ENGINEER

The Professional Bulletin of Army Engineers

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United States Army Engineer School

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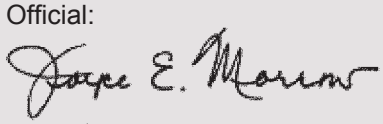

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The Professional Bulletin of Army Engineers

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Front cover: ENFORCE 2011 logo by SFC Bianka Latham.

Back cover: U.S. Army engineer photos from World War II, Korea, Vietnam, and present-day Afghanistan.

DEPARTMENTS

FEATURES

Clear The Way

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

A Timeless Profession

From the very beginning in 1775, Army leaders recognized the critical need for a profession of military engineer experts serving commanders at every level, with formations of engineers fighting alongside every combat formation from the point of attack to the ports and airfields that sustained operations. That's why we are the oldest professional Regiment in the Army; we are a profession that traces our roots back to 16 June 1775, when Congress resolved to establish a Chief of Engineers within the Army. This Regiment has played a vital role in every military operation—during peace and war—that has ultimately shaped America and helped define our prominent role as a world leader. It is no different today! Just look at the extraordinary service of Army engineers in Iraq, Afghanistan, New Orleans, and our own Army camps and stations.

This past fall, the Chief of Staff of the Army, General George Casey, designated 2011 as the "Year of the Army Profession." Across our Army, the Training and Doctrine Command is leading a number of forums designed to closely examine the profession of arms and ask ourselves some tough questions: After 10 years of combat, how are we doing as a profession? Are we meeting the nation's needs? What must we change to better prepare for the future?

The theme of this year's ENFORCE—*A Timeless Profession*—extends the Armywide dialogue on the profession of arms to our own Regiment's role as the Army's subprofession of military engineers. As we gather the tribe together from across our Regiment, we will dedicate much of our time toward examining a number of questions: What does it mean to be a subprofession of military engineers that serves the Army? What are the attributes of the military engineer professional the Army needs? After 10 years of war, where do we need to make changes within our profession to better serve our Army?

I'm extremely excited about the events during ENFORCE this year and how we have structured the week. First, we have moved the dates of ENFORCE (6–9 April) so it begins on Wednesday and culminates on Saturday to make it easier for members of the Reserve Component to attend the main events. We will open ENFORCE with our partners in industry displaying the latest technologies at Nutter Field House. Go see the displays, and allow the experience to expand your horizons on the technologies we can use to enhance our effectiveness in serving commanders on tomorrow's battlefield.

Thursday we will convene the Regimental Command Council and discuss a multitude of hot topics from the Regimental Campaign Plan that are ready for senior leader debate and input. Also on Thursday, we will hold several discussion groups designed to open a broader debate on three key areas where I think we need to make some changes in order to meet our professional responsibilities. Discussion groups will look at—

- Making changes needed to improve how we educate leaders.
- Improving the way we meet the training needs of the Regiment based on Army Force Generation (ARFORGEN).
- Leveraging knowledge management to provide the Regiment with a true virtual collaborative "cloud" that provides members of our profession with the connections they need to reach back, reach forward, swap ideas, and guide regimental decisions about the future.

The discussion groups will report their recommendations to a Council of Commanders on Saturday morning.

Thursday will culminate with one of the most solemn and respectful moments of the week, as we unveil the Fallen Engineers Memorial in Sapper Grove to honor engineers who gave their lives in support of operations in Iraq and Afghanistan. This memorial is a gift from the Regiment—through your donations to the Army Engineer Association—and we will continue the tradition of adding names each year until our mission is completed, those operations are concluded, and the team returns home. This is what a professional family does…it recognizes the selfless sacrifice of its own with honor, love, and respect.

Friday will allow us to focus on the professional attributes of the military engineer. We will conduct a panel discussion—led by engineer veterans who fought in past conflicts—and hear from unit leaders fresh out of Afghanistan and a military futurist who will help us glimpse into the future. The discussion is designed to examine the professional

(Continued on page 6)

Lead The Way

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

Our leadership has told us in FM 7-0, *Training for Full Spectrum Operations*, that "all operations are now full spectrum operations" and that "full spectrum operations require mentally agile leaders able to operate in any operational theme." As most of you know, the components of full spectrum operations are offensive, defensive, stability, and civil support operations, and the operational themes are major combat operations, irregular warfare, peace operations, limited intervention, and peacetime engagement. I couldn't find anywhere in the manual that said our mentally agile leaders should be of a certain rank or position, so it's a safe bet that this applies to team leaders as much as it does to our highest ranking officers. So how can we best prepare our private first class or second lieutenant engineer to be a mentally agile leader?

We should develop training in our unit that focuses on the transitions. We've all learned that engineers, cavalrymen, and field artillerymen are the most versatile Soldiers in the Army's formations. As far as I can tell, we're the only ones who have "Fight as Infantry" in our duty descriptions. Drill down within the Regiment and you'll see combat and construction engineers performing duties in either field. How many military occupational specialty 12N horizontal construction engineers are out there performing route clearance duties? It takes mental agility within the platoon and company to recognize when to transition from an offensive, defensive, or stability mindset. Some Soldiers call it "turning on the light switch" and say that it can only happen when a Soldier understands the environment.

Ever wonder why we're so smoked after the first four or five patrols? It's because we don't recognize the environment we're in. Everything looks like an IED, and everyone looks like the enemy. The scouts have a great technique that they use when they're on observation duty. They keep a log of everything that happens within their sector. They start documenting the patterns of people, traffic, and events while on patrol or at an observation post, and after a few days a pattern starts to emerge. The mind starts recognizing certain patterns of life and begins to recognize normal activity. How much better prepared would our Soldiers be if we were to train them in recognizing patterns? The training events could be as simple as instructing the platoon members to look for white pickup trucks on the way out to the rifle range—how many, what direction of travel, what make, how many passengers, and what were they doing are just some of the intelligence requirements for every member of the platoon. Everyone will have varying degrees of change-detection expertise. Task your more experienced Soldiers to train those who need help recognizing patterns.

The same goes for engineering. We exist to support the maneuver formations and assure their mobility, enhance their protection, enable expeditionary logistics, and build capacity both inside the formation and with the civilian population. Simply put, they are battlespace owners; we are not. We have to look at every situation through the lens of an engineer. An engineer has to recognize the lay of the land, how to use the existing terrain that provides the best cover, and what routes can best move the maneuver commander's formations. More than likely, our maneuver units are doing three of the four elements of full spectrum operations all in the same brigade combat team. They need mentally agile engineer companies to do the same, where one platoon may be clearing routes while another is building a combat outpost and the other is orchestrating a vocational training program within a village. A key element to this is finding the subject matter expert in a particular field of engineering and getting that Soldier to the right place on the battlefield. Finding the experts in your unit before you deploy, developing their skills, and putting them in specific training events can only help you rapidly transition from one phase of combat to another. It is a worthwhile endeavor, because every maneuver commander will yell out, "Where's my engineer?"

This will be my last article for the Engineer Bulletin as the Regimental Command Sergeant Major (CSM). CSM Terrence Murphy will be coming in, and I will be transitioning to the Maneuver Support Center after this year's ENFORCE. As a former brigade combat team (BCT) CSM, I am pleased that we have focused on how to best serve our maneuver brothers and our own engineers in the BCT by asking the Army to insert an engineer battalion into every BCT. The BCT is the centerpiece of the Army's formations and deserves our best efforts, whether that's inside or outside the BCT formation.

I hope that all of you will join me in unveiling our memorial tribute to our fallen comrades during ENFORCE. It's a fitting tribute to all engineers who have given their lives for their family, battle buddies, unit, and country.

Essayons!

Show The Way

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

Congratulations are in order to eleven outstanding noncommissioned officers (NCOs) who were selected for the engineer warrant officer program during the January 2011 Warrant Officer Selection Board held at Fort Knox, Kentucky. These NCOs represent the best and brightest the Engineer Regiment has to offer the Warrant Officer Corps. The Construction Engineering Technician Warrant Officer Basic Course (WOBC) will include three prime power production specialists (military occupational specialty [MOS] 12P), two construction engineer supervisors (MOS 12H) and one technical engineer (MOS 12T). The Geospatial Engineering Technician WOBC will include five geospatial engineers (MOS 12Y). These NCOs average more than 10 years of service, have served an average of three combat tours, and bring a combined 115 years of engineer technical expertise and leadership to the Warrant Officer Corps!

Many of you have noticed that I end each *Show the Way* article with a request for each of you to recruit your replacements by identifying outstanding NCOs who possess sustained and demonstrated levels of technical and leadership competency. I cannot stress enough how important this request is. The expansion of both engineer warrant officer MOSs continues, and it is imperative that we discover and then "sponsor" NCOs without sacrificing quality for quantity. I would like to spend a little more time in this bulletin on what I have observed when evaluating application packets.

First, let me thank the many warrant officers from all three components who tirelessly work to recruit their replacements and have enabled the Regiment to meet its recruiting mission for the past few years. Great job! Second, while we have been successful in our goals so far, I have noticed some cracks in the recruitment foundation. An alarming number of application packets I disapprove at the proponent level should never make it past the senior warrant officer who wrote the letter of recommendation. Let me be very blunt—we can do better. For example, recent packets included resumes with numerous misspelled words, incorrect MOS numbers and names, letters of recommendation more than a year old, and discrepancies between the DA Form 61, *Application for Appointment*; noncommissioned Officer Evaluation Reports (NCOERs); and Enlisted Record Briefs (ERBs). Soldiers have also asked for waivers of prerequisites that clearly cannot be waived due to a lack of alternate qualifications, education, or experience. The bottom line is that when we elect to write a letter of recommendation for an NCO, it becomes our responsibility to sponsor that NCO's efforts. That means providing an honest assessment of the packet, then when the Soldier is ready to apply, ensuring that the packet is 100 percent correct before submitting it to the United States Army Recruiting Command or state and Reserve Component warrant officer strength managers. The NCOs who aspire to be warrant officers deserve our best efforts—nothing less.

On another note, have you ever wanted to discuss regimental issues, share information, and participate in professional debates in a purely regimental forum? I have great news. The Engineer School Commandant has recently approved engineer CW4s to participate in the new Engineer Battalion Commander's Forum. The forum is a platform for battalion command teams as well as engineers in key positions across all components. The bottom line is that your input is valuable to the Regiment. Your voice can help shape or adjust the Regiment's Campaign Plan. More important, your voice will help feed critical thought to the senior engineer-level forums. Stay connected, participate, and engage. Many thanks to our Knowledge Management (KM) Officer for her input and efforts to provide world-class KM to our Regiment. Sign up at <*https://www.kc.army.mil/book/groups/engineer-battalion-command-forum*>.

In addition to the Battalion Commander's Forum, the Commandant has approved engineer CW5s to participate in the "Commandant's Corner," the portal where discussions regarding all facets of regimental interest are taking place! The target audience for this forum is 0-6 commanders and key staff leaders from across the Regiment, which includes (but is not limited to) combatant commands, Army Service component commands, brigades, United States Army Corps of Engineers divisions and districts, J-4 Logistics, Army G-3 Operations and Training/G-5 Civil-Military Operations/G-7 Plans/G-8 Resource Management, United States Army Forces Command, and United States Army Training and Doctrine Command—and now CW5s. Vote, discuss, chime in, and engage. Sign up at <*https://www.kc.army.mil/book/groups/usaes-commandants-corner*>.

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

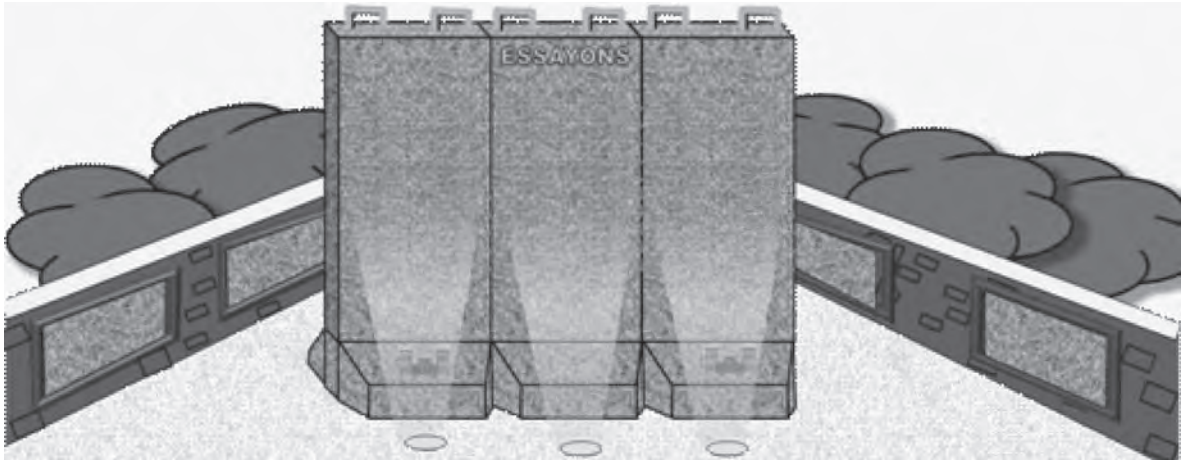
Essayons et Faissons!

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.

Aceves, Sergeant Omar	7th Engineer Battalion, 10th Sustainment Brigade	Fort Drum, New York
Beckerman, Sergeant Michael J.	2d Brigade Special Troops Battalion, 2d Brigade Combat Team	Fort Campbell, Kentucky
Cruttenden, Specialist Aaron B.	27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
Delgado Arroyo, Specialist Jose A.	130th Engineer Battalion, Puerto Rico National Guard	Aguadilla, Puerto Rico
Harris, Private Two Devon J.	4th Special Troops Battalion, 4th Brigade Combat Team	Fort Polk, Louisiana
King, Specialist Jarrid L.	7th Engineer Battalion, 10th Sustainment Brigade	Fort Drum, New York
Kridlo, Specialist Dale J.	27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
McCluskey, Sergeant Jason J.	27th Engineer Battalion, 20th Engineer Brigade	Fort Bragg, North Carolina
Moore, Private First Class Benjamin G.	7th Engineer Battalion, 10th Sustainment Brigade	Fort Drum, New York
Thode, Sergeant First Class James E.	1457th Engineer Battalion, Utah Army National Guard	Kirtland, New Mexico
Torre, Specialist Jose A.	Special Troops Battalion, 2d Advise and Assist Brigade	Fort Riley, Kansas
Whipple, Specialist Blake D.	7th Engineer Battalion, 10th Sustainment Brigade	Fort Drum, New York
Young, Specialist James C.	412th Theater Engineer Command, United States Army Reserve	Darien, Illinois

Proposed Fallen Engineers Memorial



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

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

attributes of the military engineer that have served us well in past wars—through the eyes of our veterans—and then consider the challenges we will face on future battlefields to discern what adjustments we must make in leader development. We will end the day with our keynote addresses. First, Colonel Don Snider (Retired), who is leading the Armywide discourse on the profession of arms, will give us his perspective on military engineers as a subprofession of the Army. Then our 52d Chief of Engineers, Lieutenant General Robert Van Antwerp, will address the assembled members of the Regiment and provide his perspective on the changes he has witnessed and lived through over the course of his career, with insights on what that means for the future.

Throughout the week, spouses are encouraged to participate in the Spouse Program, which includes getting some hands-on training on automatic weapons in the Engagement Skills Trainer, observing a demonstration of fixed and float bridging, and going through a tour of "a trainee's first day." There will also be a number of social events for spouses during the week, including a luncheon on Thursday.

On Saturday, we start the day by cheering on the finalists of the Best Sapper Competition as they give their all to cross the finish line first. The competition begins on Wednesday, and you can visit events during the week. If you want to see the heart and soul of our Regiment, BE THERE! We will then conduct a number of professional development seminars that are regionally focused to give our combatant command engineers a chance to showcase the complexity of engineer operations in each of the major theaters. The Army Engineer Association will hold its Awards Luncheon, where we will recognize the winners of the Itschner, Grizzly, Van Autreve, Outstanding Warrant Officer, and Outstanding Civilian awards. Of course, we will gather that night in Nutter Field House for the Engineer Regimental Ball in honor of our award recipients and will present the Gold deFleury to this year's winners.

That's a full agenda, I know, and I only hit the major events. So come to ENFORCE and help us celebrate our "timeless profession," and then help us shape this Regiment's future. See you there.

Lead to Serve!

Farewell . . .
From the Managing Editor, Shirley Bridges

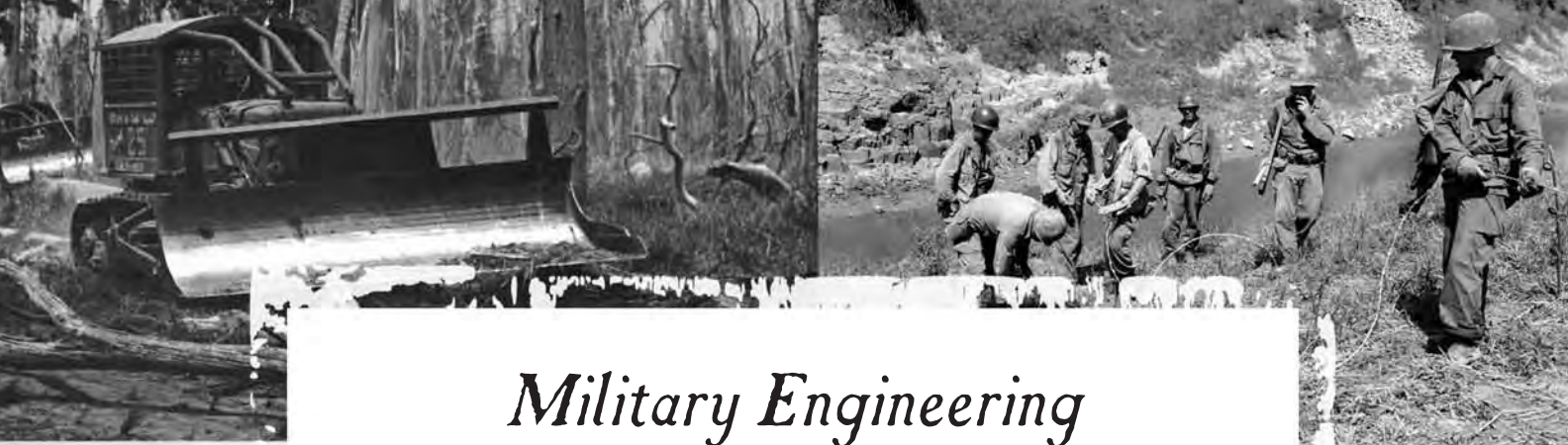
It has been a privilege and a pleasure to have been associated with *Engineer, The Professional Bulletin of Army Engineers*, for the past 17 years—beginning in October1994 as editor and from April 2003 to March 2011 as managing editor.

The publication has an interesting history that began with a Spring 1971 issue that was known as *The Engineer*. Major General Robert Ploger, then commandant of the Engineer School, was optimistic that the publication would provide a forum to "trigger engineer thinking" and "stimulate controversial subjects…with the objective in mind of progress in the profession." He said that the objective was not "controversy for controversy's sake." His aim was to provoke "the thought processes of the complete span of our personnel, from young enlisted engineers to career-oriented officers. From them may well emanate new ideas, fresh approaches to existing problem areas—solutions, perhaps, to the technical barricades facing us." In the "timeless profession" of military engineering, this attitude is still very prevalent from the current Engineer School commandant Brigadier General Bryan Watson.

The late 1979 and early 1980 issues were published under the name *Engineer*, and by the Summer of 1980 to mid-1987, it was called *Engineer, The Magazine for Army Engineers*. In the mid-1980s, the Secretary of the Army directed a large reduction in the printing budget, eliminating many periodicals. However, he authorized the Training and Doctrine Command to develop a new publication media—the professional bulletin—to keep Army personnel knowledgeable of current and emerging developments within their assigned areas of proponency. So the third issue published in 1987 became *Engineer, For Army Engineers*. The fourth issue of that year bore the name *Engineer, The Professional Bulletin for Army Engineers*, and has remained that except for changing the word "for" to "of" in 2001.

As this ENFORCE issue went to press, I was presented my Certificate of Retirement after 32 years as a Department of the Army Civilian and moved on to the next phase of my life. It is not without some sadness that I leave, because many of you have become like old friends. I've watched some of you be assigned and reassigned to Fort Leonard Wood several times, and I've followed your careers as you became leaders in the timeless military engineering profession. One example of that is Brigadier General Watson, who I (as a training and doctrine editor) first knew as a captain back in the early 1990s. It has been gratifying to see this young and capable engineer officer become an even more capable leader of the Engineer School, ever encouraging young engineers to share their experiences and expertise with others.

