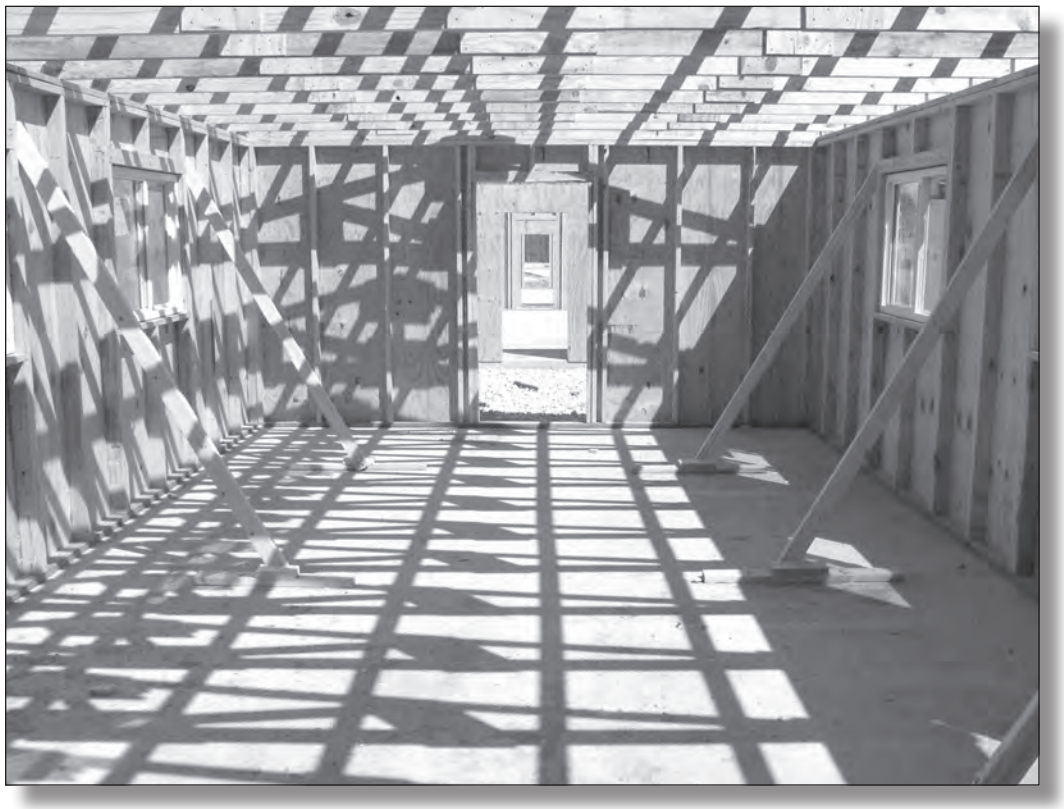
Step three was leveling and compacting. Challenges continued when Directorate of Public Works concrete teams pressed for level, compact soil on which to start pouring concrete for the SEA huts. Leveling the ground was not difficult using dozers and graders. The grader is a finely tuned machine that a skilled operator can play like a violin. The challenge was not with leveling but with compaction, since soil cannot truly be compacted until water, frost, and ice have completely melted and evaporated from the ground. Had the Soldiers compacted frozen soil, they would have been dismayed to see that stable ground cannot be created on a quickly melting base. As the weather warmed up, the ground melted and the water slowly evaporated. At one point, Mother Nature tried to slow down the project by swallowing bulldozers in 5 feet of mud. Using a sheep's foot compactor and smooth vibratory roller, Soldiers began to compact and relevel any areas that would be used for structures or vehicle traffic. Once these areas were compacted, the concrete teams came out to pour 42 pads for SEA Huts, 6 pads for guard towers, and additional pads for latrines, water points, and generators.

**Step Four**

Step four, adding entry control points, was achieved by digging out 4 feet of organically saturated earth and then slowly adding 6-inch compacted lifts of clean, dry soil. This continued until there were three extremely compacted entry control points into the TTB. Culverts were added and ditches were cut to allow proper drainage.

**Step Five**

Laying aggregate on all 14 acres was step five. At this stage, everything seemed to be flowing as it should be. The "Warriors" showed clear progress, making it easier for the Soldiers to see the effects of a hard day's work. Anyone who had seen the patch of property before the start of the project would not recognize it by now. Soldiers hauled more than 3,000 tons of rock from the quarry. This, combined with more than 6,000 tons of contracted rock, was spread over the entire site. Then the fine tuning began again, grading rock to make a smooth, level, cleanly finished horizontal product. This opened the door to the vertical portion of the TTB construction by the 77th Engineer Company.



**The interior of a SEA hut during construction**



Finished structures at TA 239

## Vertical Construction

Because of freezing temperatures, concrete couldn't be placed until mid-February, when temperatures were above freezing for five consecutive days. The "Outlaws" of the 77th seized on this delay to prefabricate components. During one period, a single platoon cut enough components to construct trusses for all 42 SEA huts. This incredible effort required 14,280 plywood gusset plates to be cut for the 714 trusses. To maintain quality assurance and high standards of construction, the 77th Engineer Company NCOs built jig tables and construction molds, ensuring that individual pieces would be within a quarter-inch tolerance of each other. This tedious work set the project up for increased efficiency when the pads were finally poured.




Engineers at work on SEA huts

The green light to place concrete marked a happy day in the life of the "Outlaws." Now they could build the long walls and start erecting the huts. These walls were too long to readily transport from TA 244 to TA 239, so they were built onsite. There was an obvious change in tone on the project site when the Soldiers got the order to start building up from the pads. This allowed the platoons on the project to be divided into two working groups. One continued to prefabricate the short walls at TA 244, and another began raising and connecting the SEA hut walls. With the four walls of the huts finally erected, the vertical engineers breathed a sigh of relief, since they could start to see the hard work of

*(continued on page 53)*



# Modular Engineer Battalion Maintenance

*By Major Scott S. Preston*

## Predeployment Maintenance

The 54th Engineer Battalion is one of two modular engineer battalions garrisoned in Germany under the 18th Engineer Brigade. When not deployed, the battalion has training and readiness oversight of two mechanized sapper companies, a clearance company, and an engineer support company. Normally, the maintenance load from these four companies—plus the forward support company (FSC) and headquarters and headquarters company—would keep most mechanics busy around the clock, but this wasn't the case during the battalion's predeployment. Training facilities provided and maintained vehicles for all battalion field training exercises. The Joint Multinational Readiness Center Counter Improvised Explosive Device Academy provided route clearance vehicles; and the Joint Multinational Training Center supplied mission readiness exercise equipment such as up-armored, high-mobility, multipurpose, wheeled vehicles and mine-resistant, ambush-protected vehicles. These fleets allowed the companies to execute real-world training, but limited their mechanics' abilities to perform maintenance. Since the companies rarely used their modified table of organization and equipment (MTOE) vehicles, maintenance demand was low, limiting on-the-job training and the battalion's management of maintenance operations.

## Modular Maintenance

Under modularity, the Army moved to two levels of maintenance—sustainment and field. Sustainment maintenance relies on end item and component repair with some component replacement, whereas field maintenance relies on component replacement alone. Each numbered engineer company has a field maintenance team (FMT). The size and makeup differ between types of engineer companies, but FMTs generally have 10 to 20 Soldiers led by a sergeant first class. These teams are responsible for field maintenance within the company. The FSC team maintains the equipment in the headquarters and headquarters company, and the FSC can also assist the engineer companies with maintenance when needed.

## Maintenance Platoon Capabilities

The FSC has a robust maintenance platoon, which includes the FMT for itself and the headquarters and headquarters company. The maintenance platoon augments the maintenance capabilities of the company FMTs (see Figure 1). Along with its FMT, the maintenance platoon contains five other sections. The recovery section supports the battalion and provides limited reinforcing recovery support to the FMTs. When reinforcing recovery support is required, the company FMTs request it through the maintenance control section (MCS). The rest of the FSC maintenance platoon includes an armament section; an allied trade section made up of welders and machinists; a ground support equipment section that specializes in generators, air conditioners, and water pumps; and a communications and electronics section. Just as with the recovery section, FMTs request support from these sections through the MCS.

## Maintenance Control Section

Before deployment, battalion leaders reviewed the MTOE and determined how to best use the capabilities of the senior ordnance noncommissioned officers, warrant officers (WOs), and commissioned officers in the FSC and headquarters and headquarters company. The first thing studied was the MCS of the FSC. The MTOE lists a first lieutenant maintenance control officer (MCO), an engineer equipment maintenance chief warrant officer three, an automotive maintenance chief warrant officer three, and a maintenance control sergeant. Army doctrine states that the MSC manages all battalion maintenance actions. The MCO is the principal assistant to the battalion and FSC commanders on all field maintenance—supervising, directing, and managing field maintenance operations and prioritizing work for the FSC maintenance section. MCO duties include—

- Developing standing operating procedures.
- Managing maintenance policies.
- Monitoring Army Oil Analysis Program testing.
- Managing test, measurement, and diagnostic equipment and exchange pricing.
- Conducting the quality control of unit services.

The MCO also employs the two WOs in the MSC section to support the battalion field maintenance operations. The WOs have similar duties, but specialize in their respective fields of engineer equipment and automotive or wheeled systems. Their duties include—

- Diagnosing and troubleshooting equipment.
- Advising the MCO on recovery operations.
- Providing technical advice on equipment use, repair, and training.
- Helping commanders inspect shop operations, oversee service schedules, and set up training.