Thanks to all of you in the Engineer Regiment for the tremendous support you have given me over the years. And thank you also to the very talented and dedicated *Engineer* staff members—both now and in the past—who have helped me continue to improve the quality and usefulness of *Engineer*. With their skill and commitment, I have no doubts that the publication will continue to thrive under the management of Diane Eidson, another veteran editor.



Military Engineering
A Timeless Profession
1775 - Present

In the following pages, you will find some intriguing "retro" articles from the Engineer Regiment's past. These interesting articles were incorporated into this issue in support of the ENFORCE theme, "A Timeless Profession." The articles span the years of 1924–1979 and include items from past issues of what is now *Engineer, The Professional Bulletin of Army Engineers*—which was first published in 1971—and *The Military Engineer*—first published by the Society of American Military Engineers in 1920. You will find some timeless principles of military engineering from those who fought the fight, including studies on improvised explosive devices from World War I, base camp construction in World War II, training engineers in the Vietnam era, and some institutional regimental history.

"Destruction of Enemy Traps and Mines," by J. Frank Barber, *The Military Engineer*, Volume XVI, Number 89, September–October 1924, p. 374.

"Engineer Buttons and Castle," by Captain Herbert Vogel, *The Military Engineer*, Volume XXXIII, Number 188, March–April 1941, p. 103.

"Engineering Operations on Advanced Bases," by Colonel Albert Lane, *The Military Engineer*, Volume XXXVII, Number 238, August 1945, p. 299.

"The Engineer School," by First Lieutenant Thomas Pedersen, *The Military Engineer*, Volume XXXVIII, Number 247, May 1946, p. 184.

"Training the Effective Sapper," by Major William L. Jones, *The Engineer*, Volume 3, Number 2, Summer 1973, p. 16.

"Selling Engineer Capability to the Maneuver Commander," by Major V. Paul Baerman, *Engineer*, Volume 9, Number 2, Fall 1979.

Destruction of Enemy Traps and Mines

By Colonel J. Frank Barber, Engineer Officers' Reserve Corps

A week or so after the armistice, the 304th Engineers were visited by a staff officer from G. H. Q., a Colonel of Engineers. Regimental headquarters were still on Samogneux Hill, along the Meuse and north of Verdun some 11 or 12 kilometers. It was here on this barren and muddy slope that the regiment had dug in on November 1, and it was here that regimental headquarters stayed until December 26, the day after that memorable Christmas of 1918.

Enemy Traps Prepared for Destruction

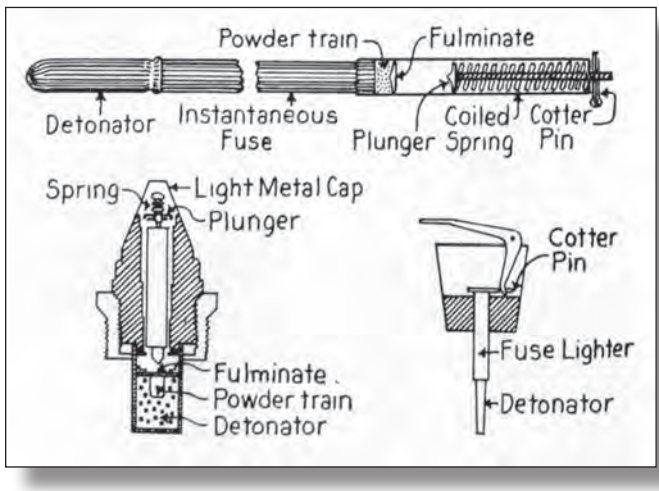
The staff officer had under his arm a great roll of maps, American, French and German. These were unfolded, and then ensued a long conference which included general instructions and details for the clearing of several extensive areas of enemy traps and mines, as well as removing (policing) from these designated areas "duds," grenades, flares and, in short, every article of an explosive or dangerous nature. The Colonel's orders were explicit, direct, and definite. The task was uncanny and, to the mind of a man with troops, unwise and a hazard unnecessary for our men to undertake. However, war is war, and orders are orders; so, with due dispatch, the regiment went to its task.

The orders covered the removal of traps, mines, "duds," mined dugouts, etc., in three major areas and five minor areas, all known to be intensively organized by this means of defense and generally shown on the captured German maps with more or less accuracy. These maps, both German and French, would, in some cases, show traps and mines which did not exist but, more frequently, whole series of traps, which had never been plotted on the maps, would be discovered.

In the first case, it was assumed that it had been planned to place mines in a certain location for certain defense purposes and, for lack of time, labor, or other reason, the scheme or location had been neglected or abandoned. In the second instance, which was by far the more frequent, it was a case of a local sector commander's being more enthusiastic in this mode of defense and more energetic, with the result that he attempted to mine every logical strategical position but had neglected to record properly, both for his own use and, as it proved subsequently, for ours, the location and type of these mines on his battle sheets.

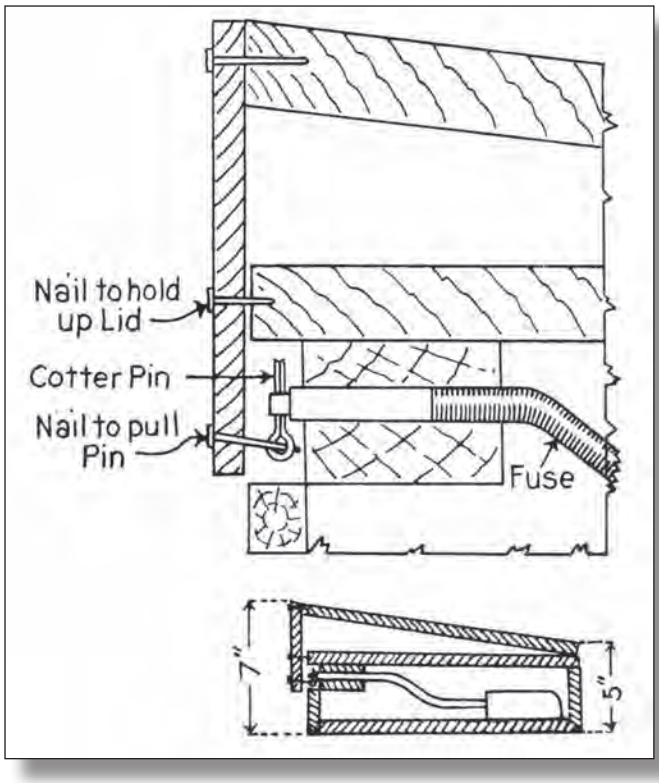
These were the conditions under which the regiment undertook its task. The weather was typical: rainy, misty, and with inches of mud under foot. The areas were, in general, distant from the then-regimental area, so that the assigned details had to move out and bivouac temporarily in the location in which they were to work.

Especially qualified officers and men were selected for this work with great care, as the hazard was fully realized. To this end, men who had been accustomed to handling explosives—mining engineers, contractors, and men with quarrying experience, were chosen. They were instructed emphatically that caution was to be observed as the first element of their duty, and that haste and carelessness were to be avoided.



German Percussion Ignition Devices

Our men met with two minor accidents which, luckily, were not fatal; but from the amount of explosives handled, the several types, and the varied and totally unknown conditions and circumstances, the toll might have been much heavier, as it proved in other engineer regiments during similar work. But, owing to caution, experience and good judgment on the part of the officers and men of the several details, we succeeded in our task with a minimum cost.



Details of firing mechanism

It would be tiresome to go into detail as to the type and number of mines taken out from the several areas, but it is interesting to note that more than three tons of explosives were removed and destroyed and, in all, a total area of 167 square kilometers were fairly well cleared. The work covered the period from November 17 to December 24, 1918, and a total of 7 officers and about 200 men were employed.

The territory to be policed was divided into three areas: Areas No. 1, Ornes-Maucourt in the Verdun Sector; Area No. 2, Ville-en-Woevre and Fresnes-en-Woevre; and Area No. 3, Samogneux and Brabant. In the third area, it was largely a case of destroying "duds," grenades, flares, etc.

The work in Area No. 1 consisted principally of removing and destroying German mines and explosive traps, mostly of the anti-tank type. A great number of these, of the box type, and each consisting of two 3-inch shells, were found.

These traps were buried in the ground in rows with the top flush with the surface, and staggered one or two meters apart. The rows extended on both sides of the road for a distance of over half a kilometer and were guarded on either side, both front and rear, by a line of barbed wire entanglement. These particular traps were rendered harmless by lifting the box lid and cutting the fuses in several places, the traps being left open to the weather.

There were also located a large number of traps consisting of one 6-inch shell each, buried in the roadway, with a plunger igniter and detonator in the nose of the shell. These were planted, as usual, in a staggered and more or less irregular design across the roads and for some distance on either side of the highways. These traps were all destroyed by placing a small charge of T. N. T. with detonator and time fuse, on each plunger, and exploding the shells in place.

Also, in this area were located a large number of mines consisting of a box with about 20 kilograms of H.E., set flush with the surface of the ground; when the box lid was forced down, the fuse was ignited and caused the explosion. These traps were placed parallel and alongside the road at a distance of some three or four meters apart and were evidently intended to destroy wagons and tanks. They were dug up and placed in piles, and were detonated by means of a small portion of T. N. T. discharged by a time fuse.

In another section of this area, a great number of anti-tank mines, of the shell and box type, were found, each having four 3-inch shells, laid on their sides, and two igniters and fuses. These traps were set in rows running at right angles to the road, and lay between two lines of barbed wire. The fuses were cut or disconnected and the shells left exposed to the weather.

Later, in an adjacent area, over 300 anti-tank mines of the "yoke" type were located, dug up, and destroyed. This type consisted of about 8 kilograms of H.E. (perdit, usually) placed in a small box about 4 inches deep and 12 inches square. This box had a yoke and a trigger connecting four igniters which, in turn, connected with four detonators and then, to instantaneous fuses. A pressure of some 40 or 50 pounds on the yoke would cause the explosion. These mines were set at intervals of about a meter in a double

Common Type of Enemy Trap

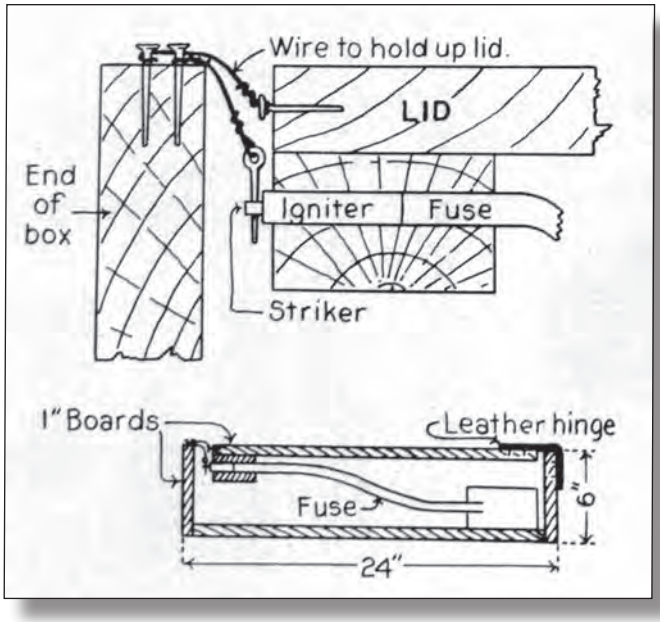
row across a ravine and were surrounded by barbed wire. The yokes and triggers were carefully detached from the boxes, and the latter were piled together and destroyed by a T. N. T. mud-cap.

A quantity of 6-inch shells was located in this same area, buried in the usual manner, with plunger detonators up. These were destroyed in place by blasting or mud-capping.

In sub-area seven of this same area, a large quantity of contact mines were located in an old quarry near Ornes. These consisted of a box containing about 10 kilograms of perdit placed at one end. They had two igniters and instantaneous fuses leading to the charge, fastened in such a manner that, upon raising or pressing down the lid, the mine would explode. The lid was held in position by five wires and made a mine which was very sensitive and dangerous, and which required very great care in the unloading. The mines were usually set at irregular intervals, without system, and slightly below the surface of the ground, being covered with a light layer of earth, grass or brush. The safest way to destroy these traps, it was found, was to detonate them in place with a half block of T. N. T., well-placed under a heavy mud-cap.

A road mine, consisting of four charges of perdit of about 60 kilograms each, placed four feet under the roadway and connected with time fuse and detonators, was found at another location in this area. This mine was not indicated on the maps. It was unloaded and the contents blown.

Many of the planted or road mines, when uncovered and deloused, as the men termed it, were found to be of rather an ancient vintage, having been affected by surface water, and often rendered harmless. This condition, however, was not ascertainable until the men had undergone the uncertainty and hazard of opening them up.



Details of Firing Mechanism

This detail encountered also several concrete dams, backing up the water of small streams and flooding areas of many acres. These flooded areas made an effective obstacle to advancing troops and, consequently, an effective defensive element. The dams were usually blown by using some of the enemy's own perdit. The charges had, however, to be placed in water-tight containers and planted well at the base of the structures.

In this area, a highway bridge prepared for demolition by placing five charges of H.E., of approximately 45 kilograms each, at vital points on the girders; a foot-bridge with two charges, each containing 55 kilograms of perdit, placed on the supports; and a light railway bridge with several charges placed about the supports were found.

Anti-tank Box Type Mine

Late in November, one of the details located, under a bridge over the Ornes river, near the town of Ornes, nine mines set in sheet-iron containers and arranged with time fuses. They also located several bangalore or pipe torpedoes in this area. These were usually made of 2-inch pipe and ranged anywhere from 12 to 20 feet in length. In some instances, they would be arranged with a trip igniter and in others with a time fuse, but they were invariably heavily charged.

Another scheme or method of defense was to blow a large crater in the road and then plant a series of tank and infantry mines on either side for a kilometer or more. Throughout, the enemy's organization of the ground evidenced unlimited energy and the expenditure of a vast amount of labor. Many of their devices were crude, yet generally practical. The most pertinent criticism would be in the matter of weather-proofing their containers. This seemed a universal fault.

Many bridges were encountered, especially in, and adjacent to, the town of Ornes. These had all been prepared for demolition with ample charges placed on the struts or major members but, through lack of time or for other reasons, they had not been fired.

Dugouts were a special problem. Groups or settlements of these dugouts were found where, in many instances, the entrances had been planted with a trap or mine. Many an American soldier, particularly of the souvenir-hunting type, has met his death through this scheme of trickery on the part of the enemy.

The general and most popular plan was to place a charge of from 25 to 50 kilograms of perdit in a container within the entrance of the dugout, and connect it with the igniter and instantaneous fuse. These igniters were so placed that when any pressure was exerted on the step, it exploded the charge. The method adopted in destroying this style of trap was to shoot the whole dugout by means of an ample charge of perdit, the enemy's own explosive, it not being deemed worthwhile to hazard the life of an American soldier by entering and exploring a subterranean habitation which never would or could be of future benefit to anyone.

The Ville-en-Woevre and Fresnes area was handled by another detail. While they encountered some of the same type of traps, it was apparent that this section had been under a different sector commander.

There were two types of mines generally used. These consisted of a charge of from 8 to 12 kilograms of perdit in

Yoke Type of Anti-tank Mine

a light wooden box covered with tarred felt and arranged with a detonating device. Often, the mine was enclosed in a heavy wooden box and buried just under the surface of the ground and camouflaged with grass, earth or other material. In some cases, the mine was placed inside a trapezoidal, wooden box that was set in the top of the ground. The detonators of the mines were connected with the traps by trip wires so that the slightest jar would explode the mine.

A line of over 760 anti-tank mines was left by the enemy just southwest of Ville-en-Woevre. These mines consisted of either a 150-millimeter or 220-millimeter shell enclosed in a wooden box. The lids of the boxes were so connected with the detonating mechanism of the shells that they would be exploded when a tank or heavy object passed over it. A man's weight was not sufficient to detonate them. The planting of these mines usually followed the contours and extended more than 1 1/2 kilometers on either side of the road. They had all been carefully camouflaged.

In most instances, the mines were set with top flush with the ground surface and camouflaged with grass, brush or a light covering of earth typical of the immediate area.

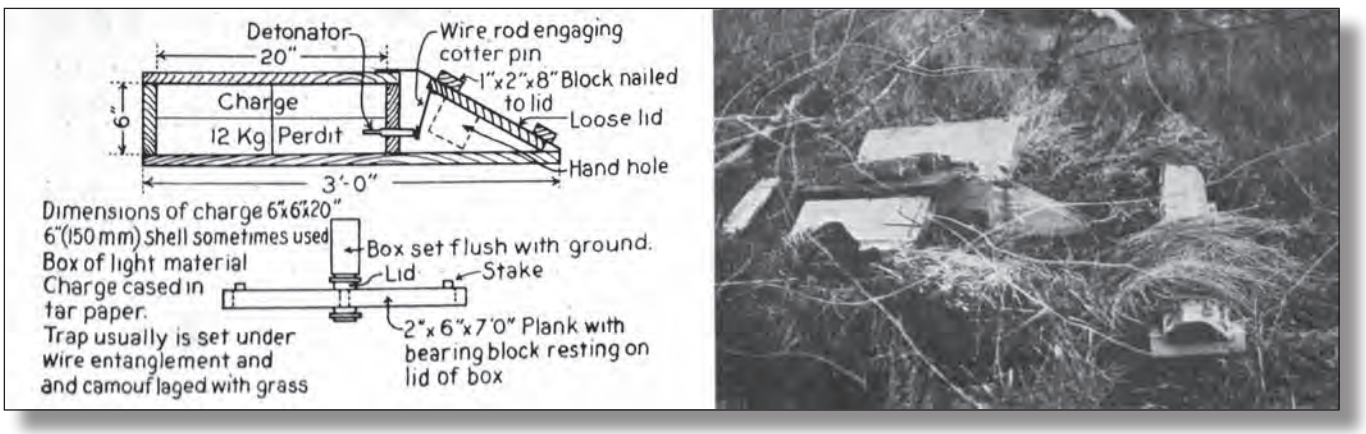
The detonators were sprung by the exertion of pressure on the lids of the containing cases. In some places, a very light or delicate pressure was sufficient, yet in others, the mechanism was such that material pressure was required to obtain detonation.

Usually, in the case of the 155-millimeter mines, about two feet of instantaneous fuse connecting the detonators, which were spring by pressure on the supporting blocks, were used.

In the case of the 250-millimeter shells, the detonator and fuse lighter were enclosed in the shell with tip or nose up. In this type, a trip wire was attached to the cotter-pin of the fuse lighter and strung across the box so that if the lid were forced down, the cotter-pin would be jerked out, allowing the fuse lighter to explode the mine. These detonators were cemented into both sides of the shells, so it was impossible to remove them, making it necessary to destroy the whole mine.

To destroy these mines, the shells were collected in piles, after cutting the wires or fuses, and a block of T. N. T. was mud-capped against the nose of one of the shells. This was fired by cap and battery. Each group contained 10 or 12 shells, and several groups were wired up together. The detonation of one shell usually was sufficient to explode all in the group. The explosion of such a series was very violent, and splinters sometimes flew a kilometer or more, while craters of 30 feet in diameter and 12 feet deep were blown. It was necessary to protect the men by constructing temporary dugouts, or using other suitable shelter.

(Continued on page 14)



Ingenious Tripping Device for German Trap Mine

Engineer Buttons and Castle

By Captain Herbert D. Vogel, Corps of Engineers

Editor's Note: The seal of our Society...includes in its design the turreted castle which, since 1840, has been the dominating feature of the insignia of the Corps of Engineers.

Lieutenant Blodgett, newly commissioned in the Corps of Engineers, had been thoroughly enjoying himself until the young lady asked that question about his buttons. He had had a fine dinner, the orchestra was playing smoothly, and he knew that his new uniform fit him perfectly. Then came the question!

"Why," she inquired, "do you wear buttons different from those that Daddy wears?"

Now when a girl is the daughter of a General Officer and that General Officer happens to be your Division Commander, you can not very well slide out from under such a question by a flippant remark to the effect that maybe it's her Old Man who's wrong. No, this was undoubtedly a question calling for a sensible answer, and he was stumped.

Looking back upon it all he was sure that his answer had left much to be desired, and to make it worse, he had even muffed the next question as to the significance of his castle insignia. Three days later, when seeking out the truth, he blushed the color of his company guidon to recall that he had stuttered something about "that building out by the reservoir in Washington—or perhaps the library at West Point." At the time, though, he had seemed to remember that someone had once told him that one or the other of these buildings had served to furnish the original design for the insignia of his branch. It was all very vague.

As a matter of fact, the Lieutenant should not be too severely criticized for failure to know the answer to the question so unexpectedly propounded. The whole story of the insignia is obtainable only from fragmentary records and incomplete descriptive articles. The assembling of pertinent data is an almost impossible task to anyone not in the immediate vicinity of Fort Belvoir and Washington.