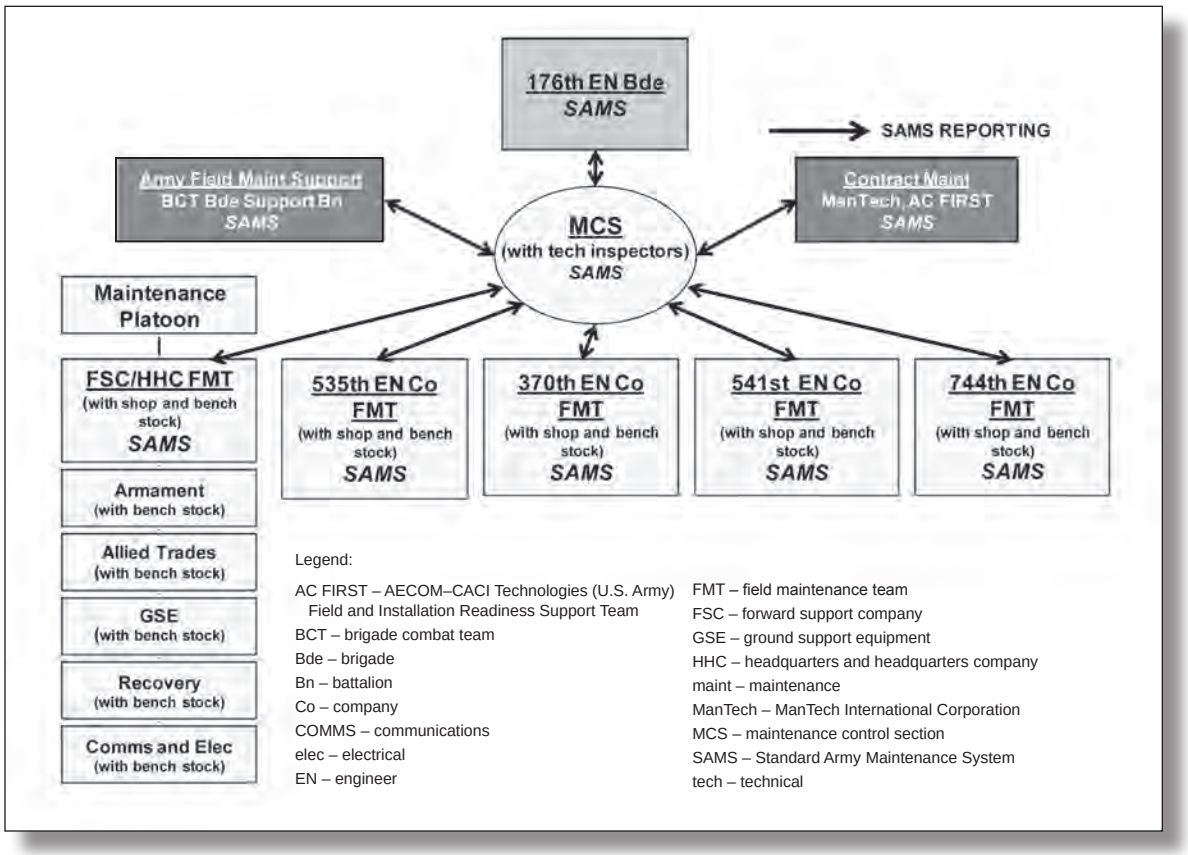



**Figure 1. 54th Engineer Maintenance Structure**

The maintenance control sergeant's job is to mentor and develop the FMT motor sergeants. Other duties include—

- Managing the cross-training of maintenance Soldiers.
- Advising the battalion command sergeant major on the placement of mechanics.
- Assigning daily workload in the maintenance platoon.
- Overseeing the FMT operation of the Standard Army Maintenance System.

The headquarters and headquarters company logistics section was studied next. The MTOE lists one engineer equipment maintenance chief warrant officer two in this section. Leaders deduced from Army doctrine that the logistics section WO would focus on advising the logistics officer on maintenance planning and coordinating and reporting to organizations outside the battalion. This WO had the title of battalion maintenance officer, with duties that included—

- Consolidating unit data and reporting it to higher entities.
- Coordinating for inorganic maintenance.
- Tracking modification work orders.
- Reporting safety-of-use messages.
- Scheduling warranty work.
- Conducting the maintenance awards program.

In the role of maintenance advisor, the battalion maintenance officer helped develop battalion level plans such as equipment reset and left-behind equipment operations. A matrix outlined the responsibilities of the battalion maintenance officer, three WOs, and senior noncommissioned officer (see Figure 2). Once in Afghanistan, this plan was put into action.

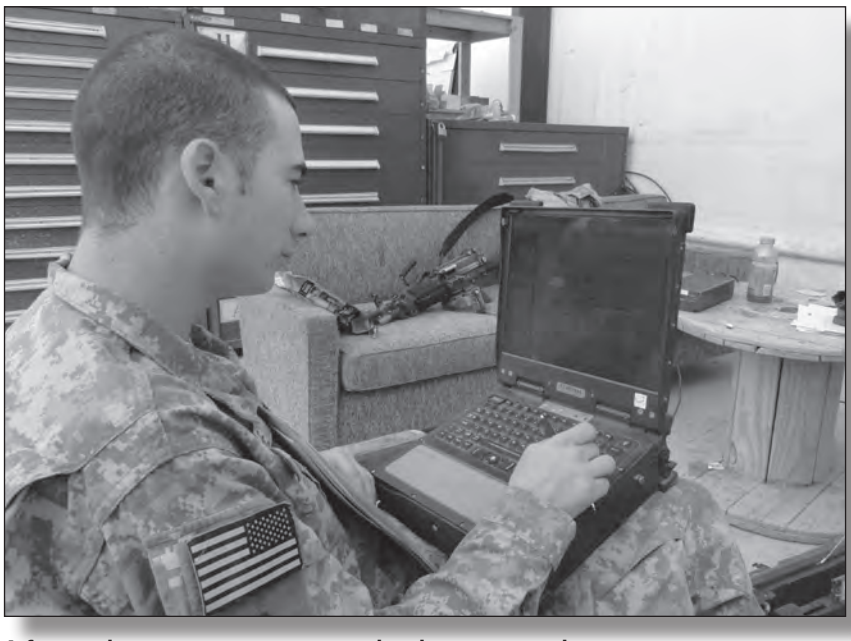
**Maintenance Control Officer**
**(First lieutenant—Maintenance control section)**

- Act as primary advisor to battalion commander
- Supervise, direct, and manage field maintenance operations
- Oversee battalion training programs
- Coordinate support from field service representatives
- Coordinate job acceptance for Standard Army Maintenance System
- Manage battalion recovery assets
- Maintain oversight of service programs
- Manage battalion maintenance policies and procedures
- Standardize procedures when none previously exist
- Oversee shop supply
- Oversee Army Oil Analysis Program
- Oversee test, measurement, and diagnostic equipment
- Oversee exchange pricing
- Employ maintenance control section warrant officers

**Automotive Maintenance Warrant Officer**
**(Chief warrant officer three–Maintenance control section)**

- Perform advanced diagnostics and troubleshooting for automotive equipment
- Oversee quality assurance representative efforts
- Evaluate and inspect shop operations and maintenance
- Advise the maintenance control officer about recovery of automotive systems
- Provide technical advice on the use, training, repair, and disposition of wheeled systems
- Oversee scheduling and performance of wheeled systems services across the battalion
- Assist company commanders in setting up preventive maintenance checks and services training programs

**Figure 2. Sample responsibilities matrix**



**A forward support company mechanic uses a maintenance support device computer.**

## Deployment

The battalion deployed to Regional Command–East in Afghanistan in late 2010 with the mission of route clearance. The battalion was under the 176th Engineer Brigade and had command and control of the 370th Engineer Company (Sapper), 535th Engineer Support Company, 541st Engineer Company (Sapper), and 744th Mobility Augmentation Company (Army Reserve). All of these companies performed route clearance operations. After the transition of authority, the battalion's units operated in four different brigade areas of operation and its Soldiers lived on six different forward operating bases. This complicated maintenance operations across the battalion.

## Contract Maintenance Support in Afghanistan

When the battalion was in garrison, only the 535th Engineer Company dealt with contract maintenance support. Once in country, all companies worked with contract employees. Contractors had positive and




**A company field maintenance team mechanic uses the Forward Repair System.**

negative effects on unit maintenance. On the positive side, they provided expertise on equipment that the Army fielded only to units in Afghanistan—rollers, robotics, Common Remotely Operated Weapon Stations (or CROWS)—and trained mechanics and combat engineers on the proper use and maintenance of this equipment. Contractors provided additional maintenance support when Army mechanics were overwhelmed by the high operational tempo, and some specialized in battle damage repairs that would normally exceed the capabilities of battalion FMTs.

However, there were some drawbacks. Often, the battalion FMTs relied too much on contractors to conduct maintenance that the teams could have performed themselves, reducing the amount of on-the-job training the team Soldiers received. Also, when a contractor repairs equipment, the Army's maintenance system does not receive the "demand" it needs to stock repair parts and capture mechanic hours. In the long run, this reduces a unit's future MTOE mechanic end strength and fails to provide the unit with a justification to increase its shop and/or bench stock density, thus increasing lead times for receiving repair parts.

## MCS Operations in Theater

With the matrix for maintenance officer duties and responsibilities constructed, battalion leaders began to execute their plan, with a few changes. Inside the MCS, the two WOs continued to focus on their areas of expertise—one on engineer equipment and the other on automotive equipment. Since the battalion commanded four companies, each WO was assigned to oversee maintenance operations for two companies. They ensured that reports were correct; helped track parts; and conducted inspections of FMT maintenance operations, in particular reviewing scheduled equipment service operations. This practice greatly assisted the companies and allowed the MCS to capitalize on the expertise of its WOs.

Contractors in theater provided field service representatives who coordinated with battalion maintenance leaders, provided technical support to the warfighter, and served as a communication channel between Soldiers and the contractor. The MCS and the company FMTs dealt directly with the field service representatives at each forward operating base. The representatives were part of weekly battalion level maintenance meetings, helping to make these civilians into members of the battalion team, where they worked diligently to help the battalion with its maintenance issues.

The MCO and MCS managed the Standard Army Maintenance System, which is the computer system that allows unit level maintenance personnel to order parts and report the status of equipment readiness (see Figure 1, page 50). Initially, the biggest challenge was requiring the companies to integrate their reports through the MCS computer. For the system to work properly, company FMTs must report equipment faults in their own computers and then send that status report to the MCS computer. When the MCS receives the report, it assigns a job order number and then allows the FMT to turn over the faulty equipment to a contractor. This system allows the MCS to capture all information about nonmission-capable equipment and send a status report to the brigade.

## Battalion Maintenance Officer Operations in Theater

The battalion maintenance officer also based his duties on the initial matrix. Once in theater, his responsibilities changed slightly, but were still focused on maintenance issues external to the battalion. He lived and worked at Bagram Airfield, where most of the brigade and division level sustainment units operated. The planning of equipment upgrades, replacements, and fieldings now fell in his lane. He worked closely with the brigade maintenance section and assured mobility systems product manager, who handles all in-theater route clearance equipment management and sustainment. He also worked closely with the theater field service representatives for other corporations, provided the battalion's voice in all brigade and division level maintenance meetings, and kept daily contact with the battalion MCS.

## Summary

Throughout the deployment, maintenance remained high on the commander's priority list. The effective use of FMTs and the FSC MCS provided the manpower and expertise needed to sustain route clearance Soldiers in the fight. The battalion built its maintenance program by looking at Army doctrine and applying it to the situation on the ground. In the end, this formula set the conditions for the 54th Engineer Battalion's successful tour in Afghanistan.

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*("Piece of Land," continued from page 48)*

prefabrication come together. The quality control NCOs were on top of their game: only minor adjustments were needed to complete the erection of components built months earlier by several different teams of carpenters.

The SEA huts were constructed by a variety of teams and leaders, using an assembly line method of construction. This ensured that a team trained on a specific task increased in efficiency over the coming months. Additionally, it helped maintain high standards of construction at the job site because each team was scrutinized until it could repeatedly meet established standards. Since there were several teams working at the same time, each team had prints for its particular piece of the construction effort.