For Lieutenants who do not have the answer, therefore, and any others who may be interested, the following information is presented.

Historical Data

According to General Harts,[1] the gateway to the city of Verdun was taken by the Marquis des Androuins as the basis of a design which he made about 1780 for a Corps of Engineers in the young American Army. Androuin, an erstwhile resident of Verdun, and an officer of the French Army had volunteered for service in the United States during our War of the Revolution and had been given the task of organizing the Corps of Engineers.

Following the Revolutionary War, the history of the Corps of Engineers became entwined with that of the Military Academy at West Point, and the castle design was apparently forgotten until about 1807. In that year, Colonel Jonathan Williams began the construction on Governor's Island of the first casemated battery in this country as one of the defenses of New York. Whether his design was influenced by the early insignia of his Corps or not, the final structure, completed in 1810, was so like a castle in its appearance that it became known as "Castle Williams." An outstanding feature of its design was a large eagle over the center.[2] Since Colonel Williams had served as the first Superintendent of the United States Military Academy, beginning April 13, 1802, it is probable that he was attempting to perpetuate the castle insignia in his design of the battery.

Gateway to the City of Verdun

In any event, Castle Williams produced such a profound effect and brought so much credit to the Corps that when distinctive buttons were designed a few years later (probably about 1812), they were made to embody a casemated, embrasured,

Castle Williams

crenelated battery of masonry defending a waterway, with a National eagle over the center. The French word *Essayons* was apparently inserted to suggest the influence exerted upon Colonel Williams during his residence in France as an American Agent at the time of the Revolutionary War.

There is at present in the Ordnance Museum at West Point, a button from the uniform of Capt. Alden Partridge, worn in 1816. This button is, in general, identical with the present Engineer button, the only difference being that the individual elements, mainly the bastion, are of slightly different aspect. A uniform worn by Sylvanus Thayer about 1830 has similar buttons.

From 1821 to 1851, officers of Engineers wore a star and wreath as a distinctive collar device, but in 1839 a turreted castle had been adopted by General Totten as the basis of a design for a belt plate. This castle was substantially the same as we now know it and apparently similar, if not identical to the one designed by Androuin. The following is quoted from a letter from the Office of the Chief of Engineers in 1903:

Sept. 12, 1839: John Smith, military tailor, 168 Pearl St., N.Y.C., sent to Gen. Totten (Sup't. U.S.M.A.) a belt plate showing the "Castle" made according to the design furnished him by Capt. F.A. Smith. Gen. Totten replied, Sept. 17, "The work is satisfactory except the castle. I think it best now to have the castle executed in this city, possibly under my own immediate supervision to serve as a pattern." Oct. 25, 1839, the belt was returned to Mr. Smith "approved" in a letter signed "by order, F.A. Smith, Capt. and Asst. to the Chief Engineer."

In 1840, an order was issued to define items of the uniform in considerable detail. The following description is taken from this order:

Buttons—gilt, nine-tenths of an inch exterior diameter, slightly convex; a raised bright rim, one-thirtieth of an inch wide; device an eagle holding in his beak a scroll with the word "Essayons," a bastion with embrasures in the distance, surrounded by water, and a rising sun; the figures to be of dead gold upon a bright field. To be made after the design in the Engineer Office. Small buttons of the same form and device, and fifty-five hundredths of an inch exterior diameter.

The same order stipulated that engineers would wear silver castles on their epaulettes, forage caps, and belt plate. All orders and regulations prior to 1840 and later than 1813 prescribed only that engineers would wear the "button now established," no description being given of said button. In 1813, the General Order stated that engineers would wear a button of "distinctive design with motto." This substantiates the view that the small group of Engineer officers existing at that time chose their own button and that it was continued by tradition until 1840, when it was described and established in orders.

In 1851, regulations were published relative to uniforms and insignia of the Army and included in these was the following description: "Cap ornament for officers of the Corps of Engineers: A gold embroidered wreath of laurel and palm, encircling a silver turreted castle." Enlisted men wore the same castle but of gold metal.[3] The choice of silver for the officer's insignia seems to follow directly from the traditional colors of the Engineers, which were red and white. In G.O. No. 93, A.G.O., Nov. 26, 1866, the Battalion Color was designated to be of "Scarlet * * * * bearing in the center a castle with the letters 'U.S.' above and the word 'Engineers' below, in silver; fringe white, Cords and tassels to be red and white silk intermixed."[4] It is thus seen that silver castles were traditional with officers of the Corps of Engineers from at least 1851 until the promulgation of AR 600-35 in 1921, when silver metal was exchanged for brass in conformity to the rest of the Army.

A Board of Officers convened by Par. 14, S.O. 52, March 3, 1902, A.G.O. decided, relative to buttons for the uniform, that they should be: "For all officers—Circular, slightly convex, device, coat of arms of the United States. * * * * Engineers to retain their present design but conforming in all other respects to that for the Army." This order was

Officers' Button **Soldiers' Collar Ornament** **Officers' Castle**

subsequently amended as follows: "For all officers except Engineers * * * * For officers of Engineers * * * * circular, slightly convex; device, an eagle holding in his beak a scroll with the word 'Essayons,' a bastion with embrasures in the distance surrounded by water, with a rising sun. * * * * Insignia * * * * Corps of Engineers, a silver turreted castle."

Recapitulation

Piecing together the information contained in the preceding paragraphs, the following sequence of events is deduced:

1780—The Marquis des Androuins designed a castle insignia for a corps of engineers (Corps du Genie) in the Continental Army, this design being based on the gateway of the City of Verdun. A similar castle had been used as early as 1159 on the shield of the Count of Lenzberg.

1802—Jonathan Williams, an Engineer officer, became first Superintendent of West Point.

1807—Jonathan Williams began construction of the first casemated battery in this country at what is now Governor's Island.

1810—Castle Williams was completed to the great credit of Colonel Williams and his Corps.

Circa 1812—Small group of officers comprising the Corps of Engineers, began wearing a distinctive button with castle, water, rising sun, eagle and motto, all of which relate to Colonel Williams and his castle.

1813—Engineers were directed by regulations to wear a distinctive button with motto.

1839—General Totten directed design of present castle.

1840—Silver castles were ordered worn on epaulettes, forage cap, and belt plate. Distinctive buttons were described in detail for the first time.

1851—Buttons were again described, and silver castles (surrounded by laurel and palm leaves) were prescribed as cap ornaments.

1902—Buttons were again described and prescribed.

1921—Silver castles were changed to gold.

Endnotes

[1]Brig. Gen. William W. Harts, "Origin of the Engineer Insignia," *The Military Engineer*, September–October, 1930.

[2]S.A. McCarthy, "The Insignia of the Corps of Engineers," *The Military Engineer*, September–October, 1921.

[3]*Uniform and Dress of the Army of the United States*, June, 1851, Wm. A. Horstmann and Sons, Philadelphia.

[4]"History of Engineer Troops in the U.S. Army, 1775–1901," *Occasional Paper No. 37*, Engineer School, Washington Barracks, 1910.

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("Traps and Mines,"continued from page 11)

In the town of Ville-en-Woevre, the Germans had constructed a deep gallery shelter and road mine under the main street, parts of which were used as a storehouse for their immense stock of explosives, and other chambers loaded for discharge. In one room 500 kilograms of perdit were stored, and in the main chamber some 200 kilograms of the same explosive. At the entrance to the gallery, however, was a charge of 3,000 kilograms and, unquestionably, it was the intention of the Germans to blow up the crossroad before evacuating the town. It was assumed that the armistice was responsible for their change of mind. The perdit was removed from all the galleries and fired.

In addition to clearing the several areas of the deliberately placed traps and mines, the details collected and destroyed tons of "dud" shells, grenades, trench mortar ammunition, pyrotechnics, cartridges and shell.

In disposing of this material it was the custom to lay a base of grenades first, then successive tiers of shells, mortar bombs, rockets, etc., and more shells. The pile was detonated by means of a stick grenade with a time fuse cut for several minutes.

The material was placed for demolition in old dugouts or deep trenches, in order to confine or localize the effect of the explosion. Gas shells were treated by burying in deep shell holes and covering with a layer of chloride of lime and several feet of earth.

The Germans were partial to two typical positions for anti-tank defense. A gap or ravine which would be the probable course selected by the tanks in an advance was heavily mined in their anticipation. Elsewhere a road mine would be exploded, thus diverting the tanks to either side of the road, where a warm reception had been prepared for them.

About the 24th of December, the details were relieved and rejoined their respective outfits, and the work was continued by captive Germans.

The work was carried on over a period of seven weeks, and tons of explosives were destroyed or rendered harmless. Some 200 men were employed in the ultra-hazardous task, yet they met with but two minor accidents, due largely to the care, caution, judgment and experience of the officers and noncoms in charge and to the courage and skill of the enlisted personnel.

On December 26, the day after the most unique Christmas ever experienced by American troops, spent in the same desolate and shell-torn area where the last days of fighting of the Meuse-Argonne had left us, the regiment was ordered with the division back to the Souilly area, which proved to be the first step on our long journey home.

For the purposes of this feature, the article "Destruction of Enemy Traps and Mines," by J. Frank Barber, is printed as it appeared in *The Military Engineer*, Volume XVI, Issue Number 89, page 374, copyright September–October 1924, reprinted with permission of the Society of American Military Engineers (SAME).

Engineering Operations on Advanced Bases

By Colonel Albert L. Lane, Corps of Engineers

In all the theaters of operations on our far-flung battle lines, enemy forces are being driven back and new bases are being established for our front-line forces. Many problems arise in developing these bases. Some of the problems are more or less common to all advance bases, while others are peculiar to particular locations and conditions. Many different methods, some better than others, are used to solve common problems. The detailed knowledge of how particular problems have been solved in certain bases is often of great value to officials in other bases. This article, covering engineering problems encountered in some forward Southwest Pacific bases, is written in an attempt to pass on some useful information and also to encourage discussions on this vital subject

Advance Planning

The importance of advance planning for a new base cannot be stressed too highly. This planning should be started prior to actual landing operations. A skeleton staff, made up of officers from each major branch of the service, should take part in this planning. Every available means should be used to obtain as much knowledge as possible about the new base. One of the best methods of doing this is to study aerial photographs of the area by means of a stereoscope.* A large-scale planimetric map is a great aid in co-ordinating this advance planning and very useful to the tactical troops both prior to and after the landing has been made. If a suitable map is not available, a reasonably accurate map can be quickly made from aerial photographs by using the radial-line method where the map is made to the average scale of the first two photographs. (See Par. 78e, TM 5-230.) Tentative locations for airdromes, roads, wharves, telephone lines, bivouac and storage areas, hospitals, et cetera, can be spotted on this map.

The recommended scale for this map is 1:7,200 or 1 inch = 600 feet as this is the most practical scale for the general purpose use of the aerial photographs from which it is made. Distances can be readily scaled by using the 60 scale on the Engineer's scale. Having photographs taken periodically in this uniform scale makes plotting of construction progress on the map very easy and reduces materially the extensive field surveys normally used for this purpose.

Planning After Landing Has Been Made

During, and immediately after, the initial landing operations, the tactical situation predominates, and roads for supplying the combat troops should receive first consideration. With proper advance planning these roads can be located so as to fit in with the final plan for the base. As the enemy is driven back, thorough ground reconnaissance should be made as a check on the tentative advance plan for the base. Use of aerial photographs is of great assistance in this reconnaissance.

Normally, the first actual base construction will be airdromes for the Air Corps and most of the heavy construction equipment will be needed for this purpose. Our own tactical roads and former enemy roads will have to be put to maximum use as, initially, very little equipment will be available for this type of construction. However, the use of a few pieces of equipment for building permanent, well-located roads will usually pay big dividends, and often these roads can be built with less equipment than would be required to maintain the poor roads properly. Also, in early operations, the supply of all types of transportation and spare parts for repair are always at a premium, so damage to this equipment due to poor roads should be reduced to a minimum. *Provision for proper drainage is of major importance. Plans for this drainage should be made before construction starts and should be continually kept in mind throughout the life of the base.* Sufficient, competent staff inspectors should be in the field contantly, at night as well as during the daytime, to supervise construction. It is desirable that the primary features which should be covered in such inspections be well defined, in order to insure that consideration be given, by the appropriate technical staffs, to the principal factors effecting efficient prosecution of construction operations under their supervisory control. These inspectors should insure that proper construction methods are employed on these specific projects. For example, they should check such things as unbalanced effort in the use of man-power and equipment. Every effort should be made to eliminate bottlenecks. In the early stages, Engineer troops will be at a premium, so the main objective should be the efficient planning, supervision, and coordination of these units to attain the maximum of results quickly by the minimum of overall engineer effort.

Another vital problem in the early stages of any operation is the lack of ships to transport needed supplies and the lack of facilities to unload ships when they do arrive. Supplies for the tactical troops, both ground and Air Corps, generally receive first consideration. There is always a scarcity of lumber and other supplies for engineering construction. Every effort should be made to put sawmills into operation promptly in order to correct this situation. Where possible, native poles should be utilized in constructing buildings for operational offices, mess halls, and covered storage. Troops should remain quartered in tents until such time as essential construction is completed.

Details of Planning and Construction

The stereoscopic examination of aerial photographs will be found to be one of the most useful tools for planning all types of construction. There are certain fundamental principles in construction, which if followed, will lend to the efficient operation of the base. A brief description of the application of these fundamental principles to the various base construction projects are as follows:

Airdromes—The planning of airdromes is too complicated a subject to cover in this article. Adequate information on it is given in various War Department publications. However, it is desired to call attention to the great assistance that aerial photographs will give in suitable sites. Runways, parallel taxiways, and hardstands can be laid out on these photographs by stereoscopic study and the photographs can then be taken into the field and the photo location placed on the ground. A good method to use in these studies is to use pieces of transparent acetate cut to the proper size for the scale of the photograph to represent the runway, hardstanding or other features, the location of which is being studied. The best ground location for the features can be determined by shifting these transparent models on one photograph of an overlapping pair while the stereoscopic study is being made.

Roads—For the efficient operation of a base, roads, wherever possible, should be built as a series of straight tangents connected by easy curves. With the prevalent heavy volume of traffic and bad dust conditions, crooked roads slow up operations and cause many accidents. For example, the right angle turn and the bridge shown in Figure 1 were the cause of a number of accidents resulting in many injuries and one fatality. The location of this road was eventually changed as indicated, after which no more accidents occurred there. If the available photographs had been used initially in locating this road, most of these accidents and considerable unnecessary road construction would have been avoided.

Where roads are built in areas of frequent rains, it is absolutely necessary to provide a fully-crowned cross section and to have adequate drainage. Soil stabilization is especially important in road building; by its use a firm, usable road can usually be built by the proper mixture of materials found along the road right-of-way, thus saving the time and equipment which would be consumed by the hauling of road-surfacing material from distant points. An experienced, practical man who can dig a few test holes, feel the soil and then prescribe how much of each soil is to be used in building each particular stretch of the road is invaluable for this type of work. Periodic sieve analyses and laboratory tests should be made of the various types of soil on the base in order to determine what mixture of available soils will give the best results. However, usually such a wide variation in soil conditions will be found that use of such tests for each little stretch of road or airdrome will be found too time-consuming to be practical. It is far better to have a man who by feeling and looking at soil can prescribe the proper mixture to use. An experienced civilian from the Australian Public Roads Department, who was employed in an advisory capacity at several bases, proved to be invaluable for this type of work.

Wharves

Normally, the first semi-permanent docks installed at any base are D-type docks, 30 feet wide, built to serve one Liberty Ship. Comprehensive plans should be made for eventual dock expansion so that when individual Liberty Docks are connected up to form a continuous dock extra construction required to secure a straight face for the dock will be avoided. A Phase-2 dock is one whose width is expanded from 30 feet to 70 feet. A Phase-2 and -3 dock is one in which the space between approached to the Phase-2 dock are filled in so that trucks can be backed up to the back face of the dock. A Phase-2 and -3 dock can handle a third more freight with the same men and equipment than can a Phase-1 dock; hence, original wharf construction plans should provide for eventual extension to this type of dock. Figure 2, page 17 shows the work in progress on extending a Phase-1 dock to form a Phase-2 dock.

If possible one or more large transshipment warehouses should be built close to the docks so that fork lifts can transport cargo directly from the ships to the warehouses and vice versa. All large depots and storage areas should be located as close to the docks as possible. The desirability of such locations becomes especially apparent when bases begin to disband and there is a scarcity of both labor and motor transportation. This procedure consolidates the base, thus permitting available labor and transportation to be shifted quickly to points where they are most needed.

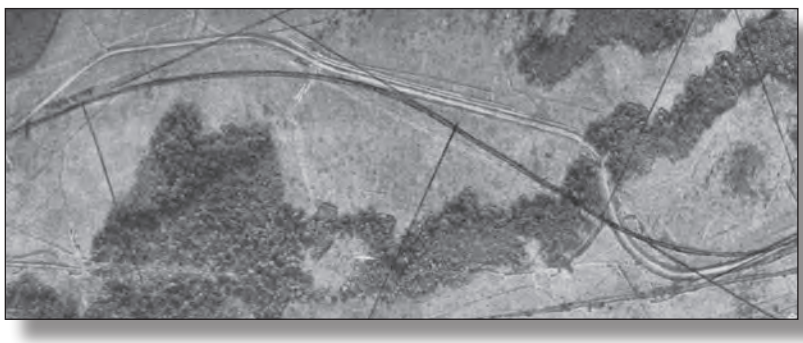

Figure 1. Relocation of Road to Eliminate Hazards

Water Supply

Experience has shown that, where possible, a central water-supply system should be built at the earliest possible date to serve the main base installations. Such systems can usually be installed quickly by using Avgas tanks and 4-inch Avgas pipeline. At some bases, a great deal of material, time, and labor has been used in providing small individual water points whose inadequacy eventually required that a central

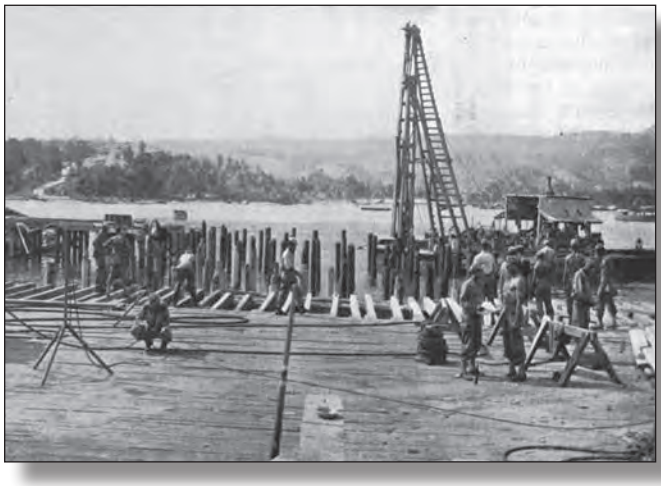

Figure 2. Extending Dock to Phase-2 Type

system be built. One of the main considerations in planning such a system is to provide water for ships at the docks. If possible, the source of water should be located so that water can be supplied by gravity rather than by means of extensive pumping operations. Pumps are generally both hard to obtain and to maintain and a sizable crew is needed to keep them in operation.

Bridges

Where tropical deluges, causing flash floods carrying much debris, are prevalent, bridges should be built with as wide span and as much clearance as possible. In one case, such a debris jam wrecked the existing bridge and changed the course of the river so that it endangered extensive base installations farther on downstream. This danger was relieved by blasting out a new channel in order to move the river back to a satisfactory location.

Most of the bridges in the Southwest Pacific Area bases have been of pile bent construction and much trouble has been caused by flash floods washing out the abutments of these bridges. The remedy for this situation has been to drive the end pile bents at points as far up the bank slopes as possible and use an extra stringer span at each end. Experience has shown that by building these bridges with a floor elevation 2 feet above the level of the roadway and using the stringer spans as ramps, traffic is slowed down and damage to bridges due to impact is materially reduced.

Covered Storage

When a base is first started some covered storage must be provided immediately as protection for perishable and critical items. Since, normally, lumber and other construction materials are not available at these early stages, the common practice has been to construct buildings 20 feet wide of native poles and to using tarpaulins for roofing (see Figure 3). It has been found that, in this type of construction, buildings 40 feet wide can be constructed almost as quickly as the 20-foot buildings and one such building gave more storage space and better protection than did two 20-foot buildings. Neither of these two types of buildings is satisfactory for efficient base operation. Where possible, storage sheds with concrete floors, so that supplies can be stacked and handled by means of fork lifts, should be constructed at the earliest possible date (see Figure 4).

Figure 4. Prefabricated Storage Shed with Concrete Floor

A good plan to secure quick temporary coverage is to use tarpaulins over individual rafters which are placed on the top of carefully piled stacks of supplies as illustrated in Figure 5, page 18.