The vertical construction portion of the project was helped immensely through the guidance of a warrant officer engineering construction technician. He conducted daily quality control checks on each facet of the project—including the walls, windows and doors, truss installation, and roofing. Along with the NCOs, he ensured that each section of the project was executed to standard. The building practices and procedures had to be constantly reinforced, since the plumbers and electricians who helped with the framing had not previously received institutional training. The mix of engineers in a vertical construction unit ensures that all work required from the ground up, and the electrical transformers back, can be performed.

## Conclusion

A ribbon-cutting ceremony was conducted 11 months and 18 days after the first dirt was initially disturbed. The 94th Engineer Battalion commander said, "I was raised in combat engineer units, and we were always groomed to leave the area as if no one had been there. . . . It is evident that in this engineer unit, we leave something behind, something that even the builders' children might one day train on." While constructing the TTB, Army surveyors, equipment operators, carpenters, electricians, and plumbers honed the skills necessary to provide a wide spectrum of engineer capabilities. It seems only fitting that it will be used to train engineers for years to come.

*First Lieutenant Balvanz is a platoon leader with the 77th Engineer Company, 94th Engineer Battalion, Fort Leonard Wood, Missouri. Previous assignments include the 37th Engineer Battalion, Fort Bragg, North Carolina; 911th Rescue Company, Fort Belvoir, Virginia; 249th Engineer Battalion, U.S. Army Prime Power School, Fort Belvoir; Bravo Company, 249th Engineer Battalion, Fort Bragg; and Charlie Company, 2d Battalion, 10th Infantry Regiment, Fort Leonard Wood, where he was the Maneuver Support Center and Fort Leonard Wood Drill Sergeant of the Year. He graduated from Officer Candidate School in 2009 and is enrolled at Columbia University, seeking a bachelor's degree in political science.*



# Engineer Communications Need Improvements

*By Captain Jena S. Hutchison*

The Engineer Regiment has been left behind by the advancement of communications systems within the U.S. Army. This is evidenced by a lack of access to the lower-level tactical Internet and a lack of equipment for independent connectivity to telephones, and the secure and nonsecure Internet. Since the implementation of the Tactical Battle Command (TBC) System, the Army has expanded digital communications and planning overall, but has left engineer battalions out of the distribution. In place of more advanced and up-to-date equipment, these battalions have many pieces of equipment that have not been used in decades. The Regiment must update its communications equipment authorization to allow effective command and control, integration with supported units, and increased effectiveness of platoon level engineers.

The battalion communications section is responsible for providing connectivity and communications support for command and control. The Army signal architecture for the tactical Internet is organized to have a joint network node (JNN) at the brigade level and a command post node (CPN) at the maneuver battalion level. The CPN allows access to the Internet and telephones—secure and nonsecure—through the JNN. The maneuver battalion is also assigned a four-person communications team for maintenance and operation—two multichannel transmission systems operators-maintainers and two information

technology specialists. Because an engineer battalion is theoretically supposed to be attached to a division or brigade, with connectivity provided by a signal company, it is not authorized its own CPN and guaranteed access to the lower-level tactical Internet. During a recent deployment to Iraq, the 1st Engineer Battalion was not attached to a division or brigade with a signal company and only had access to Internet and telephone service through the fiber optics at the contingency operating base (COB). That access was lost early in the deployment due to a fire at the COB, leaving the battalion with no connection to subordinate units in Fort Riley, Kansas; Kuwait; and Iraq.

Engineer battalions are not authorized a CPN, but need to be self-sufficient and have their own equipment for connectivity. The permanent solution would be to add the same CPN and four signal Soldiers authorized for maneuver battalions. The workaround that the 1st Engineer Battalion used was to buy its own Internet terminal, giving access to the nonsecure internet protocol router network (NIPRNET). The addition of a surplus TACLANE® Encryptor (KG-175) from Fort Riley ensured secure communications.

Once an engineer battalion provides its own connectivity, the next hurdle is knowledge distribution. TBC Systems create a digital battlefield that illustrates every stationary and moving piece in the operational environment. For engineers, they offer a place to transfer improvised explosive device storyboards, present morning battle update briefs, track sustainment equipment, and access hundreds of products in use across the theater, but engineer battalions are not authorized necessary TBC products. Many features incorporated in the TBC System—Air and Missile Defense Workstations, the Advanced Field Artillery Tactical Data System, and the Tactical Airspace Integration System—would not be of use to engineers. But engineer battalions require many of the remaining TBC features, including the Command Post of the Future (CPOF), Maneuver Control System (MCS), Battle Command Sustainment Support System (BCS3), Distributed Common Ground Station–Army (DCGS–A), Digital Topographic Support System (DTSS), and Tactical Ground Reporting (TIGR) System, which does not fall under the Army Battle Command System but has been grouped with the necessary digital systems.

The only TBC System authorized for engineer battalions is Force XXI Battle Command, Brigade and Below/Blue Force Tracking (BFT). TBC uses a BFT feed to get a nearly real-time picture of friendly forces on the battlefield. These digital systems are necessary for a common operational picture to make command decisions, link into higher and supported units, and gain intelligence information. The permanent fix for engineer battalions would be to get all of these systems authorized. To obtain them, 1st Engineer Battalion leaders began calling different contacts, such as higher commands, peers, and project managers. Most of them regretfully said that they could not help because the equipment was not on the battalion modified table of organization and equipment (MTOE). Through numerous telephone calls, e-mails, and meetings over the course of 18 months, battalion leaders convinced a few contacts of the battalion's need to train on and obtain components of the TBC System. Now, the battalion deployable command post in Iraq can support its unit with the most up-to-date intelligence analysis available while they are spread across United States Division–North. Leaders can now make assessments and recommendations to the battalion commander and execute the unit's operations efficiently and with the necessary information.

Unfortunately, there are also shortages of combat net radio devices at the platoon level. The two main problems are the lack of enough handheld frequency modulation (FM) radios and the complete lack of tactical satellite (TACSAT) radios. The handheld, multiband inter/intrateam radio (MBITR) is only on the clearance company MTOE. This handheld radio is invaluable for platoon and squad leaders; platoon leaders are in constant communication even when their platoons are executing dismounted patrols. This constant communication adds to the safety of all Soldiers in the patrol and is a critical control system for the dismounted personnel. Contingency communications systems like the Harris 117, 150, or 152 satellite radios are crucial. The Harris 152 is a handheld device that can operate in FM and TACSAT modes.

These Harris radios should be on the MTOE to provide communications and improve the efficiency of platoons. Instead, there are other radios on the engineer battalion MTOE that have been obsolete for years. One of the battalion's companies has 51 AN/PRC-126 radios on its MTOE. This handheld radio uses encryption that is not compatible with any other radio currently used in the Army. The radio is not authorized for use and should be replaced with the MBITR, which is compatible with all FM radios. Recommendations to remove the following items from the engineer battalion MTOE have been made: the KOI-18 encryption tape reader; SB-993 telephone switchboard; TA-977, an outdated telephone; CE-11 phone wiring equipment; and AN/PRC-126 radio. Most signal Soldiers are unfamiliar with these devices, which have not been used by the battalion for at least 12 years, but they are required to perform maintenance on the equipment. Without the proper radios, the safety of Soldiers executing combat operations is in jeopardy. Fortunately, MBITRs and Harris radios are included as theater-provided equipment. If the battalion did not have this equipment while deployed, their safety and effectiveness would be reduced.

Engineers have the mission of paving the way for maneuver units, but need the proper equipment to complete that task. The communications system shortfalls in the engineer battalion MTOE should be addressed. The Regiment must restructure its MTOE communications equipment authorization to allow effective command and control and integration with supported units.

*Captain Hutchison is the communications officer for the 1st Engineer Battalion. She holds a bachelor's degree from the University of Central Missouri at Warrensburg.*

# The Battle for Sowchos 79

*By Captain Christopher J. Scott*

Historians and military personnel are very familiar with the World War II Battle of Stalingrad in the winter of 1942. The fight along the Chir River is less widely known, but is significant to the events surrounding the Stalingrad battle. In early December 1942, the Russians continued their westward attacks against the German forces surrounded at Stalingrad, including along the Chir River. Their aim was to force the Germans to abandon efforts to relieve Stalingrad. Combat on the Chir River, fought 7–22 December by units of the German 48th *Panzer* "Tank" Corps and the Russian 5th Tank Army, had a large operational impact on both the German and Russian campaigns.

The Battle for Sowchos 79, fought 7–8 December 1942, was the first major engagement on the Chir River. Sowchos 79 was a small Soviet collective farm 10 miles south of the Chir River and 70 miles from Stalingrad. The German 11th Panzer Division, 48th Panzer Corps (under Major General Hermann Balck), fought the Russian 1st Tank Corps, 5th Tank Army (under Major General V.V. Butkov). This article shows that the Germans won the battle by effectively applying certain principles of war—mass, maneuver, and surprise—to defeat numerically superior Russian forces. The Russians lost the battle by violating the principles of security and the offensive, as well as the offensive characteristics of audacity and tempo. Key events in the battle (including the seizure of Sowchos 79 by the Russians, the German 15th Panzer Regiment blockage of the Russian 1st Tank Corps, and the 15th Panzer Regiment counterattack) will show how the Russian failures directly related to the outcome of the battle.



**A German tank near Stalingrad**



**A Russian T-34 tank at Stalingrad**

On 7 December, the German 7th Panzer Division had about 30 operational tanks, roughly the same as a current American battalion. The German tanks were mostly Panzer IIIs, whose 50-millimeter guns could only destroy a Russian T-34 tank in a frontal attack at ranges under 500 meters. The Russian 1st Tank Corps had about 60 tanks, mostly T-34s with 76-millimeter guns. The Russian tanks completely outclassed the German panzers in terms of protection, firepower, and mobility.

The Battle for Sowchos 79 began when the Russian 1st Tank Corps attacked across the Chir River, penetrating the defending German 336th Infantry Division and continuing south. The lead Russian elements seized Sowchos 79 by 0930 on 7 December. The first key event in the battle was the Russian breakthrough along the Chir River. This success was a result of the defending German 336th Infantry Division having a long front, no armor support, and inadequate antitank capabilities. The typical German antitank gun was a towed, 37- or 50-millimeter model, neither of which could destroy a T-34 at more than 500 yards. The 336th did not have enough guns to cover its front or defend in depth. By seizing Sowchos 79, the tanks of the Russian 1st Tank Corps posed a large threat to the rear of the German infantry and the entire Chir River front. This forced German leaders to commit the still-arriving 11th Panzer Division to battle.