Figure 3. Storage Sheds, 20 Feet Wide, of Native Pole Construction

Staging and Training Areas

Plans should be made to locate staging areas so that adequate training areas are easily accessible. Also, staging of units will be greatly facilitated if the areas are laid out to accommodate standard-sized units, and if housekeeping facilities, such as headquarters buildings, mess halls, water tanks, storage buildings, latrines, and shower baths are built before the unit arrives. The buildings need be only native pole frames that can be covered by the units' own tarpaulins.

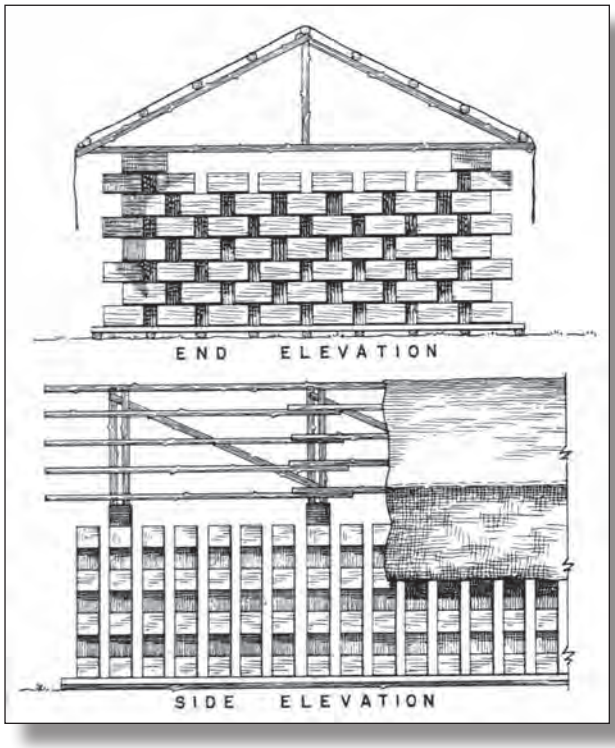

Figure 5. Improvised Cover for Stacked Supplies

Miscellaneous Base Facilities

Much improvisation is needed in order to provide the various facilities that are required for base operations. Frontispiece shows how salvaged oil drums used as a retaining wall and engineer heavy equipment were employed to prepare a foundation for a concrete loading dock to be used by the Quartermaster for distributing Class 1 supplies. Figure 6 shows the construction for the water supply of a WAC camp. A clamshell bucket was first used to dig a large hole for the well, later to lower a strongly built lined framework into this hole and, finally, to backfill the loose sand around this frame. This was a much quicker operation than the normal method of sinking a shaft. Note the native poles used as columns for the water tower structure. A church was also built by using native poles and a canvas tarpaulin for a roof.

Figure 6. Water-Supply System for a WAC Camp

A base carpenter shop equipped with power, cross-cut, and rip saws and other labor-saving devices is an essential base facility. It can be used day and night for making furniture, packing crates, boards for signs, mess tables, benches for theaters and churches, and framing for all types of portable buildings, et cetera. A sign-painting shop, electrical equipment-repair shop, and a combined water-supply and plumbing shop are also essential.

This whole discussion has been based on the situation where our air power has been so superior to that of the enemy that danger from enemy bombing has been very slight. Where danger from bombing is great, provisions will, of course, have to be made for dispersal of activities and utilization of natural cover for camouflage wherever possible.

Conclusion

The Engineering considerations needed to insure the success of forward base operations are:

1. Careful advance planning.

2. Thorough knowledge of terrain secured by personal reconnaissance and by stereoscopic study of aerial photographs.

3. Properly located and constructed base facilities such as airdromes, roads, wharves, bridges, water-supply installations, storage facilities, staging areas, et cetera.

4. A comprehensive, continually followed up plan for drainage.

5. An adequate and qualified engineer supervisory staff making day and night inspections of essential construction and maintenance work.

6. Knowledge of the overall needs of all branches of the Service, and continuous contact with these Services, to understand and plan in advance to meet changing situations.

7. Consolidation of base facilities so as to have economy of time, space, and effort. This is especially important in the closing up stages of a base when there is a scarcity of labor including prisoners, natives, and casual labor so that the withdrawal of engineer troops to new forward bases will not disrupt operations.

*See "Use of Aerial Photographs," by Colonel Albert L. Lane, in *The Military Engineer*, July, 1943.

For the purposes of this feature, the article "Engineering Operations on Advanced Bases," by Colonel Albert Lane, is printed as it appeared in *The Military Engineer*, Volume XXXVII, Issue Number 238, page 299, copyright August 1945, reprinted with permission of the Society of American Military Engineers (SAME).

The Engineer School

By First Lieutenant Thomas A. Pedersen, Corps of Engineers

Nestled on the peaceful banks of the Potomac River in the verdant countryside of old Virginia, on the historic Fairfax estate of 18th Century fame, is situated the world-famous Engineer School, the seat of learning for the Corps of Engineers. Recent investigation has disclosed this to be the oldest Service school in the army, whose roots extend through the pages of history for over 150 years. West Point, New York, Willetts Point, New York, and Washington Barracks, D.C., were former homes of the school.*

From a humble beginning on the Hudson to its present establishment on the Potomac, and throughout each succeeding war, the Engineer School was to demonstrate the wisdom of its founders and the excellence of its teaching. The Civil War proved for the first time the vital significance of the Corps of Engineers and it is not surprising that many of the famous generals of that war, including Meade and Robert E. Lee, were Engineer officers. It was in the Virginian campaign that the federal Engineers, on the night of June 14, 1864, built the longest ponton bridge in history, over 2,000 feet, across the James River. By midnight, June 15, Grant's entire army with all its artillery had crossed the river. The Rhine crossing was still 80 years away. It was near the James River crossing that hundreds of engineer officers, students at the Engineer School, received their instruction in modern river crossing operations in preparation for the hardest school of applications—actual warfare.

But it took World War II to convince the world that modern war is an engineer's war. The miracles performed on every beachhead, river, harbor, and airfield throughout the globe, are tributes to the glorious tradition of the Corps of Engineers. It was not a mere coincidence that the atom bomb project was entrusted to these same Engineers. Since the war began, over 23,000 Engineer officers were taught modern military engineering at the Engineer Officer Candidate School; over 20,000 Engineer officers were given additional training in specialized military subjects; and over 22,000 enlisted specialists were trained in its modern shops and classrooms. Among the many subjects taught are included mines and booby traps; bridges; camouflage; water purification and supply; airdrome construction; roads; demolitions; map reproduction; surveying; photography; and Engineer heavy equipment, including bulldozers, graders, scrapers, shovels, and pile drivers. The battle importance of the subjects taught and the high standard of instruction have attracted Engineer officers and enlisted men from over thirty allied nations to come and study or visit at the school.

The teachings at the school include only proven doctrine: lessons learned and tested in battle. Intelligence reports from all the theaters are received, studied, and evaluated for their military significance. These reports are supplemented by first-hand reports of overseas observers who are constantly on the alert for new ideas, techniques, and enemy material. The cream of this sifting process is incorporated at once into the instruction at the Engineer School and published in the many engineer manuals which are prepared and written by its Research and Training Publications Department. These manuals are written and edited by a skilled staff of professional writers with literary and editorial experience, and are illustrated by a group of artists many of whom were nationally known in civilian life. These publications are then printed and bound by the school's $350,000 reproduction

Abbot Hall, Headquarters Building, The Engineer School

Engineers Breaching Barbed Wire Entanglements with Bangalore Torpedo

Converging Tracer Ammunition Demonstration on the Bayliss Combat Range

plant operated by an expert staff of experienced technicians. This is one of the finest plants of its kind in the nation and is capable of turning out all varieties of printing, lithography, and photography.

As described briefly by Lt. Gen. Raymond A. Wheeler, the present Chief of Engineers, in his article in this issue, many Engineer officers held high commands during World War II.

But now the Engineer School turns to peacetime instruction and training. And in the quiet countryside of Virginia, on land bombarded by British war ships in the War of 1812, and where Lee once established his headquarters in the Civil War, the Engineer School begins a new chapter in its illustrious history.

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*See *What You Should Know About the Army Engineers*, by Lt. Col. (now Brig. Gen.) Paul W. Thompson.

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Training the Effective Sapper

By Major William L. Jones

Effective countermine training is almost universally accepted as being in about the same state as it has been over the past 40 years—unsatisfactory. This has created the MICMIS Study which has generated the need for a sapper military occupational specialty (MOS).

The design of a program of instruction supporting an MOS is normally done through a process called systems engineering. This involves three basic steps prior to developing the actual lessons. First, the job itself is examined, and a list of tasks is prepared that shows everything the specialist must be able to do. Second, these tasks are examined to determine where they can best be learned—service school, unit, or on-the-job training (OJT). Third, the tasks selected for training are each broken down further into knowledges that are then taught or trained as parts of specific lessons.

In evaluating a program to train an effective sapper, one task—that of finding a mine or booby trap—cannot be analyzed by listing knowledges, because such a list will not enable the graduate to consistently find the mine or booby trap. When this is the case, the task has not been trained. An easy path is to regulate the task to OJT, but now—as in the past—the price in combat is too high, and the problem is not solved. The program of instruction under development must therefore, of necessity, include—along with the remaining conventional MOS tasks—the task of finding mines. This article concerns itself with the training of the unique task of "finding mines and booby traps."

Extensive attempts in recent years have been made to determine and analyze the human characteristics or traits which make up the outstanding patrol point men. Whatever enables them to find mines and booby traps better than others has not yet been isolated. Some individuals just excel in this skill more than others. The experts who have been interviewed and tested learned their skills by experiencing real live situations. Their skills were trained and sharpened to a fine edge through individual adaptation—much the same as a child's reflexes are automatically adapted to his environment. These specialists are not constant with each other when they explain why they are more skillful than their contemporaries.

Education of an individual takes many forms other than that normally found in the classroom. Reports by some of

"Sapper training will be complex and physically demanding and will require a high efficiency level with detailed accuracy under conditions of stress."

our most noted educators document that both humans and animals rapidly learn tasks on their own simply by being put in a situation where they desire to do the task successfully and the means to do it are available. For a simplified illustration let us put a mouse at location X and food at location Y.

On the first trial the mouse takes 1 1/2 hours to find the food with obvious difficulty. Subsequent attempts shorten until the mouse learns this maze and gets the food within a few seconds. The mouse is next placed in a new maze. Does he completely start over? No. The mouse has learned to learn. Experience is transferred and both his initial trial time and his total learning of the new maze are appreciably shortened. Now, if this trained mouse could talk could he really explain why he is faster now? Does he himself really know all the cues he acts upon when he moves through the maze? This principle of the mind's automatically learning to adopt a new environment also works with humans, and although the cues providing stimulus are not always identified, learning still takes place.

This theory is currently widely used during military field training, but success is dependent on rigid adherence to the following two factors—

- The student motivation must be very strong, causing either a fervent desire to be successful or an equal1y strong fear of failure. The motivation should parallel, as much as possible, that of the combat environment for which it is being prepared.
- The learning or training environment must be as close as possible to the real environment. This is difficult, since conditions such as fear, fatigue, and time require very careful analysis and preparation and are essential if valid skill transfer is to take place. A seemingly minor compromise can sometimes destroy the environment sufficiently so that effective learning transfer does not occur. The student learns to train but does not learn to accomplish the task. These principles can now be applied to the countermine task of "Find an Enemy Mine or Booby Trap."

Motivating men is a leadership problem that is always present in training, both in units and at service schools. Most men attempt to do well, but need some inducement to sustain themselves if the environment becomes tough. Sapper training will be complex and physically demanding and will require a high efficiency level with detailed accuracy under conditions of stress. The student must work hard to pass the instruction program and then be motivated sufficiently to maintain his skills and knowledge beyond graduation. One proposal is to authorize hazardous duty (demolition) pay for sapper training—and continuously for sapper graduates who can maintain proficiency, regardless of their current assignment. Controlled testing with very high minimum standards would be required quarterly or semiannually to include new information learned by individuals through self-study programs that each sapper needs to continue. These rigid standards, if maintained, will generate an espirit that will sustain the sapper corps—the hazardous duty pay will compensate for the real explosive hazards in this specialty plus offer the needed intense training motivation by providing a very real and tangible loss that will result from failure. I know of no other motivation that will provide the needed desire during and after the course that will generate the needed performance quality.

From the training viewpoint the best environment would be a real one—real mines employed by and against a real enemy using real weapons and ammunition. To save injuries, compromises have to be made, but each compromise must be seriously considered for necessity and for proper compensations. For example, when eliminating the mine itself, a training aid must be substituted that looks, feels, and functions the same. The mine is replaced with a duplicate that does everything except injure men. This single substitution is serious. From the motivation point of view, fear of failure, needless to say, is drastically reduced. Given the fervent desire to pass the course as outlined in the paragraph above, this compromise can be partly compensated by failing a student and dropping him from the program the fifth time he unsafely detonates a device, regardless of the circumstances. This automatic negative motivator parallels closely the concern real mines cause. In theory, the first accident should be grounds for failure, but the loss of potentially good sappers would be too high. In combat, men are hot, tired, and impatient. In training, hard physical requirements, long hours, tight schedules, and a strict cadre can reconstruct many of these hazardous distractors. A third environment pitfall is that individual consistency in the work of the mine layer trains the countermine student in those specific consistencies. By having two or more teams of students—who do not meet—work against each other, each will develop and employ improvisations, based on their analysis of other teams designed to deliberately deceive. This adds the challenges and diversity that are needed.

A side benefit is the discussion within an installing team analyzing if and how a system being employed could be

countered. Thus it can be concluded that, to learn the task of finding a booby trap, it must be learned in the most dynamic, realistic fashion possible. The course must be structured around a 24-hour day and be physically and mentally demanding.

In developing a sapper course using the above ideas, the problem of managing and controlling the students arises. To maintain realism, the missions must be exceptionally clear with the instructors relegated to quietly grading leadership, evaluating mine and countermine techniques, and declaring casualties.

The missions will initially involve simple tasks but ultimately evolve to large-area problems with many alternative solutions. The support requirements can be kept to a minimum, since most preparation is done by two or more squad-sized student units continuously working against each other. Techniques will grow in sophistication as time passes.

A key reminder should be emphasized at this point. Devices used for training must be installed and removed prior to real equipment failing; in this, the installing squad will miss the major portion of the training potential. An example of one exercise toward the end of the course might be—

- SQUAD #1: Move from A to B (distance of six miles) between 0600 and 0830 tomorrow. Booby traps are very likely to be about. This squad has the alternative of picking several routes, using trails or not.
- SQUAD #2: This squad must outwit Squad #1. Keep in mind that the squad roles will soon be reversed. By designating squads or patrols as the basic school training units, graduates will live many examples of dynamic training and, as a result, will be able to take a wealth of training ideas to their future assignments.

The sapper program has the potential opportunity to develop a viable countermine plan. If all the aforementioned constraints and conditions are met, the Army's new sapper will have pride in his ability and sufficient confidence in his subject—so that he will become its advocate and inspire confidence wherever he goes.

Major Jones, currently the chief of the Demolition/Mine Warfare Division, Department of Applied Engineering, U.S. Army Engineer School, Fort Belvoir, Virginia, is a graduate of Norwich University and the University of Missouri at Rolla. He served as a combat engineer company commander in both the 12th Engineer Battalion, 8th Infantry Division, in Germany and with the 27th Engineer Battalion in the Republic of Vietnam between 1964 and 1967. He also later served as the Battalion Executive Officer, 8th Engineer Battalion, lst Cavalry Division, in Vietnam from 1970 to 1971.

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SAPPER COURSE CONCEPT

The course will be approximately 7 to 9 weeks in duration, rigorous both mentally and physically in its demands on the student. Input requirements and graduation/qualification standards will be very high since the graduate will be considered an expert in theory and practical application of combat demolition techniques, all phases of mine/countermine warfare, and to instruct troops of all arms in appropriate phases of demolitions and mine/countermine warfare. The first two weeks of the course will consist of demo/mine/countermine obstacle planning and design, methods of instruction and physical acclimation with emphasis on the student learning to teach his peers appropriate subject matter. The last weeks will be conducted in the dynamic training mode, and will concentrate on detailed use of all demo/mine/countermine hardware (including foreign materials) and intensive physical development. Throughout the course, the role of instructor will phase from that of the traditional instructor to that of monitor/supervisor; the last 1 1/2 to 2 weeks of the course will be administered by students under instructor supervision. The use of live explosive/mines in practical exercises will also progress during the course. All students will employ and handle all available U.S. explosives/mines and representative items from foreign nations. Maximum emphasis will continually be placed on stress situations, developing high skill/confidence levels, and producing a professional instructor expert. The major portion of this program of instruction will not be time structured to a 40-hour week but be continuous field training 12 hours per day, 6 days per week. Graduation will be a challenge requiring high motivation and aptitudes.

Selling Engineer Capability to the Maneuver Commander

By Major V. Paul Baerman

The maneuver commander on today's battlefield has a vast quantity of combat power at his call. In addition to the correct employment of his direct and indirect fire weaponry, he can effectively increase his combat power with a variety of combat multipliers, such as smoke and electronic warfare.

One of the most useful combat multipliers is terrain reinforcement, done either by the maneuver unit alone or, most profitably, in conjunction with supporting engineers. However, its usefulness is directly proportional to the maneuver unit's ability to understand and apply terrain reinforcement measures. While it is incumbent on the maneuver commander to understand terrain reinforcement and its contribution to combat power, it is also the engineer's job to increase awareness of terrain reinforcement operations.

Terrain reinforcement (TR) operations are simply those measures that degrade enemy mobility and improve friendly survivability. To be effective, those operations require a fully developed coordination/partnership role between engineer and maneuver unit. Obviously, the maneuver commander must perform terrain analysis to have a good knowledge of the ground on which he will be operating.

Claymore mine being set on live-fire range at Fort Carson

There are a number of techniques which engineers can use to demonstrate the value of TR operations to maneuver commanders. This article examines those techniques from the viewpoint of a maneuver arms officer, with the goal of contributing to his awareness of TR operations.

Probably the most important step to keeping maneuver units in tune with TR operations is the establishment of a firm unit-to-unit relationship. Obstacles to the formation of such a relationship are many, but it is essential that these obstacles be overcome. The maneuver unit only appreciates other members of the combined arms team to the extent that those members are known and available. Ways to foster the unit relationship include the mutual exchange and review of training schedules, field training exercises, and classroom instruction. If a maneuver brigade habitually receives the training schedules of each company of the engineer battalion, then the company commanders within the engineer battalion should also have access to the brigade's training schedules. Each engineer company commander's platoons should also receive the training schedules of the battalion which it habitually supports. The engineer platoon leader should review the schedule to determine if he can offer assistance with that battalion's training. After a period of time, the battalion should be aware that an engineer is part of the team, willing to assist.

Likewise, the engineer would be smart to send his company training schedule to the brigade operations staff officer (S-3) if there is training being conducted in which units of brigade could participate. To promote the unit-to-unit relationship, the engineer has to "sell" himself and his product. Regular, personal visits by engineer platoon leaders and company commanders also go far in promoting their "product" and improving training schedule interaction.

Maneuver unit exercises should include engineer support or expertise. Of course, the field training exercise (FTX) is the most obvious example, but there are numerous other opportunities for engineer support or expertise—command post exercises (CPXs), war games/simulations, sand tables, training exercises without troops (TEWTS), terrain walks, and so on. TEWTS and terrain walks offer particularly good opportunities for the engineer to assist and foster knowledge of engineer capabilities.

TEWTS are generally low-key exercises that offer ample time for interchange of ideas, impromptu classes, and understanding of each other's jobs. At some time during these activities, the engineer should be explicit in pointing out where he *cannot* help and where the maneuver commander must help himself. Engineer expertise does not necessarily mean officer presence.

In many cases, lower-ranking, knowledgeable engineers might prove more worthwhile—for example, a D-7 operator talking to a maneuver platoon leader. In particular, the engineer should stress those items which he considers in an engineer reconnaissance.

Officer and NCO classes also present opportunities to promote unit relationships. Again, it is a matter of the engineer forcefully "selling" himself and his product. There is enough change in engineer doctrine, when coupled with maneuver doctrine changes, to accommodate numerous engineer presentations to unit officers and NCOs in a classroom environment.

Destroying a mine in place with C-4

An additional opportunity for promoting unit relationships occurs when the brigade engineer and his subordinates participate in unit social functions.

But there is probably no better place to establish the capabilities of TR than during training. Here, the engineer can offer his expertise to train individuals, or he can offer training tips to the maneuver unit commander.