The Russian 1st Tank Corps attack succeeded by correctly applying the principles of mass, the offensive, objective, and simplicity. They massed an entire tank corps against a weakly held portion of the German line, which had no defending tanks and few antitank capabilities. By continuing their attack across the Chir River, the Russians maintained the overall momentum of their Stalingrad offensive. Last, the Russian 1st Tank Corps mission was very simple—attack across the Chir River to surround the 336th Infantry Division and fix the 48th Panzer Corps. The Russian tank corps, however, disregarded the keys to their 7 December success and were defeated the following day.

American doctrine captures and applies the lesson learned by the Germans. Defending infantry units must be prepared to defend in depth and have adequate antitank capabilities when facing an armored force. According to Field Manual (FM) 3-90, *Tactics*, obstacles (in this case, the Chir River) must be covered by direct and indirect fire or they will not be effective barriers against attacking forces. Offensive units massing their forces can easily develop local superiority in numbers to achieve a breakthrough if obstacles are not properly considered. The Germans, unlike the Russians, learned from their mistakes and were flexible enough to exploit the Russian breakthrough to their own advantage on 8 December.

The battle's second key event demonstrates the application of the principles of mass and the offensive, along with the characteristics of the offense. On 7 December, the German 11th Panzer Division moved north from its railhead at Rostov to join the 48th Panzer Corps. Only its 15th Panzer Regiment was available to stop a Russian breakthrough. The 48th Panzer Corps ordered the regiment

to stop the Russian breakthrough and push the enemy back across the Chir River. The Russians still maintained a good operational tempo and continued to mass their forces against the German lines. By midday on 7 December, the Germans were unable to halt the Russian advance, but the 15th Panzer Regiment resistance allowed the 11th Panzer Division's main body—including the 110th and 111th Panzer Grenadier Regiments—to arrive that afternoon. The division's artillery, engineer, and antiaircraft units were committed to stop the Russian advance. A counterattack by the 15th Panzer Regiment, with support from the antiaircraft and engineer units, blocked the Russians from penetrating south of Sowchos 79.

The commander of the 15th Panzer Regiment, Colonel Graf Schimmelmann, displayed tremendous audacity by moving his unit forward before the rest of the 11th Panzer Division was concentrated for a counterattack. Schimmelmann recognized the importance of his regiment as the only full-strength unit available to the 48th Panzer Corps. His first battalion left its assembly area 15 minutes after receiving its warning order. By quickly counterattacking, the regiment acted as a fixing force that helped in "establishing the conditions necessary for decisive operations."[1] The 15th Panzer Regiment counterattack massed every available tank to stop the Russians at Sowchos 79.

The action of the Russian commanders contributed to German success. The Russian 1st Tank Corps did not exploit its success from the afternoon of 7 December, but instead held its positions at Sowchos 79. The Russian corps lost the initiative because it did not exploit its original success with the offensive characteristics of audacity and tempo. Exploitation "follows a successful attack and is designed to disorganize the enemy in depth."[2] While the German 15th Panzer Regiment's counterattack and heavy resistance certainly contributed to halting the Russian advance, the Russians simply did not exploit their attack. There were numerous instances of a lack of initiative at the junior level of Russian armored forces.[3] There is no direct evidence of the lack of initiative at the Battle of Sowchos 79, but it can be inferred from the state of the Russian armored forces at this point in the war. Instead of continuing the assault or seeking a weak point, the Russians continued attacking directly at the 15th Panzer Regiment until the panzers fixed them at Sowchos 79.

The final key event of the Battle for Sowchos 79 was the counterattack by the German 11th Panzer Division and the destruction of the Russian 1st Tank Corps. During the evening of 7 December, German Major General Balck ordered the 15th Panzer Regiment to attack around the western flank of the Russian 1st Tank Corps in a single envelopment. He reasoned that a forced march would catch the Russians off guard in the morning. Balck planned to use the panzer regiment's superior maneuver and command and control capabilities to place his units where the Russians were weakest. He used effective terrain analysis to identify an open route into the Russian western flank. The road network in the area was severely limited, with only a small dirt road network to the south of Sowchos 79. The roads could only support armored forces "dependent on weather conditions,"[4] and the terrain had steep cuts and small rivers that channeled units onto the few roads. The Russians used the steep, dry streambeds around Sowchos 79 as natural concealment for tanks, hiding in *balkas* (gullies) and camouflaged with snow to avoid German detection for days after the battle.[5] The balkas south of Sowchos 79 acted as natural antitank ditches, but the western side of Sowchos 79 is mostly flat with low hills. Balck decided to use the hills north and west of Sowchos 79 to avoid direct observation by the Russians.

The Russians did not expect a German counterattack on 8 December and did not establish security, offering the Germans an assailable flank. On the night of 7 December, the German 15th Panzer Regiment conducted a relief in place with the 110th Panzer Grenadier Regiment, which was to block any Russian breakthrough toward the south. Good off-road mobility and low hills gave the 15th Panzers an open corridor into its assault position. Along with the 111th Panzer Grenadier Regiment, the 15th Panzers advanced north, using terrain and darkness to mask their movements. They reached their assault positions by morning on 8 December 1942.

Balck also placed the 11th Panzer Division's engineer battalion southeast of Sowchos 79 to prevent a Russian breakthrough there and positioned the division's antiaircraft units there so that their 88-millimeter guns could serve as antitank artillery.[6] The 110th Panzer Grenadier Regiment supported the main attack by conducting a demonstration on 8 December, keeping the Russians in place.[7] Units of the 336th Infantry Division held to the east and prepared for a continued Russian offensive into its flank.