Many basic TR tasks are included in maneuver unit Soldiers' Manuals and Skill Qualification Tests. A unit can save valuable time by "packaging" hands-on training in kit form. One kit might come in a footlocker-size container and deal exclusively with the unit's authorized mines. The kit would include all the mock-up mines (from TASC), any graphic training aids (to be handed out to the troops), plus laminated cards on which instructions for emplacement and retrieval of each type of mine are included.

Kits can be used at small unit level during slack time (such as in the motor pool), for regular training periods, as concurrent training, or for inclusion in inclement weather schedules. Because kits are prepackaged, they can be used quickly and with little advance preparation. Other similarly designed kits could cover such subjects as troop-emplaced obstacles (such as fougasse), demolitions, and booby traps.

Range training should be conducted with an eye to maximizing the potential of the range. By coordinating with the appropriate range authorities, units can conduct interesting, realistic TR training while on another type of range.

How many times have you seen troops bored to death with concurrent training, such as weapons assembly and disassembly, while waiting to fire or awaiting transportation? Spice up their life a bit—let them fire a claymore, or prepare and set off a demolitions charge, or build a flame mine. It's guaranteed to keep their interest and avoid training doldrums. The engineer can provide the expertise to start this training and, at the same time, to get across the importance of TR operations.

There are a number of easy ways, while in the field, to increase the maneuver commander's awareness of the use of obstacles and the effectiveness of terrain reinforcement. Many of these ideas use soldier ingenuity and promote the kind of thinking that will help overcome the odds we might be faced with on the European battlefield.

Bangalore torpedo set to fire

Here are some examples:

- Since mines are difficult to portray in the field (unless you use TASC mock-ups which must be accounted for and cost money), take scrap 2x4 lumber and cut it into 6-inch lengths. Paint the resulting blocks blue, and stencil the word "MINE" on top and bottom. Several hundred of these can be made up and issued for field training. If some are lost, it doesn't really matter. Scattered throughout an avenue of approach, these dummy mines force an attacker to perform some sort of mine-clearing action. To make the situation more interesting, bury a tear gas grenade (with pin pulled) in the ground and put a block on top of the grenade spoon. Anyone who comes along and kicks or lifts the dummy mine will set off the tear gas. This is called mine awareness and causes the attacker to slow down and be more careful when he encounters "blocks" the next time.
- Counter-strike (CS)/smoke grenades with pins pulled and buried in a road obstacle will definitely slow the combat engineer vehicle (CEV)/tank dozer crew that pushes down the obstacle and sets off the grenades. The crew will also be more careful at the next obstacle.
- CS powder and/or pellets can be used to increase the value of less substantial obstacles by creating confusion or more difficult working conditions. How do you disseminate the CS? Tie or tape a baggie, with CS powder or pellets inside, to every smoke grenade or smoke pot. No matter what color smoke, one whiff of the burning CS and masking procedures will slow everybody and make them more wary.
- TR operations also include survivability of the friendly force. Survivability not only includes digging in personnel and equipment, but deceptive measures to increase the lifespan or usefulness of fortifications. The tube-launched, optically tracked, wire command-link guided (TOW) and Dragon are crucial antitank weapons that must be protected. If you've had that maneuver unit out with their claymores, suggest splicing several strands of used claymore wire together and wire a TOW M-80 blast simulator to the ends of the claymore wire, setting the entire device off with the claymore "clacker." Voila! They've duplicated the signature of the antitank missile firing without giving away their position.

Such actions will increase the value of obstacles and, more important, increase the maneuver unit's interest in TR planning. "Tricks of the trade" of this sort allowed an armored cavalry platoon scout section, ably supported by engineers, to bottle up a mechanized infantry battalion for more than four hours in one recent exercise. And the scouts and engineers thoroughly enjoyed themselves!

These are just a few of the methods by which engineers can better sell their product to maneuver commanders and make the combined arms team more effective. The more aware that the maneuver commander is of his engineer assets and their capabilities, the better off he and his engineer partner and their soldiers will be.

Major Baerman is an armor officer who wrote this article while attending the Command and General Staff College. Previous assignments have included command of a tank company and armored cavalry troop and assignments as a battalion, brigade, and squadron S-3.

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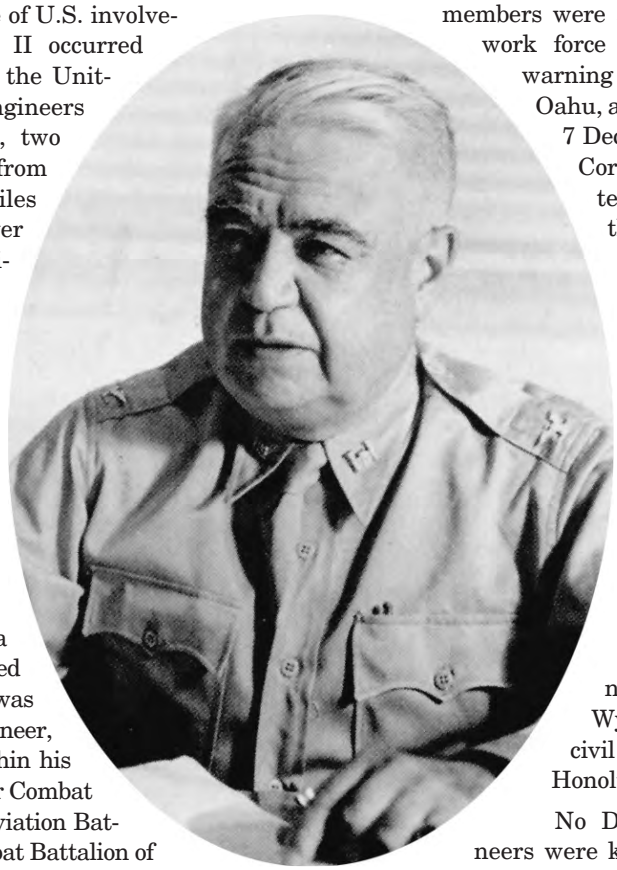
Army Engineers at Pearl Harbor

By the Office of History, Headquarters, United States Army Corps of Engineers

When the opening scene of U.S. involvement in World War II occurred on 7 December 1941, the United States Army Corps of Engineers (USACE) was there. At 0755, two waves of Japanese warplanes from a naval task force about 250 miles north of Hawaii appeared over Oahu. Some headed for American warships at Pearl Harbor and the planes on the ground at nearby Hickam Field; others hit Schofield Barracks, Wheeler Field, and Bellows Field. USACE in Hawaii consisted of Soldier-engineers in the Army's Hawaiian Department and the Honolulu Engineer District, then part of the South Pacific Division.



Native Hawaiian Colonel Albert K.B. Lyman, the Army's Hawaiian Department engineer during the attack on Pearl Harbor, commanded the 34th Engineer Combat Regiment, the 804th Engineer Aviation Battalion, and the 3d Engineer Combat Battalion of the 25th Infantry Division. U.S. Army photo

Colonel Albert K.B. Lyman, a native Hawaiian who later attained the rank of brigadier general, was the Hawaiian Department engineer, with offices at Fort Shafter. Within his command were the 34th Engineer Combat Regiment, the 804th Engineer Aviation Battalion, and the 3d Engineer Combat Battalion of the 25th Infantry Division. All of Lyman's engineers were at Schofield Barracks. These military engineers were enlarging and modernizing facilities at Fort Shafter and Schofield Barracks, building antiaircraft gun sites, and bombproofing coastal fortifications. A portion of the 804th Engineer Aviation Battalion was building U-shaped dirt bunkers for aircraft dispersal at Wheeler Field.

On the civil side, Lieutenant Colonel Theodore Wyman, the Honolulu District Engineer, had offices employing 10 officers and 400 civilians at the Alexander Young Building in Honolulu. Fourteen field area offices had 3 officers and 200 civilians. There had been a rapid increase in defense projects after France fell in 1940, so many District team members were at work that morning. Wyman's work force was building stationary early-warning radar sites on Kauai, Maui, and Oahu, although none were operational on 7 December. The transfer of Army Air Corps construction from the Quartermaster's Department to USACE that was authorized in November 1940 also increased Wyman's responsibilities. His District took over enlarging eight airfields and building two new ones and began work on a gasoline and bomb storage site at Hickam Field. In October, Wyman began his most important project—building an air ferry route across the South Pacific to Australia. By December, airfields were being built on Christmas and Canton Islands, in Fiji, and on New Caledonia. In addition to defense work, Wyman remained responsible for civil works projects, such as dredging Honolulu Harbor.

No District team members or engineers were killed when the Japanese struck without warning, but there were close calls. The area engineer in charge of construction at Bellows Field watched with horror as Japanese planes strafed the field, destroying most of the P-40 Warhawk fighter planes. He directed dispersal of his equipment and, because of his efforts, none was lost.

One lieutenant who had been reassigned to the mainland—and who had recently turned over Alpha Company, 3d Engineer Combat Battalion, to his successor—was at Schofield Barracks that morning, preparing to leave the next day. One of the first bomb blasts blew out a window of his house, and he ran to get his pistol to shoot at the low-flying planes, forgetting he had already turned in his

The 804th Aviation Engineer Battalion cleaned up the wreckage caused by the Japanese bombing of Wheeler Field when Pearl Harbor was attacked on 7 December 1941. U.S. Army photo.

weapon. He hurried to Schofield Barracks, where the battalion commander gave him back Alpha Company. He found his men in the street, shooting at attacking planes, and told the supply sergeant to give weapons to anyone who asked for them and to tell them to shoot at the Japanese planes. Later, the lieutenant almost had to pay for the weapons, because in the haste to go to war, no one had asked for—or given out—receipts!

That afternoon, the 804th Engineer Aviation Battalion began salvage operations at Wheeler Field. The 3d Engineer Combat Battalion moved with the 24th Infantry Division to the north shore to defend against the expected Japanese invasion, which never came. As eventful as 7 December 1941 was, it was but the first of many days of war for the engineers in Hawaii. The Honolulu District completed the ferry route in January 1942 and built more airfields and port and base facilities for the war. All the Hawaiian Department engineer units served in the war. The 34th Engineer Combat Regiment served in the Central Pacific and landed on Kwajalein. The 804th Engineer Combat Battalion, also in the Central Pacific, saw action at Saipan. The 3d Engineer Combat Battalion and 64th Engineer Topographic Battalion went to the Southwest Pacific and fought and built their way through the Solomon, New Guinea, and the Philippine Islands.[1]

USACE Honolulu District editor's note:

Brigadier General Albert Kualii Brickwood Lyman (5 May 1885–13 August 1942) was born in Paauhau, Hamakua Coast, Hawaii, and was the first ethnic Hawaiian to attain the rank of general or admiral in the United States Armed Forces—achieved during World War II. He attended schools in Hilo and the Kamehameha and Punahou Schools in Honolulu and graduated from the United States Military Academy at West Point, New York. From a family of 15 siblings, he was the grandson of David Belden Lyman—a Christian missionary from New England who settled in the Hilo, Hawaii area—and the descendent of Kualii, high chief of Oahu. His nephew, Richard Lyman Jr., was a trustee of the Bishop Estate in Honolulu, Hawaii. The Lyman House Memorial Museum in Hilo, the repository of the history of the Lyman family, is open to the public.

Brigadier General Lyman graduated from West Point with honors, number 15 in his class of 103. During his 33 years in the United States Army, he had 25 assignments in 12 states and four overseas posts (Panama, France, Cuba, and the Philippines). Having served in 1913 at Schofield Barracks in Oahu, Hawaii, as a junior officer, he was assigned there in May 1940, where as a full colonel he was commanding officer of the 3d Engineer Combat Battalion. He was also responsible for construction projects, thereby performing virtually two full-time jobs. He was promoted to brigadier general on 11 August 1942. Two days later, he became ill at the home of his brother-in-law and died before medical help could reach him.

Among the numerous awards he received, Brigadier General Lyman was awarded the Distinguished Service Medal posthumously for his service from July 1940 to

August 1942 for completion of "construction of defense projects before the anticipated completion dates." On 19 April 1943, the Hawaii state legislature declared that the main passenger terminal of the Hilo International Airport be called the General Lyman Terminal. The military schools he attended were the United States Army Engineer School and the Army Industrial College.

Brigadier General Charles R.B. Lyman (20 August 1888–15 April 1981), Albert's brother, was the second Asian-Hawaiian-Pacific Islander American (AHPIA) to be accorded the rank of general or admiral. He graduated from West Point on 12 June 1913. During his 36 years in the Army, Charles had assignments in nine states and three overseas posts—Australia, New Guinea, and the Philippines. His duty was almost wholly with the infantry. In July 1941, shortly after Japan attacked Pearl Harbor, Charles, a full colonel, was appointed military governor of Maui, Lanai, and Molokai. After 11 months in that position, he was deployed to Australia as assistant division commander of the 32d Infantry Division. He was in the first group of troops that attacked Tanah Merah Bay, Dutch New Guinea, and he personally directed the front line units that seized Hollandia.

Charles Lyman was promoted to brigadier general in 1944 and served as commanding general of the 32d Infantry Division, which in June 1945 was deployed in Luzon and subsequently in the Leyte Campaigns, Philippines. The war ended at this point, and Charles participated in the signing of the peace treaty in Baguio, Philippines. His decorations included the Combat Infantryman's Badge; Silver Star for gallantry in leading his troops in the Dutch New Guinea invasion; the Legion of Merit with oak leaf cluster; the Bronze Star with oak leaf cluster; and four campaign ribbons.[2]

Endnotes

[1]Portions of this article appeared in slightly different form at USACE Headquarters Historical Vignettes, Vignette 002, "The Engineers Fought and Lived Through Day of Infamy," 2000, *<http://www.usace.army.mil/History/hv/Pages/002-Pearl%20Harbor.aspx>*, accessed 28 January 2011.

[2]Japanese American Veterans Association news release, "The Lyman Brothers of Hawaii, Both West Point Graduates, are the First Asian Hawaiian Pacific Island Americans to Gain General's Rank," Vol. II, No. 51, 7 January 2008, *<http://www.javadc.org/Press%20release%2001-07-08%20Lymn%20Brothers%20of%20Hawaii%20Are%20First%20Asian%20Hawaiian%20Pacific%20Island%20Americans%20to%20Gain%20General's%20Rank.htm>*, accessed 28 January 2011; and *<http://www.asianweek.com/2008/01/22/lyman-brothers-first-asian-americans-to-gain-general%E2%80%99s-rank/>*, accessed 28 January 2011.

THE ENGINEER WRITER'S GUIDE

Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted Soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

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

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

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USACE DISTRICT COMMANDERS

By Lieutenant Colonel Laurence M. Farrell and Ms. Julie E. Melow

As Lieutenant Colonel Smith sipped his morning coffee and prepared for classes at the United States Army War College, he suddenly felt a variety of emotions. Checking the United States Army Human Resources Command website, he saw his name as a command selectee on the Strategic Support list. "Strategic Support" meant command in the United States Army Corps of Engineers (USACE), and although he had extensive service in tactical and nontactical positions, he had never served there. He knew little about USACE, but in a few months he would take command and lead a billion-dollar organization of almost 1,000 civilians, focusing on construction projects in several states. His thought was, "How can I lead an organization I know so little about?"

Given the current force structure and operational assignments, many officers' first assignment in USACE occurs at the commander or deputy commander level. Currently, USACE has 45 districts, each with commander and deputy commander positions. Nine districts are commanded by a lieutenant colonel and 36 are commanded by a colonel. In addition, there are nine USACE divisions commanded by a general officer, each with a colonel deputy commanding general position. This force structure yields a demand of 99 officers, mostly at the lieutenant colonel and colonel grades. Many officers successfully complete battalion command and then are selected for a colonel-level command slot in a USACE district, or successfully complete an assignment as an operations and training or executive officer and then are sent to a USACE district as a senior major or junior lieutenant colonel.

Training Plan Needed

Serving successfully as the commander or deputy commander with no prior experience in the USACE organization is a challenging and arduous experience. This is true for any organization. To be successful under these conditions requires a dedicated training plan that reinforces the USACE Campaign Plan to develop and retain a highly skilled workforce. The purpose of this article is to provide a certification recommendation and self-development training plan that can be tailored to a specific district and implemented with few resources and minimal time and provide the new

Construction on this California project, the San Ramon Recycled Water Pipeline and Pump Station, required solid understanding of construction scheduling to accommodate the city's changing traffic requirements.

commander increased credibility and skills within the first six months of command. This recommendation includes project management certification and a way of quickly ascertaining which courses hold the most benefit to the commander and attending those courses as soon as possible. This allows USACE, the Army, and the individual to achieve the most successful command.

Ironically, many officers discount the technical component of district command in USACE, one of the Army's most technical organizations. Many new commanders say their assignment is to "provide leadership and organizational management." Though this statement is accurate, it does not negate the technical requirements of district command. For example, would an artillery officer at the battalion or brigade level ever tell the maneuver commander that the technical requirements of field artillery were not part of his duty description? Of course not. A successful field artillery battalion commander must have a basic knowledge of field artillery. The same principle is also true for a USACE command. District commanders must understand certain technical components within their respective districts and this is why, even at the battalion and brigade levels, commanders are chosen by branch. The Army fully realizes that even at the colonel level, technical competency matters.

The Army also understands that as officers rise in grade to general officer level, the technical requirements at each position decrease. This is why general officers do not wear branch insignia on the Army service uniform and are assigned and managed by an Armywide organization, the General Officer Management Office. Even the title of general means generalist—one who does not specialize in a particular function.

New district commanders have the foundations for a successful command. No one expects the commander to be a trained engineer. Not only is that an unrealistic goal, it is completely unnecessary. Each district has a large component of trained professional engineers who meet the technical requirements of the district. Providing leadership to the organization through influencing, operating, and assessing is the most important aspect of command. The leadership and management requirements of district command are similar to any other command. The Army's required schooling, such as the Engineer Basic Officer Leader Course, Engineer Captains Career Course, and the United States Army Command and General Staff College provide an extensive background in construction management that meet the day-to-day requirements of district command. By the time most officers are lieutenant colonels,

The San Ramon project required contract modifications to accommodate unforeseen geotechnical conditions.

they have a graduate degree that reinforces their engineering and/or management skills. Again, this adds to the commander's skill set when leading a USACE district. Finally, the two required USACE precommand courses (PCCs), held immediately before and approximately 90 days after taking command, are almost three weeks long. They provide an extensive background in USACE missions, operations, and functions. The takeaway products and binders from these two courses provide substantial reference material for the new commander. (Unlike other PCCs, deputy commanders are welcome to attend the USACE course and often do so.) All of these set the foundation, but if the true goal is to be great, more training is required.

The USACE Campaign Plan (page 31) asks what we will do to make USACE great, and Goal 4 is to "build and cultivate a competent, disciplined, and resilient team equipped to deliver high-quality solutions." Implementing this recommendation reinforces behavior expected of the workforce in a learning organization. The Project Management Business Process is the guide to the USACE method of operating and is defined in Engineering Regulation 5-1-11, *Program and Project Management*. Clearly, project management is a key component in making USACE great. To be effective, a new commander needs a firm understanding of, and adequate training in, the technical requirements of project management and the technical aspects of the district's core functions.

Understanding, Training Needed

A new commander, to be effective, requires a firm understanding and adequate training in the basic technical requirements in project management and the technical aspects of the district's core functions.

Project Management. Most of a district commander's time and effort focus on projects—civil works such as levees, dams, and locks; or military construction such as barracks, day care facilities, and battalion headquarters. Project management is different from construction management in that it focuses on the entire project's life cycle from planning, scheduling, budgeting, contracting, construction and, finally, to closeout. Construction management is a subset of project management. Fully understanding the project management process is essential to being a successful commander. Not only is USACE a project-based organization, but understanding the project management process allows more appropriate shifting of resources when required. Previous Army training for new commanders focused on construction management, not project management. Fortunately, project management is a relatively defined skill set and there are many one-week training courses that train and reinforce a person's understanding of it. Many of the district commander's teammates have attended these courses and obtained the Project Management Professional (PMP) certification. (USACE formally encourages its project managers to obtain this certification.) It is provided and administered by the Project Management Institute and certifies that an individual has the basic skills to be a project manager. Like many others, this certification has review books to help people study. The process of certification enhances knowledge of project management and helps the commander become a better leader. Having a certification and the skills it encompasses brings credibility to the USACE organization, the Army, and the individual. Finally, maintaining certification also reduces the potential for inefficiency, ineffectiveness, and embar-

rassment. The following website provides information on the Project Management Institute and the certification process: <*http://www.pmi.org/CareerDevelopment/Pages/AboutCredentialsPMP.aspx.*>.

District Core Functions. Thoroughly understanding a district's primary functions, core missions, and primary funding streams is the most unique and challenging aspect of serving as a district commander. USACE, unlike other Army organizations, derives its funding from managing projects. Simply stated, more projects equal more funding and more capacity. Different projects are also funded through different authorizations and appropriations. Adding to this complexity, each district is different and even districts within the same division can have widely divergent missions.

For example, in the South Pacific Division, the San Francisco District is a civil works-only district focusing on navigation, recreation, and regulatory functions. The Los Angeles District and the Albuquerque District focus primarily on military construction, while the Sacramento District has both extensive civil works and military construction missions. Even districts that appear to have similar missions may have different organizational structures due to "Centers of Excellence" located within them. Understanding a district's core mission also allows the commander to better communicate with each project's local or federal sponsor. Commanders in USACE routinely interface and communicate directly with public citizens and local, state, and federal officials, to include members of Congress. These individuals often have direct and pointed questions concerning projects in the district that affect their constituents. It is essential for a new district commander to quickly assess the business lines that provide the district with the most funding and with the most public interaction. Once a commander determines the primary business lines, simply enrolling in an appropriate USACE resident training course ensures more than fundamental knowledge in the proper arenas.

With more than 39,000 civil servants and an annual attrition of more than 5,000 people per year, USACE has a voracious annual requirement to recruit, train, professionally develop, and retain qualified personnel. This training and professional development is primarily conducted in-house by the USACE Engineering and Support Center, Huntsville, Alabama, in the Proponent-Sponsored Engineer Corps Training (PROSPECT) Program. USACE annually offers hundreds of courses in areas tailored to cultivate and synchronize with the organization to make them efficient, concise, and accessible. These courses are described in detail in the USACE Purple Book at <*http://pdsc.usace.army.mil/downloads/PurpleBook2010.pdf*>.

Once a commander determines and confirms his own "training requirements" with the district's subject matter experts, the next step is to register for the courses and attend the training. Setting the example in support of training encourages individual growth, which establishes a foundation for finding solutions to the stakeholder needs identified in the USACE Campaign Plan. Though these courses do not make the student an expert, they provide an increased level of knowledge and enable the commander to ask the proper questions at the appropriate time.

Summary

Serving as a district commander or deputy district commander is an exciting, challenging experience. The Army's traditional career path provides officers with the skills required to be successful, but more can be achieved to obtain excellence. Officers assigned to USACE are especially knowledgeable in leadership, management, and construction management; however, most of them have limited project management experience. The fact that each district is unique adds to command complexities. To be successful, officers should create a self-development training plan that quickly hones their project management skills by obtaining PMP certification, then determine the critical business lines that fund and affect their district so they can become more technically proficient in those business lines. This certification and training plan should be completed in the first six months of command, giving the commander sufficient time to lead and guide the district with his or her newfound skills. This flexible training plan will provide the new commander with a strong launching pad to more efficiently allocate resources, earn respect from stakeholders, and reduce command risk by obtaining greatness.

Lieutenant Colonel Farrell serves as the Executive Director of Military and International Operations for the United States Army Corps of Engineers, Washington, D.C. Previous assignments include commander, San Francisco District, USACE; and deputy commander, Gulf Region Division, North District, Tikrit, Iraq. He holds a bachelor's in civil engineering and a master's in civil engineering from the University of Missouri–Rolla (now Missouri University of Science and Technology). He is a registered professional engineer in Missouri and a certified project management professional. This is his fourth article for Engineer Professional Bulletin.

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Investigations—Part II: Why Official Inquiries Are Needed

By Captain Daniel D. Maurer

Part I of this discussion (Engineer, September–December 2010) reviewed some of the legal and practical justifications for the command's inherent authority to initiate inquiries into cases of suspected misconduct; systemic failures in leadership, training, or maintenance; or any event or issue that alarms the unit's leadership. The second part of the discussion focuses on methodology. If the goal is to foster minimally intrusive but productive and reasonable inquiries, then it is important to reflect on what kinds of questions to ask, what subjects are appropriate, and how to draw conclusions and recommendations from the answers.

How We Investigate

Command-initiated investigations and inquiries are often plagued by three significant but related problems:

- They are usually conducted by officers with little or no training or experience with investigations.
- They typically lack sufficient objectivity and neutrality.
- They are not sufficiently thorough or comprehensive.

Any of these ailments can lead to serious unintended consequences, the worst of which might be the prosecution of a Soldier for a crime that someone else committed or the prosecution of a Soldier when the matter could reasonably have been disposed of differently.[1] Prosecution also may become more challenging, perhaps as a result of evidentiary problems or because the commander finds that making a disposition decision that is "warranted, appropriate, and fair" is problematic.[2]

For the lay officer, playing detective is hard—as is making a fair, thoughtful, evidence-based recommendation to the commander about how to dispose of a case.[3] Discussion of the following topics may ease that task:

- How the commander can define the scope of the investigation for the benefit of the investigating officer (IO)
- How the IO can plan the investigation, given the commander's scope
- How the IO can use critical thinking to execute a thorough, timely, unbiased, and useful investigation

Defining the Scope of the Investigation

A commander about to launch a fact-finding mission must be clear about the scope of the inquiry or investigation. A proper "scope" instruction in an appointment memorandum (or any other directive to investigate) marks the left and right bounds of what should be investigated. The commander's intent should drive the IO's "concept of the operation"—the sequential, collaborative efforts used to accomplish the underlying goal.[4] The scope is further defined by the particular Army regulation (AR) that drives the investigation. For example, AR 735-5, *Policies and Procedures for Property Accountability*, identifies specific requirements for financial liability investigations of property loss (FLIPL), while AR 600-8-4, *Line of Duty Policy, Procedures, and Investigations*, guides line-of-duty investigations.

Consider the facts involved in an escalation-of-force (EOF) incident. The machine gunner with a crew-served weapon in the trail vehicle of a route clearance patrol alleges that the aggressive driving of a pickup truck demonstrated potential "hostile intent," and that its subsequent attempt to pass the patrol—ignoring visual warnings to back away—constituted a "hostile act." Consequently, the gunner opened fire on the passing truck—hitting the radiator, tires, and windshield—causing the truck to skid to a stop and roll to the side of the road. In this example, if the commander's intent is to confirm that the EOF was justifiable rather than a negligent discharge (ND) during a show of force with the weapon, the scope would likely include questions about the gunner's specific observations, his training, and the information he shared with his crewmates before or after he fired his weapon. A clearly expressed intent will help the IO develop appropriate questions to ask witnesses.

These three fields of inquiry include numerous questions that will eventually add precision to the fact-finding process. Like "mission analysis" in the military decision-making process, defining the scope is the first analytical step toward ensuring that IOs receive enough relevant information to make a deliberate and considered strategy for investigating.

For some incidents, the scope may be relatively obvious. If a female specialist raises an informal complaint of gender-based harassment against a male staff sergeant, the scope will naturally configure itself around the statements or actions of the two individuals, observations made by others, and the impact of that conduct on the purported victim. But other cases are more ambiguous and deserve a thoughtful plan, as the previous EOF example demonstrates. A proper scope will force the investigating officer to ask questions and think about context from multiple perspectives. This is not always an easy or straightforward task. The servicing judge advocate (JA) advisor, after learning the intent of an investigation and the basic facts of an event, can help design an inquiry with a reasonable scope. The advisor will look at the event from an even more detached and neutral point of view, with an eye toward collecting evidence and fitting the facts to a plausible explanation.[5]

Depending on the nature of the incident, the time and personnel resources available to the commander, and the advice of a servicing JA advisor, the inquiry can be as informal as a verbal directive to a platoon leader to "look into" certain allegations or concerns. Or the inquiry can be as formal as a direct written appointment of an IO with a specified scope and deadline, requirement for a legal in-brief and legal review, and the formal due process protecting procedures of AR 15-6, *Procedures for Investigating Officers and Boards of Officers*.[6] There may be instances, however, when the wide-ranging authority granted by military law and custom should not be employed.[7] When cases involve sexual assault, domestic abuse, violence resulting in medical treatment or hospitalization of a victim, or off-post interviews of civilians not affiliated with the military, the complexities and logistical burden on the command are too great. The evidence may be forensically challenging; the issues may be too sensitive to be handled by a lay officer; or the expertise needed to understand the crime scene may exceed the command's resources, knowledge, and time. In these cases, it is always better to quickly open the doors to the professional criminal investigators of the Criminal Investigation Division. The best advice to commanders is to seek advice from their servicing JA advisor for an opinion on the form the inquiry should take. That advisor can help develop a plan that will guide the IO in the right direction.

The IO's To-Do List

Each IO may prepare and attack an investigation differently, and each legal advisor may suggest a different approach, depending on whether it is a generic commander's inquiry, an AR 15-6 investigation, a FLIPL, or a line-of-duty investigation. However, several successful best practices are recommended.

Preparation. IOs should prepare by reading their appointment memorandum or discussing it with their commander. The appointment should be viewed as a mission from higher headquarters and the appointment memo should be considered the initial mission analysis. It is the IO's job to figure out how to answer the commander's questions, paint a clear picture of what occurred, explain why it happened, and give the commander maximum freedom and flexibility to decide on a just and appropriate course of action.

Consultation. IOs should consult the proper legal advisor. A well-drafted appointment memo should direct the IO to seek advice immediately from a JA advisor. To avoid potential or perceived conflicts of interest, the IO should contact an attorney other than the serving trial counsel, who acts as prosecutor. (At the brigade level, there are usually two JA officers, thereby reducing the risk of conflicts.) Advice on best practices and legal requirements should come from a source as neutral and independent as possible. In our brigade, for instance, all IOs are advised by the command judge advocate at the beginning, end, and throughout their investigations, while the brigade's trial counsel is screened out. This way, should the investigation uncover misconduct, the commander can seek an unbiased perspective from the attorney charged with adding in the administration of military justice.

Besides offering counsel on general best practices, the legal advisor can explain how, where, and when to take sworn statements (always, if possible); when Article 31 rights protection against self-incrimination advice must be given (whenever an IO seeks written or verbal evidence that may incriminate the person providing the evidence); how to determine whom to interview and in what order; and the form or type of questions to ask.

To illustrate how not to frame questions for interviewees, consider Example No. 1, drawn from a real sworn statement:

Example No. 1

Q: Have you ever consumed alcohol with, done illegal drugs with, or visited SPC Jones in her CHU alone, or kissed SPC Jones in your CHU on 24 May 2009 or at some point between 26 May and 4 April 2009?

A: Yes.

Q: Have you had an inappropriate relationship with SPC Jones?

A: No.

//NOTHING FOLLOWS//

Legend:

CHU - containerized housing unit
SPC - specialist

This example clearly depicts an IO who never received (or failed to pay attention to) legal counsel during the investigation. The first question is a compound query, embedding multiple subjects under one roof, which can only serve to confuse the interviewee. As a result, it is unclear to what the first answer is referring. What specific act did the interviewee just admit to—or did he admit to anything at all? And on what date did the act or acts happen? Next,

the answer to the second question does not make any sense in relation to the first answer, and the interview certainly should not have concluded on that note. Perhaps the interviewee was confused by the barrage of questions. Or perhaps the IO simply failed to read, digest, and prepare for an ambiguous answer. Had the IO consulted with a legal advisor first, together they could have developed lines of clear, simple, direct questions. IOs should prepare for each interview with the goal in mind of acquiring specific information and should always clear up ambiguous responses. By failing on these fronts, the IO adds a substantial constraint on the appointing authority—the commander—who must now try to make a fair and appropriate choice based on incomplete or confusing data.

Organization. IOs must keep track of evidence. There is no doctrinal method to adopt, just a best practice of organizing and identifying the documents, statements, or physical evidence that is collected or being sought. Since these items will form the nucleus for the IO's findings and recommendation, it is imperative to develop and adhere to an organized system of record-keeping. This system may also help frame further lines of inquiry. Example No. 2, below, is a very basic sample.

Categorization. IOs should practice knowledge management to capture the facts of the investigation, to account for their own biases and assumptions, and to mitigate possible damage caused by erroneous logic.[8] Reference points can be categorized in Example No. 3 (page 37).

This methodology could be useful at the outset of an investigation, referenced periodically throughout the process, or tailored for each interview. The point is to be conscious of common investigative blunders which, if left unchecked, could taint the process and limit the commander's options. For instance, assuming that the discharge of an M240 machine gun round was negligent—merely because it was unintended—risks ignoring other environmental, human, or mechanical factors that might suggest the incident was more accidental than negligent. Consequently, the Soldier might join the deep ranks of fellow Servicemembers quietly and presumptively punished for the common ND instead of the command making efforts to improve training for M240B gunners, confirm proper preventive maintenance and servicing of weapon systems, or identify mechanical failures in a particular weapon.

Often—especially when working under the stresses of time, the watchful eye of the commander, or a desire to get back to normal duties—there is a tendency to draw conclusions based on assumed facts rather than the evidence. This can lead to a faulty cause-and-effect analysis. An IO's background and experience may make him well suited to investigate certain matters, but that familiarity also carries the risk of a certain myopia or narrowness of inquiry. It is important for the IO to self-identify initial presumptions of what he knows or thinks he knows.

Conclusion

This article has captured some key lessons learned from watching successful investigations help the command make sound, reasonable choices regarding misconduct or other issues. Some of these tips, on the other hand, were gleaned while watching faulty investigations unravel and therefore thwart a command's ability to act appropriately. For the commander trying to design the proper scope of an inquiry—or for the new IO unsure of the first, second, or eighteenth step to take—this article may make the process a little easier to grasp. Besides the IO's

Example No. 2

Evidence	Collected By	Collected On	Issues
Sworn statement from eyewitness #1	DA Form 2823	During witness interview on 14 Aug 09	Witness is reluctant to get involved because he works for suspect
Potential admission by suspect	Email from suspect to company 1SG	Forwarded from 1SG to me on 15 Aug 09	Why didn't 1SG come forward earlier?
Sworn statement from eyewitness #2, potential accomplice	DA Form 2823	During witness interview on 16 Aug 09	Forgot to do Rights Warning and Waiver on DA Form 3881
Company POW log, signed by suspect, IDing serial number and model of weapon	Excel® spreadsheet, maintained by BN S-2	Requested from BN on 8 Aug 09; received via email on 13 Aug 09	Spreadsheet is 6 months old

Legend:

1SG - first sergeant
Aug - August
BN - battalion
DA - Department of the Army
IDing - identifying
POW - privately owned weapon

Example No. 3

Knowledge Management					
What facts do I already know?	What's my source?	What assumptions am I making?	Assumptions based on what?	What do I want to know?	Why?

servicing JA advisor and senior officers or peers with past experience as investigators, following are more resources to use:

- AR 15-6, *Procedures for Investigating Officers and Boards of Officers*, 2 October 2006.
- Field Manual (FM) 3-19.13, *Law Enforcement Investigations*, 10 January 2005.
- AR 195-2, *Criminal Investigative Activities*, 15 May 2009.
- AR 27-10, *Military Justice*, 16 November 2005.
- *Manual for Courts-Martial (MCM) United States*, 2008 edition.

Captain Maurer serves as the command judge advocate for the 36th Engineer Brigade (Joint Task Force Rugged). Previous assignments include trial counsel for the brigade at Fort Hood, Texas; assistant task force engineer; sapper platoon leader attached to a 4th Infantry Division mechanized infantry task force during Operation Iraqi Freedom; and battalion support platoon leader and supply officer in a mechanized engineer battalion at Fort Carson, Colorado. He holds a bachelor's from James Madison University, where he was Distinguished Military Graduate from the United States Army Reserve Officer Training Corps program, and a law degree from The Ohio State University.

Endnotes

[1]This article will not go into great depth regarding the myriad disposition choices available to a commander. These generally range from the administrative reprimand, counseling, extra training, rehabilitative transfer, administrative reduction, administrative separation, or nonjudicial punishment to the preferral of charges leading to a court-martial. There are also any number of other corrective actions that a creative first sergeant can conjure up.

[2]MCM United States, 2008, Rule 306(b) discussion.

[3]Ibid. The military justice system requires that the commander consider myriad factors when making that initial decision, to include what kind of punishment fits the crime, the background and service of the suspect, the nature of the offense or misconduct and the extent of harm caused, the available evidence, the reluctance of the victim or others to testify, and the motives of the accuser or other witnesses.

[4]See FM 5-0, *The Operations Process*, 26 March 2010, paragraph 2-92.

[5]Misconduct is not the only cause of an investigation. For example, having a JA help in designing the scope of an inquiry into widespread suicide ideations across several subordinate commands may reveal the need to consider family, rank, finances, deployments, operational tempo, drug dependencies, and command climate as factors.

[6]For example, see AR 15-6, paragraphs 3-10 and 3-11, which define both "facts" and "recommendations," as well as the regulation's requirement for sworn statements on Department of the Army (DA) Form 2823 and Article 31 rights "waivers" on DA Form 3881.

[7]See MCM, Rule for Court-Martial 303: "Upon receipt of information that a member of the command is accused or suspected of committing an offense or offenses triable by court-martial, the immediate commander shall make or cause to be made a preliminary inquiry into the charges or suspected offenses."

[8]A "false cause" is an example of a logical fallacy. It is a conclusion that some event must have been caused by a particular initiating act because the two occurred close in time or location, without identifying other intervening causes or factors influencing the eventual outcome.

Building Great (Coalition) Engineers

By Major Timothy R. Beck

G'day from the Royal Australian Engineers (RAE) School of Military Engineering (SME) at Steele Barracks, Moorebank, New South Wales, Australia. Like more than 20 United States Army engineer majors before me, I am the military personnel exchange program officer assigned to the United States Army Engineer School, attached to United States Army Pacific, and further attached to SME. By position, I am the officer commanding/senior instructor for the Engineer Tactics Wing, responsible for training engineer officers and combat engineer noncommissioned officers (NCOs). Officer training consists of three courses:

- Regimental Officers Basic Course (ROBC) for all new engineer officers coming into the RAE
- Engineer Operations Officers Course for junior captains
- Combat Officers Advanced Course for senior captains before promotion to major and company-level command

There are promotion-related courses for four NCO groups:

- Combat engineer corporals
- Combat engineer sergeants
- Engineer warrant officers (WOs)
- Combat engineer WOs

Australian Army NCO ranks are modeled after the British Army, in which corporals are equivalent to grades E-5 and E-6, sergeants to grade E-7, WO Class 2 to grade E-8, and WO Class 1 to grade E-9. The Engineer Tactics Wing also oversees the Assault Pioneer Officer/NCO Course for the Royal Australian Infantry, consisting of light infantry training on demolitions, breaching, and watermanship (small boat operations) to support infantry assaults. This article will briefly highlight the ROBC for 2010.

Regimental Officers Basic Course

ROBC is almost 7 months long, the longest combat arms officer basic course in the Australian Army. A list of the topics covered by the course shows why:

- Operations
- Introduction to technical engineering
- Basic combat engineering (BCE)
- Geospatial engineering
- Search operations
- Demolitions
- Mine warfare
- Watermanship and bridging
- Force engineering

- Force survivability, including chemical, biological, radiological, and nuclear detection (CBRND) and explosive ordnance disposal (EOD).

Course Phases

Operations. The operations phase of ROBC gives the course a doctrinal foundation for topics such as offensive, defensive, and urban operations, emphasizing how engineers conduct and support them. Students learn how engineers conduct the individual military appreciation process to support engineer unit planning and provide engineer input for the staff military appreciation process, which is similar to the U.S. Army's military decisionmaking process. The operations phase is spread throughout the course, with topics covered by lectures and tactical exercises without troops (TEWTs).

Technical Engineering. This phase introduces officers without engineering degrees to the subject. Starting with a mathematics test (or "maths," as Australians say it) to determine their level of knowledge, students receive lessons on everything from basic algebra to the physics of structures. Introduction to building codes; case studies on construction projects; and practical exercises on construction recons, structures, and concrete are all part of this phase. Students team up to build model bridges out of dry spaghetti and participate in bridge-loading competitions for bragging rights. As a bonus, one of the SME wings (training companies) got a decent concrete slab to use for a break area as part of the concrete practical exercise. While the "nontechs" are having fun, the officers with technical backgrounds conduct technical reconnaissance missions and design projects to be executed by other training courses.

Basic Combat Engineering. The course brings both sections of the course back together to learn ropes, knots, block and tackle, leverage, hand and power tools, and basic field fortifications. The RAE are responsible for water point operations, so students learn about water purification and conduct reconnaissance for water point operations. This is a very important mission, as seen during the Australian Army's disaster relief mission to Sumatra in 2009. Students enjoy getting out of the classroom and getting dirty during this phase of the course.

Geospatial Engineering. Back in the classroom, students get their introduction to geospatial engineering, or "Geo." The Geo phase is designed only to skim the surface

Students set up a troop harbor—or platoon field site—command post during a field exercise.

Left: ROBC students build a scaled-down nonequipment bridge during the course.