At 0445 on 8 December 1942, the 15th Panzer Regiment attacked eastward against the rear of the Russian armor line.[8] Its lead elements spotted Russian motorized infantry moving south into Sowchos 79, so the panzers engaged and destroyed the Russian trucks and infantry. The panzers then pushed on to engage the Russian armored forces. At that time, the Russians were preparing to continue their attack from the previous day into the flank of the German 336th Infantry Division. The 15th Panzers engaged the Russian tanks, throwing them into a confused panic. The Russian 1st Tank Corps command and control collapsed and lost all unit cohesion. The panzer grenadiers closely supported the tanks and engaged Russian infantry in the vicinity of Sowchos 79. Before the fighting was over, another Russian breakthrough on the Chir River forced the Germans to withdraw the 15th Panzer Regiment's tanks. This left German infantry to finish the battle alone, but by then the Germans had destroyed almost all of the Russian armor. The remaining Russian infantry conducted a piecemeal and uncoordinated resistance. The Germans retook Sowchos 79 by midafternoon and claimed 53 destroyed Russian tanks.[9]

"Surprise, coordinated fires, and control are the keys to a successful counterattack."[10] The German counterattack

demonstrated this principle perfectly. Balck's use of maneuver achieved complete surprise against the 1st Tank Corps. The Russian tanks outnumbered the Germans by two to one, but the superior maneuver capabilities of the 15th Panzer Regiment enabled it to mass its forces and gain local superiority to overwhelm the numerically larger enemy. In addition, the Germans effectively executed a complex relief in place during the night and a coordinated two-regiment attack at dawn. This demonstrated excellent overall command and control. The Russians, however, lost all initiative and momentum from the day before. They established no local security and ignored the continued threat from the panzers they had encountered on 7 December. This left their 1st Tank Corps extremely vulnerable and resulted in its destruction. By the evening of 8 December, the 11th Panzer Division destroyed the Russian tank corps, which did not play a significant role in future engagements around the Chir and Donetz Rivers.

The principles of war outlined in FM 3-0, *Operations*—offense, mass, maneuver, surprise, simplicity, and security—are fundamentals that were relevant when the German 11th Panzer Division defeated the Russian 1st Tank Corps at Sowchos 79 in December 1942. Both sides applied the principles of war and won or lost based on their application of them. The Germans, although seriously outnumbered, effectively held to the principles of war, particularly mass and surprise. The Russians initially followed the principles of war and the characteristics of the offense. However, after their initial breakthrough, they lost their tactical advantage and repeatedly violated the principles of war and the characteristics of the offense. This resulted in a decisive defeat for the Russian 1st Tank Corps and a major tactical victory for the German 11th Panzer Division.

**Endnotes**

[1]FM 3-90, *Tactics*, 4 July 2001, p. 10-10.

[2]Ibid., p. 6-1.

[3]Friedrich Wilhelm Von Mellenthin, *Panzer Battles: A Study of the Employment of Armor in the Second World War*, Ballentine Books, New York, NY, 1971, pp. 223–224.

[4]John Drinkwater, *When to Pull the Trigger for the Counterattack: Simplicity versus Sophistication,* U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1985, Defense Technical Information Center (DTIC), <*http://www.dtic.mil/srch/doc?collection=t3&id=ADA167705*>, p. 14, accessed 3 May 2011.

[5]Alan Clark, *Barbarossa: The Russian-German Conflict, 1941-1945*, H. Wolff, New York, 1965, p. 261.

[6]Mellenthin, p. 213.

[7]Ibid., p. 213.

[8]Robert Walters, *Order Out of Chaos: A Case Study of the Application of Auftragstaktik by the 11th Panzer Division During the Chir River Battles 7–19 December 1942,* master's thesis, Naval Postgraduate School, Monterey, CA, 1989, DTIC, p. 26.

[9]Ibid., p. 28.

[10]FM 3-90, p. 5-36.

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*("Discussion Groups," continued from page 9)*

- *Warrant Officer Education System:* The focus of this subgroup was the expansion of the Warrant Officer Basic Course and support of Army Learning Concept 2015. The group established that Warrant Officer Basic Course outcomes support unit requirements for engineer construction technicians. It also identified technical "electives" that give better support to theater mission sets and promote retention of construction engineering technician warrant officers through professional certifications.
- *Noncommissioned Officer Education System:* Participants discussed changes to the system and ways that the Regiment plans to implement Army Learning Concept 2015 by focusing training on the most critical tasks, while shifting common tasks to distributed and blended learning. Discussion included assessing instructor experience as facilitators.

The working group concluded that current engineer additional skill identifier qualifications do not support employment skills needed at each grade. Additionally, Army Regulation 600-3, *The Army Personnel Development System*, does not lead individuals on lifelong learning paths to professional skill and certifications. Compounding this dilemma is the fact that most Army engineers do not possess recognized certifications (such as project manager professional, professional engineer, or authorized contracting officer) applicable to joint engineering. The working groups' final recommendation was that professional certification be awarded for studies in the professional military education system and that additional skill identifiers be awarded for specialized engineer training, such as the Sapper Leader Course. The U.S. Army Engineer School will continue to develop these recommendations to ensure the correct Engineer employment skills needed at each grade.

Again, participation in this year's ENFORCE working groups was exceptional, and great feedback was received from the field. Thanks to all who participated. Your regimental headquarters will continue to work on and refine the working group recommendations as we move forward in our Regimental Campaign Plan. We encourage everyone to participate in further development and track our progress on achieving the objectives of the working groups.



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