Below: The students destroy the bridge in a follow-on demolition mission.

of the subject and give instruction on surveying. Students conduct a practical survey exercise around the Steele Barracks grounds to familiarize themselves with survey equipment and recording practices and procedures.

Search Operations. Search training in the RAE has roots in the United Kingdom's Corps of Royal Engineers, as does our own Army's. It focuses on everything from basic systematic techniques for searching structures, buildings, areas, personnel, and vehicles to the use of specialized tools and explosives-detection dogs and proper evidence handling procedures. RAE troops (platoons) get search missions while deployed, to include high-risk search and route clearance with dismounted searches at designated vulnerable points along the route.

Demolitions. Arguably the most academically challenging phase, "dems" gives young officers training in theory, safety procedures, and calculations, concluding with a live demolitions range exercise and a demolition mission during their final field exercise. This phase gives in-depth background during the theory and calculation lessons, explaining how different explosives work. This provides more flexibility for mission accomplishment, since an RAE officer can draw upon explosives from Australia, the United States, United Kingdom, or New Zealand, and quickly determine how to achieve the required effect. This phase traditionally results in more retests than any other phase of the course.

Mine Warfare. Mine warfare training is important to Australian Army leaders since they stress training for *a war*, not *the war*—current operations, in other words. The ROBC students receive training on national policies concerning mines, reporting requirements, procedures for planning and emplacing mines, and reducing minefields. This phase gives plenty of hands-on training in employing mine detectors and probing rods, culminating in a minefield breaching exercise at night.

Watermanship and Bridging. ROBC students historically love the watermanship and bridging phase of the course, which covers small-boat operations, water safety, engineer bridge reconnaissance, and planning and construction of military bridges, including medium girder and floating support bridges—our old ribbon bridge. This phase gives the students a mental and physical workout. Mentally, students must learn the calculations required for planning bridging operations. Physically, they must work in crews to emplace and remove several medium girder bridges—to include three 13-bay, double-story builds (double, link, and pier) and a 14-bay, double-story build on a restricted site with a reverse bank strip—during their final field exercise. This phase isn't all hard work. Small-boat and ferry operations (with Zodiac® inflatable boats and float bridge rafts) add a little fun to the course.

Force Engineering. The force engineering phase teaches nontechnical students the basics of construction

Students learn the possible results of failure to search role players for CS grenades.

to support force protection. Students go over basic construction design, planning, construction management, and horizontal construction—including testing procedures and hands-on heavy construction equipment demonstrations. The hands-on demonstration is a great concept, allowing students to "play" on equipment before arriving at their units. Lessons continue with force protection design, including blast and ballistic effects, risk mitigation, rough assessments of postblast damage, and the planning and construction of nonequipment bridges.

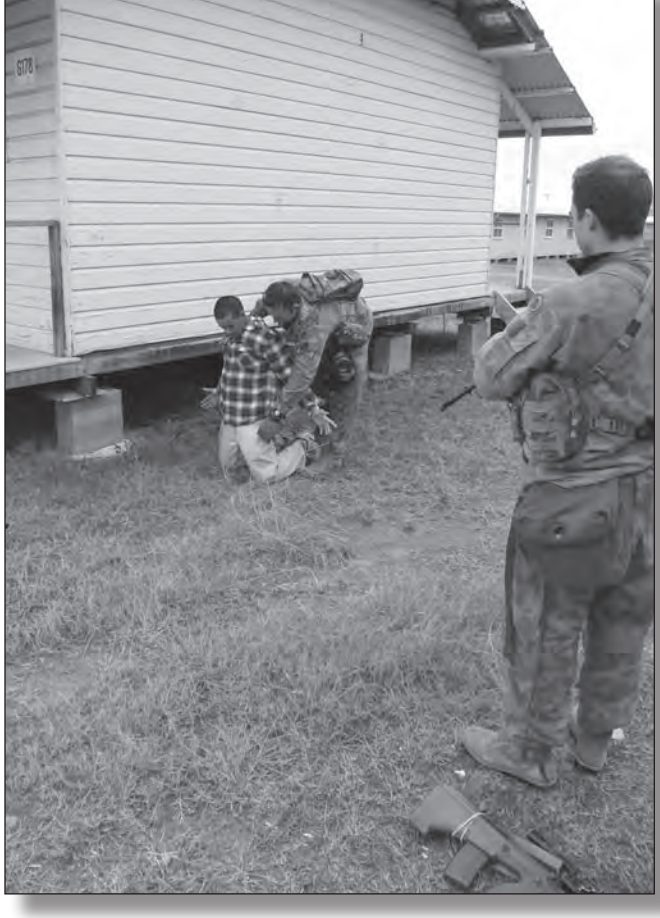
Force Survivability. This phase covers the topics of CBRND and EOD, both part of the engineer mission of the RAE. This phase is strictly an introduction to these topics for the new engineer officers. Engineers can attend full courses on CBRND and EOD following successful completion of ROBC. Currently, EOD is basically an additional duty or "second hat" engineers wear in the RAE. The combat engineer troop sergeant (platoon sergeant) may be the unit EOD technician, obliged to support a combat engineer troop and maintain individual proficiency in EOD operations. In 2011, the first EOD squadron, or company, will stand up to try out the concept of centralizing the EOD skill set.

The ROBC also includes TEWTs, field exercises, and range safety officer (RSO)/officer-in-charge (OIC) qualifications week.

Tactical Exercises Without Troops. While a lot of the training is delivered by classroom lecture, the use of TEWTs and field exercises provides a method to reinforce learning and permit assessment of each student to determine competency. TEWTs cover engineer support for offensive, defensive, and urban operations. The defensive and urban operations TEWTs are favorites, because students get on the ground to finalize and brief their plans. The defensive TEWT has been conducted at the same hilltop farmhouse in Mittagong, New South Wales, for more than 30 years, giving students a commanding view over the engagement area they plan to defend. The urban operations TEWT takes the course out of the classroom and into the Holsworthy Barracks urban operations site.

Field Exercises. All of the course lessons and TEWTs help prepare students for their field exercises.

- *Exercise Coral.* This exercise provides a forward operating base environment where students live and run missions for two weeks. It gives them the opportunity for practical application of course topics in a low-intensity, nation-building setting. While not assessed for record, the ROBC students get feedback and guidance on their technical execution of engineer tasks and their tactical execution as leaders. This exercise was developed as part of past course feedback from instructors and students.
- *Exercise Kokoda.* This is the culminating exercise of the ROBC. Students deploy to the field for two weeks for practical application of course topics in a high-intensity environment and are assessed for record. Starting in a troop harbor—or platoon field site—in the Holsworthy



ROBC students search a role player.

Training Area, the class functions as a light engineer troop supporting a maneuver battalion. Students rotate leadership roles as troop commander, troop sergeant, reconnaissance officer, or as one of three section commanders (squad leaders). The students must build up their troop harbor while conducting missions ranging from forward landing strip denial to reserve bridge demolitions. By design, the exercise keeps the students very busy. Opposing Force Soldiers become a great tool to reinforce good practices and highlight poor practices. The threat—and use—of chemical agents in the form of CS grenades kept students during the recent course on their toes and in their protective gear (which they appreciated, since most of the evenings were near freezing).

One of the most memorable missions was the reserve demolitions on Engineers Bridge—a uniquely designed Bailey bridge that is famous in the RAE, since every ROBC class conducts a reserve dems mission on it. One lucky student first gets to conduct a reconnaissance of the bridge, then plans the mission of emplacing demolitions to prepare the bridge as a reserve target. A different student acts as the troop commander to prepare the bridge. During the mission, students don rigging harnesses and climb onto the bridge while placing inert charges as planned by the recon officer. A "mortar attack" by the opposition was repelled, but CS gas lingered a long time that cold morning, and the smell was still in the air hours later. The students had to break down their troop harbor, to include removing protective obstacles and filling in the fighting positions they had called home for a week, and deploy to the urban operations site. There they had to search the area, occupy an abandoned building, plan and build a defense of it, and interact with people who were both for and against the Australian Army.

This final phase of the exercise was a real challenge for the students to accomplish their missions and protect themselves while working within the rules of engagement. At some points, students were confronted by dozens of role players and had to make split-second decisions. A well-placed CS grenade from a role player who hadn't been searched ended the course's barbeque lunch, before "final call" finally went out. The students had their ups and

Engineers Bridge is wired with inert demolition charges.

A group of ROBC students pose with their last medium girder bridge.

downs during the exercise, but it was clear they were learning, retaining, and improving throughout its length.

Range Safety Officer/Officer in Charge. SME helps RAE units with RSO and OIC qualifications by running a week of range qualifications at the end of the ROBC schedule. The Australian Army requires RSO and OIC personnel to qualify on a range, then to be certified to run that range as RSOs or OICs. This certification is permanently recorded and follows the officers for their careers. This allows students to leave ROBC and be certified to act as RSOs or OICs at certain ranges, regardless of what unit they are posted to. This range week greatly helps the RAE overall and reduces training costs.

Conclusion

Upon completion of Exercise Kokoda, course members got to relax for 24 hours before going on to their specialty courses. Officers heading to combat engineer regiments were off to the Search Advisors Course; those heading to construction squadrons—to include sister Service officers—and the foreign students, went to the Construction Commanders Course; the remaining two officers headed to the Geospatial Officers Basic Course. All of these courses run for three weeks and provide a critical qualification for new engineer officers. A number of them were assigned to units set to deploy to Afghanistan in a few short months.

Overseeing the ROBC class for the RAE was an unbelievable experience. The course included all of this year's new engineer officers from Australia, New Zealand, Brunei, and Vietnam. It also included the first-ever fully qualified East Timorese engineer officer. The impact of this exchange program is far reaching as former students from the Australian and U.S. Armies progress through their careers.

Major Beck is the officer commanding / senior instructor of the Engineer Tactics Wing, SME, Moorebank (Sydney), Australia. He has served in leadership and staff positions at platoon, company, battalion, brigade, and division levels. His most recent Operation Iraqi Freedom tour was from December 2007 to February 2009, as the brigade combat team (BCT) engineer, 3d BCT, 4th Infantry Division (Mechanized) in Baghdad, Iraq, including the battle for Sadr City. He is a graduate of the Engineer Captains Career Course, Fort Leonard Wood, Missouri, and the United States Army Command and General Staff College, Fort Leavenworth, Kansas. He holds a bachelor's in civil engineering from Polytechnic University, Brooklyn, New York, and a master's in liberal arts from Louisiana State University, Baton Rouge, Louisiana.

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*	Pending (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 addresses engineer operations across the entire spectrum of operations. **Status:** Revising manual to incorporate the engineer lines of support framework. Estimated publishing date is 4QFY11.
Combat Engineering			
FM 3-90.4 (*FM 3-34.2) (*FM 3-90.12)	*Combined Arms Mobility Operations*	Pending (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 (MAGTF) Breaching Operations*. **Status:** To be published 2QFY11.
ATTP 3-34.55 (FM 5-103)	*Survivability*	Pending (Jun 85)	This is a full revision of FM 5-103, *Survivability*. **Status:** Initial Draft staffing in 3QFY11.
General Engineering			
TM 3-34.48 1/2 (*FM 5-430-00-1 & 5-430-00-2)	*Design of Theater of Operations Roads, Airfields and Helipads*	Pending (Aug 94) (Sep 94)	This manual will serve as a reference for engineer planners in support of joint and theater operations in the design of roads, airfields, and helipads. This manual is currently dual-designated with the Air Force. The Air Force (as well as the Navy and Marine Corps) plans to adopt the new manual also. **Status:** Estimated publishing date is 3QFY11.
TM 3-34.41	*Construction Planning and Estimating*	NEW	This new manual is being produced by the Navy, in coordination with the Army and Air Force. The manual will provide the TTP and planning factors for conducting construction planning at the crew leader level. The manual will also provide useful expeditionary construction planning factors for use by planners at all levels. **Status:** Estimated publishing date is 3QFY11.
TM 3-34.43 (*FM 3-34.451) (*FM 5-472)	*Materials Testing*	Pending (Dec 92)	This manual will provide technical information for obtaining samples and performing engineering tests and calculations on soils, bituminous paving mixtures, and concrete. For use in military construction. The test procedures and terminology will conform to the latest methods and specifications of the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), and the Portland Cement Association (PCA), with alternate field testing methods and sampling techniques when complete lab facilities are unavailable or impractical to use. The Marine Corps and Air Force plan to adopt this manual as well. **Status:** Estimated publishing date is 3QFY11.

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 1/2 (*FM 3-34.465)	*Quarry Operations*	Pending (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. **Status:** Preparing Volume II. Initial Draft staffing of both volumes 2QFY11.
TM 3-34.49 (*FM 5-484)	*Multi-Service Well Drilling Operations*	Pending (Mar 94)	This manual is a guide for planning, designing, and drilling wells. It focuses on techniques and procedures for installing wells and includes expedient methods for digging shallow water wells, such as hand-dug wells. This collaborative effort with the Navy, Air Force, and Marine Corps includes the newest technologies, current practices, and revised formulas. **Status**: Estimated publishing date is 2QFY11.
TM 3-34.56	*Waste Management*	New	This manual addresses issues not currently integrated into FM 3-34.5, *Environmental Considerations*. The manual will address the role of waste management in support of deployed forces, as well as the integration of waste management throughout the operations process, including its critical linkage to the composite risk management process. **Status:** Estimated publishing date is 2QFY11.

Notes: Current engineer publications can be accessed and downloaded in electronic format from the Reimer Digital Library at <*http://www.adtdl.army.mil*> or the MSKN Web site at <*https://www.us.army.mil/suite/page/500629*>. The manuals discussed in this article are currently under development and/or recently published. Drafts may be obtained during the staffing process or by contacting the Engineer Doctrine Branch at commercial 573-563-0003, DSN 676-0003, or <*douglas.merrill@us.army.mil*> or contact commercial 573-563-2717, DSN 676-2717, or <*brian.davis6@us.army.mil*>. The development status of these manuals was current as of 25 Jan 10.

***Publications shown inside parenthesis with an asterisk beside the number indicate the current published number, but that number will be superseded by the new number at the beginning of the listing. Multiple manuals in parenthesis will indicate consolidation into one manual.**

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

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 videos and tapes, and three million pages of documents on engineer history—includes information on units, equipment, organization, 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.

Clear Your Mind to Clear the Way: Managing the Moment

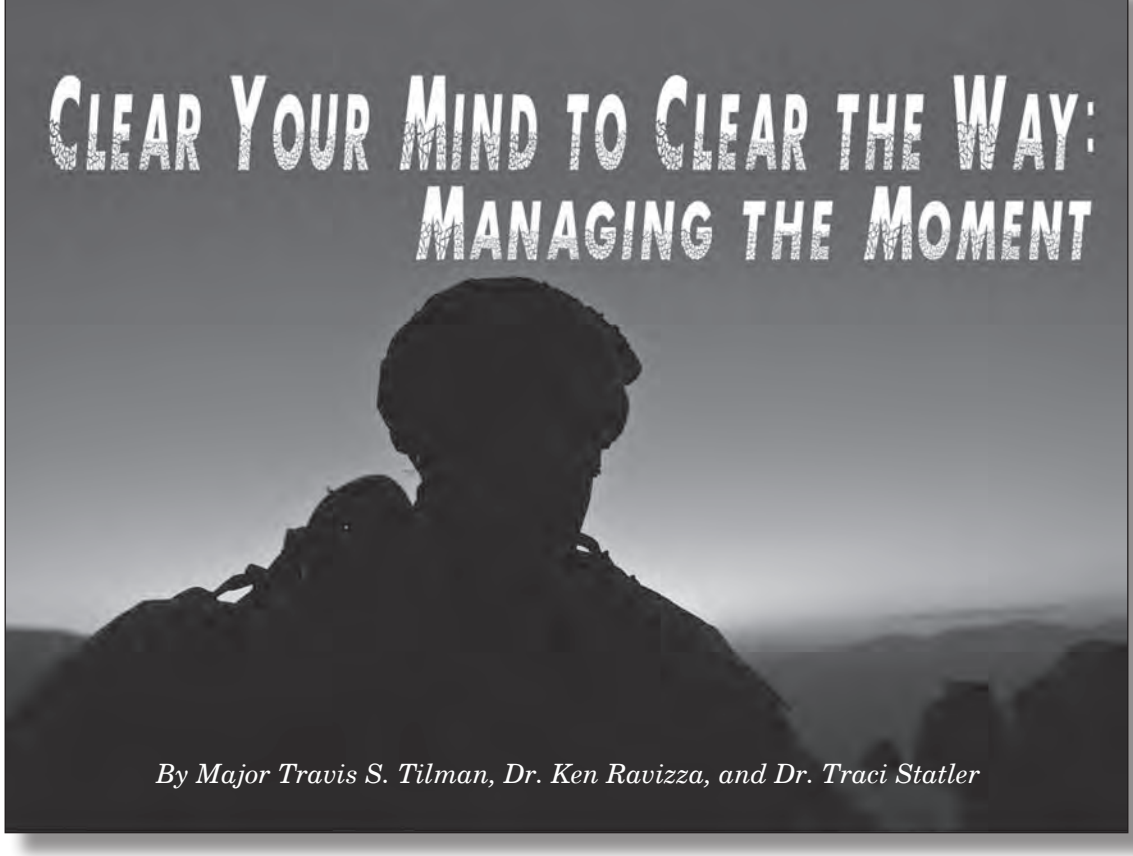


Photo by U.S. Army Staff Sergeant Mark Burrell

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

Route clearance missions can range from a few hours to many days. It is unlikely you can stay completely focused for an entire mission, but you can learn to focus for a short duration many times during the task. This article provides some tools to help increase your ability to manage the moment. The presented method, created by Dr. Ken Ravizza, adapts a systematic approach to taking one thing at a time. Ravizza's method follows six steps to help you "be where you need to be when you need to be there." This adaptation is about helping you to perform well consistently by refocusing for short periods of time. Ravizza's process is known as the *Rs*.

Your Attitude: Your Decision

Before we get to the *Rs*, let's examine attitude. You control your attitude. You can either decide to commit to the mission and be the best improvised explosive device (IED) spotter possible, or you can roll with the punches and hope that you find something or that you don't get blown up. It's your decision. To help with that choice, look at your mission. Why are you doing what you're doing? It may be stated in the patrol brief's mission statement. If not, determine the purpose of going out. It may be to clear a road in order to move supplies or help another unit move safely to an objective. If you ask your leader, ask in a way that doesn't question his or her decisionmaking, but rather clarifies your purpose. Ultimately, you use your specialized knowledge and equipment to protect others so that they can perform their missions.

Responsibility

The fundamental component of the Rs process is *responsibility*. Learn what you can control—then take the responsibility to act appropriately. As a member of a route clearance team, you have a responsibility to yourself, your unit, and those following behind to both find IEDs and clear a path. You must maintain your personal weapon and protective equipment, night vision devices, and first aid kit. You have a responsibility to be on time and ready—which includes being mentally prepared—for each mission. Taking responsibility for your mental readiness means choosing a proactive method to control yourself so that you can consistently search effectively for IEDs. You may not find every IED, but wouldn't it be great if you found just one more?

Imagine yourself as a spotter searching for IEDs during a standard route clearance mission. Use the photo on page 49 to help you visualize a typical street. What distractions could be present? What thoughts can get in the way? What could keep you from focusing on the one task of finding an IED? Take a minute to write out a list of distractions. On this list, there are things you can control and things you can't. Cross off those things you cannot control, and focus on what you can control. Don't waste time and energy on things beyond your control. You probably notice that the only thing you can consistently control is yourself. You can control your behaviors, your thoughts, your emotions, and your attitude—and you must learn to be in control of yourself for high-level performance. In sports, self-control leads to body control, which leads to skill control (Figure 1, page 47). Think of the basketball player who turns the ball over and immediately reaches in and fouls the opponent. This is an example of someone who lost self-control and then couldn't maintain body or skill control. For those clearing a route, your skill is your ability to focus. Start by taking a slow, deep breath. The breath is a good indicator of whether or not you are in control. If you can breathe, you give yourself a chance to perform with a clear, calm, and focused mind.

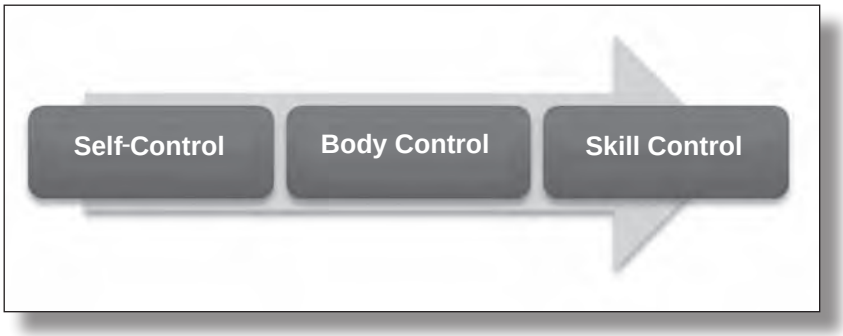


Figure 1. Progression of Control

Simplifying the Rs Process

The *Rs* process is built around three components of *self-control, plan,* and *trust* (Figure 2):

- Gain or maintain *self-control* by recognizing where you are mentally and emotionally and where you need to be. Release any negative thoughts or tension and regroup.
- Transition to the *plan* step as you refocus on the task at hand and what is important right now.
- *Trust* in your ability to find IEDs by ensuring that you are ready and by responding as you search for IED indicators.

These three components are a simplified version of the *Rs* process, and you can substitute words of your own to help you remember it. West Point's football team, for example, uses the terms "clear-load-target" to help them remember to take one play at a time. For them, *clear* represents releasing the last play. They *load* the upcoming play and focus on it. *Target* is their word for executing the play by trusting their ability and responding with what they have.

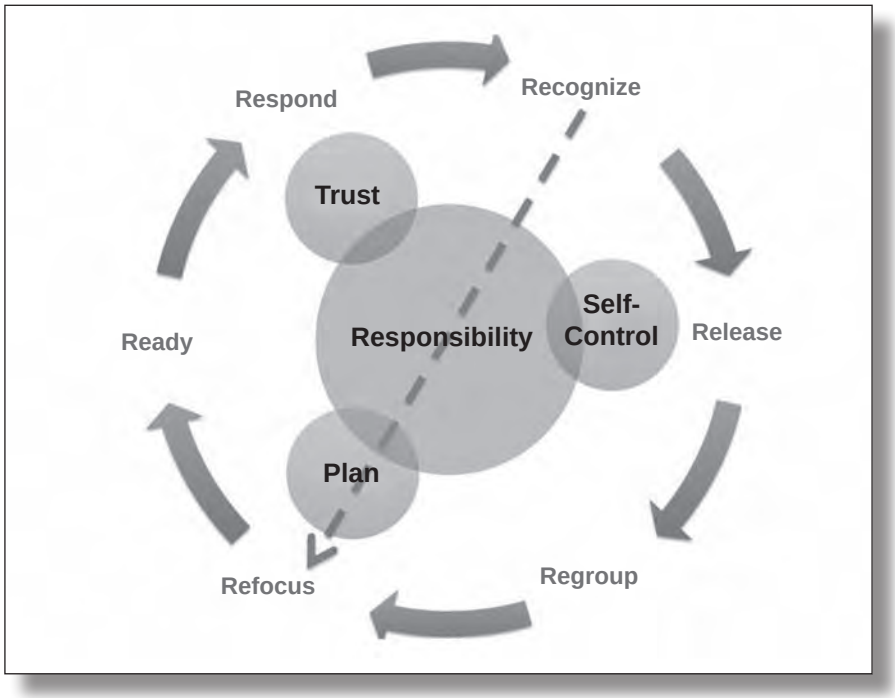


Figure 2. The Rs Process

The Six-Step Rs Process

Recognize

Learn to *recognize* where you are mentally and where you need to be. How do you recognize when you are not focused on searching for IEDs? Figure 3, page 48 lists some examples of physical, cognitive (thoughts), behavioral, and emotional indicators. Think back to playing a sport. Did you ever tense up? What happened to your heart rate, focus, muscular tension, or thoughts? Did you play better or worse? If you can learn to be more aware of where you are and make adjustments to get you to where you need to be, you can learn to perform more consistently. Think about searching for IEDs. Do you simply look for a big box or artillery shell in the middle of the road? It isn't that obvious. You do, however, look for the indicators that an IED is present: a thin copper wire shimmering in the distance, disturbed dirt on the side of the road, an empty marketplace, or rubble piled up to create a choke point. In a similar way, you must become aware of the indicators that let you know when you are not in control of yourself. Once you've recognized where you are and where you need to be, you have two choices: *refocus* or *release*.

You can think about your ability to recognize your level of readiness as a traffic light (Figure 4, page 48). When the light is green, you go right on through with no reason to slow down. You do the same when you are performing well—you keep going with little thought or conscious effort. However, when the light turns yellow, you can speed up or slow down to stop. Many athletes speed up when they arrive at yellow light situations rather than gaining control by slowing down. Finally, when the light is red, you stop—or you could crash. Think of your performance in these terms. When do you have green, yellow, or red lights? What indicates that you have yellow or red lights? If you have a green light, keep on going! If you have yellow or red lights, you need to release the stress or negative thoughts and get control of yourself.

This process is ongoing. You must learn to check in regularly throughout the mission. For instance, you might consciously check in with yourself when you reach a checkpoint. You might do so every time your vehicle stops to interrogate a possible IED. You should always do so after an IED detonation or enemy attack. Where will you check in, and what is the first step in checking in? Can you breathe?

Physical Indicators	Cognitive Indicators	Behavioral and Emotional Indicators
■ Increased heart rate ■ Increased respiration ■ Increased body temperature ■ Sweaty hands and feet ■ Frequent urination ■ Decreased saliva (cottonmouth)	■ Internal ■ Negative ■ Critical of others ■ Forgetful	■ Anxious ■ Angry ■ Walking faster ■ Depressed ■ Yawning/tired ■ Accident prone

Figure 3. Examples of Physical, Cognitive, Behavioral, and Emotional Indicators

Release

To manage the moment, you have to let go of past events that may distract you from the present. Many athletes have found physical cues or actions helpful in *releasing* their last play. After baseball players miss a swing, they might step out of the batter's box, undo and redo their gloves, and then step back in. For them, it's about playing pitch to pitch. For you, it's about searching for IEDs, checkpoint to checkpoint. Here are some ideas to help release distractions:

- Squeeze the event into the ball of your fist as tightly as possible. When you are ready, let it go.
- Take a deep breath, and blow it out. Take a few more breaths, and feel tension disappear as you exhale.
- Take off your gloves. Don't put them on until you are ready to focus again.
- Talk to those around you. Silence can indicate that a person has become internally focused; speaking to people near you can help.

Green - Locked in, everything is good

Yellow - Tense, distracted, trouble focusing

Red - No focus, waiting for mission to end

Figure 4. Levels of Readiness

This list is not all-inclusive, but it may give you some ideas. Do not keep stress inside as you search for and clear IEDs. Part of what the hitter does in baseball is try to see the ball clearly at the release point. You aren't attempting to see a ball going 90+ miles per hour, but rather to spot anything that indicates an IED.

Regroup

Once you release, you need to *regroup*. To do this, simultaneously take a slow, deep breath and pull your head and chest up. Lengthen your spine, and let your shoulders lower. (We tend to pull our shoulders to our ears when we are stressed.) Let your feet feel loose. Try it now to see how it feels; regrouping is a way of changing your body to a more confident posture and preparing for whatever comes next. When you act confident, you feel confident, and confidence is important when searching for IEDs as well as playing sports. Watch the quarterbacks who have a bad set of downs. Inspect their body language: The less-confident ones may hang their heads down. If they maintain that posture, they probably won't do well on their next outing.

Along with changing your posture, using positive self-talk can help you regroup. We all talk to ourselves throughout the day, and positive self-talk helps us concentrate in a purposeful way. Here are some examples of positive language to help you regroup:

- Let's go!
- I've got this!
- I will find you!
- Bring it on!

Another tool to help you regroup is to use a focal point—a visual trigger that reminds you to be confident. Some baseball players use the tip of the foul pole to remind them to breathe, to get their head up and chest out, and to play with confidence. Several pitchers have written in their hats certain words that they read after a bad pitch, when they need to regroup. You might use a small dot on your watch or words you've written on the inside of the vehicle.

A street scene suggesting potential distractions

Refocus

Now it is time to focus on the next part of the mission. What do you have to do right now, and what is the plan? The football team focuses on the next play call—but in looking for IEDs, you must *refocus* on the road ahead. What do you know about the next portion of the road? Is it dirt, gravel, asphalt, urban, or other—and how does that change where you need to look? Do you need to scan the horizon for possible enemy forces? Once again, this is a proactive approach to managing the moment and becoming more effective at searching for IEDs.

Ready

How do you know that you are *ready*? Quickly scan your body, and ask yourself if you can breathe. If the answer is yes, you are ready. If not, start the process over, and make yourself ready. You don't have the choice to step off the mound or take yourself out of the game, but you have some tools to help make yourself more ready. A slow, steady breath is a good indicator that you're in control. If you're in control of yourself, there is a good chance that you can control your performance and are ready to search for IEDs.

Respond

As stated before, the *Rs* process helps to get you in the right mindset for taking one thing at a time. Part of the process is learning to trust your ability to execute a task. You trust that you're properly prepared and will *respond* accordingly. You are in control of you, and now you just search—with the one responsibility to speak up when you spot a possible IED or when you have the sense that one is present. It may be your first combat mission, and you're unsure; but you must speak up—even if you cannot explain why you think there is an IED. Do not second-guess your ability; lives depend on your speaking up.

Summary

Now that you have learned a method to help you better manage the moment, you must practice this process during training and throughout missions, since it requires repetition to become effective. Be patient, and remember that reacting to a weapons malfunction or becoming proficient at a battle drill was not immediately easy but took practice and determination. Practice!

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Joint Engineer Operations Course: A Combined Approach

By Lieutenant Colonel Shawn P. Howley (Retired) and Major Charles R. McGinnis (Retired)

In his "Chairman's Vision" on 15 July 2009, the Chairman of the Joint Chiefs of Staff remarked, "Today, the United States enjoys an overwhelming qualitative advantage not only in our fielded capabilities, but in our cognitive approach to our duties; sustaining and increasing this advantage will require a transformation achieved by combining technology, intellect, and cultural changes across the joint community."[1] The Joint Engineer Operations Course (JEOC) continues to be an important element of the joint engineer cognitive framework. During the 2010 training year, the JEOC program educated 293 Service engineers in preparation for current or future joint engineer staff assignments.[2] The JEOC program continues to focus on developing the operational engineering capabilities of Service engineer officers, noncommissioned officers, warrant officers, and Department of Defense civilian leaders preparing to join combined joint task forces in support of combat operations around the world.

The JEOC program consists of two phases:

- Phase I is an eight-module online distributed learning course focused on building joint engineer knowledge and comprehension necessary for a firm joint engineering foundation.[3]
- Phase II is a five-day resident educational event that is focused on the application and analysis of the joint engineer operational environment through large-group lectures and small-group practical exercises and discussion.[4]

Phase I online learning and Phase II resident discussion enhance the development and effectiveness of the joint engineer staff officer upon assignment to a joint staff.

The JEOC program continues to build capacity and meet the current educational needs of our Service engineers by refining the curriculum to enhance the understanding of our current interagency, intergovernmental organization, and nongovernmental organization coordination environment.[5] To improve the learning opportunities for Service and multinational engineer students, the program has adjusted the course information; Phase I (online) and Phase II (resident) are now open to multinational engineers, whose resident seats are coordinated through a sponsoring combatant command—each of which is allocated one seat per year. A goal of the JEOC program is to seat two multinational engineer officers per resident class. During the 2010 training year, the JEOC program educated four multinational engineers. We encourage multinational engineers to register and complete Phase I and then attain a seat for Phase II through their sponsoring combatant command.

Recently, the JEOC program was modified to directly support combatant command engineers deployed outside the continental United States (OCONUS).[6] In September 2010, the United States Pacific Command (USPACOM) hosted a JEOC class at the Navy Education Center, Pearl Harbor, Hawaii, to improve the abilities of their joint staff engineers. The class successfully trained and educated joint and Service engineers from USPACOM's area of responsibility. In March 2011, the United States European Command (USEUCOM) hosted a JEOC class to improve their joint staff engineers and multinational staff engineers. The class was conducted at the Military Engineering Center of Excellence (MILENG COE) in Ingolstadt, Germany, and successfully trained and educated joint, Service, and multinational engineers from USEUCOM's area of responsibility.

"The JEOC program continues to build capacity and meet the current educational needs of our Service engineers by refining the curriculum to enhance the understanding of our current interagency, intergovernmental organization, and nongovernmental organization coordination environment."

JEOC Rotational Course Schedule

Fiscal Year 2011	Location	Fiscal Year 2012	Location
1–5 Nov	United States Marine Corps University— Quantico, Virginia	31 Oct–4 Nov	United States Marine Corps University— Quantico, Virginia
11–15 April	United States Army Engineer School— Fort Leonard Wood, Missouri	9–13 April	United States Army Engineer School— Fort Leonard Wood, Missouri
13–17 June	United States Air Force Institute of Technology— Wright-Patterson Air Force Base, Ohio	18–22 June	United States Air Force Institute of Technology— Wright-Patterson Air Force Base, Ohio
15–19 Aug	United States Navy Civil Engineer Corps Officer School— Port Hueneme, California	23–27 July	United States Navy Civil Engineer Corps Officer School— Port Hueneme, California

Currently, the JEOC program is scheduled to conduct four core resident classes in training years 2011 and 2012. The program started with a successful JEOC offering at the United States Marine Corps University in November 2010 and is on schedule for the remaining classes for this training year.

The course is a United States Joint Forces Command (USJFCOM) Joint Training Directorate/Joint Warfighting Center (J-7) joint professional military education (JPME)-certified course, which is on the Army Training Requirements and Resource System (ATRRS) under course number 4A-F16/030-F20. To enroll, students must first have an active Army Knowledge Online (AKO) or Defense Knowledge Online (DKO) account. Once an AKO/DKO account is established, students should contact their respective course administrators or Mr. Dwayne Boeres, (573) 563-7065 or <*dwayne.boeres@us.army.mil*>, to process their enrollment. JEOC Service representatives may be contacted through the Joint Knowledge Online network at <*https://www.us.army.mil/suite/portal/index.jsp;jsessionid=141B46CC25D62C3BE4D1592E2CA4197A.appd02_3*>.

Future objectives for the program for training year 2011 are to continue to update the course material with relevant information from current operations and lessons learned provided by combatant commands and combined joint task forces operating around the world. Additional enabling objectives to support the JEOC program this training year are—

- Establishing a training partnership with the MILENG COE.
- Updating the Joint Forces Command Engineer Battlebook.
- Conducting the annual course review.
- Being prepared to support OCONUS combatant command staff engineer training.

Lieutenant Colonel Howley (Retired) is the JEOC program and course manager. He has served in leadership positions and has assisted Army units in organizational development for more than 24 years.

Major McGinnis (Retired) is a JEOC training specialist. He has worked in leadership and organizational development of Army units for more than 20 years.

Endnotes

[1]Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 1800.01D, *Officer Professional Military Education Policy* (OPMEP), 15 July 2009, <*www.dtic.mil/cjcs_directives/cdata/unlimit/1800_01.pdf*>, accessed 20 December 2010.

[2]"Joint Engineer Operations Course," *Engineer*, Vol. 40, January–April 2010, pp. 34-35.

[3]Benjamin S. Bloom, *Taxonomy of Education Objectives*, Pearson Education, Boston, 1956.

[4]Ibid.

[5]Brigadier General Bryan G. Watson, "Clear the Way," *Engineer*, Vol. 40, May–August 2010, pp. 2 and 10.

[6]CJCSI 3500.01F, *Joint Training Policy and Guidance for the Armed Forces of the United States*, 19 November 2010, <*www.dtic.mil/doctrine/training/cjcsi3500_01f.pdf*>, accessed 20 December 2010.

This article, "Who Is the 'Real' Engineer?" refers to the obsolete 2 January 2004 edition of Field Manual (FM) 3-34, *Engineer Operations*. The current edition of FM 3-34 was published on 2 April 2009. Some of the information contained in this article may no longer be applicable. We apologize for this error.

Who Is the "Real" Engineer?

By First Lieutenant Claude E. Barron

In a combined arms battalion tactical operations center in Mosul, Iraq, two engineer captains discussed their duties as task force engineers. One captain told the other, "Man, you're like a real engineer!"

"No," replied the second captain, pointing to a nearby second lieutenant. "He's the real engineer." The second lieutenant, an earthmoving construction platoon leader, was responsible for improving force protection measures at the task force checkpoints. He was planning a 100-mile movement of equipment and personnel across northern Iraq to the next jobsite. He also denied being the real engineer, arguing that his responsibilities merely included planning and overseeing the filling of HESCO Bastion Concertainer® barriers and grading gravel parking lots. These were nothing near the kind of calculations and analyses he expected real engineers to do.

These three officers represent many characteristics typically associated with United States Army engineers. Two held civil engineering degrees, two had conducted route clearance missions as platoon leaders on previous deployments, one had completed force protection and drainage improvement missions in northern Iraq, and one had a

Early on in the mission, a D7G bulldozer operator completes a rough leveling of the ground.

To swiftly construct a protective perimeter wall, an operator uses a hydraulic excavator to fill HESCO Bastion barriers.

Sapper tab. Despite these qualifications, none of them felt they deserved the title of real engineer. If they don't deserve the title, who does?

Finding Commonality

Field Manual 3-34, *Engineer Operations*, states the Engineer Regiment's mission-essential task list (METL) as—

- Shape the security environment.
- Respond promptly to crisis.
- Mobilize engineer forces.
- Support forcible entry operations.
- Support assured mobility to dominate land operations.
- Provide support to civil authorities.
- Provide quality, responsive engineering services to the nation.

This broad scope requires the Regiment to distribute various aspects of its mission among its many diverse types of units and personnel, all with their own focused tasks and purposes. This inherent diversity creates a challenge when trying to find commonality among all the units in the Regiment. Despite the varying qualifications and characteristics of the engineers in the Regiment—like the three described above—it is likely that many would deny being the real engineers. If a diver, a heavy equipment operator, and a geodetic surveyor discussed their roles, they would probably have the same difficulty in connecting their diverse skills to explain why they all wear the same engineer castle. The Regiment's METL—the *what*—is so broad that many engineers find it hard to relate to all of the tasks collectively. However, if engineers look at *how* they carry out those tasks, they will find it is possible to define who they are. Real engineers, no matter their role, professionally execute the Regiment's METL with problem solving as the core attribute. Real engineers are professional problem solvers.

The Professional

In his book, *The Future of the Army Profession*, Don M. Snider proposes three attributes of a profession: expertise, jurisdiction, and legitimacy. Applying this model to the individual professional, we can see there are specific obligations that engineers have to fulfill. They must—

- Demonstrate expert knowledge within their field and engage in lifelong learning to constantly update and maintain their expertise as the world changes.
- Take ownership of their assigned tasks—their jurisdiction.
- Maintain legitimacy in the eyes of the customer they serve.

Twin D9 bulldozers work side by side to push an earthen berm during a base expansion mission.

These three obligations must be supported by a solid foundation defined by strong character, living the Army values, maintaining and enforcing the standards of the profession, self policing, and developing and growing other professionals within the engineer profession. The professional behavior demonstrated by real engineers forms the foundation of how they carry out their mission. However, engineers must possess another attribute that uniquely defines them—the technical knowledge and operational proficiency to serve as the Army's problem solver.

The Problem Solver

Army engineers solve problems. They are not asked to simply analyze and report but to analyze, plan, organize, build, and deliver solutions using the materials, people, and equipment available. To do this, engineers must not only demonstrate professional attributes but also be able to solve hard problems. Engineers must understand and employ a problem-solving method, whether it is one prescribed in introductory engineering textbooks; the military decisionmaking process (MDMP); John Boyd's observation–orientation–decision–action loop; or a combination of multiple processes. They must be able to clearly define problems, accurately identify the facts, intelligently make assumptions, apply principles and theories as necessary, use their ingenuity and resourcefulness to solve the problems, and organize and implement the available resources so that the end product satisfies the requirements of the customer. Technical knowledge and proficiency in solving hard problems uniquely defines them as the real engineers.

Creating More Real Engineers

Understanding the attributes that define the real engineer can help develop more of them and improve the Regiment's ability to accomplish its METL. To develop the professional, engineers must continue to maintain and improve their expert knowledge, encourage ownership of their jurisdiction, and continue to improve their legitimacy. To develop the problem solver, the Regiment must continue to maintain and improve its search for problem-solving individuals and conduct training that forces creative thought and the use of a problem-solving method.

Improving Expert Knowledge

Expert knowledge comes from the United States Army Engineer School at Fort Leonard Wood, Missouri; other military and civilian schools; personal development; and the training planned by Army leaders and conducted by noncommissioned officers (NCOs). The Regiment must maintain its schoolhouse training, but should continue to improve its training techniques to ensure that the best teaching methods are used. These improvements evolve from conducting after action reviews and implementing the lessons learned, leveraging effective methods from other successful institutions, and studying the human capacity for growth and development. Along with schoolhouse courses, there must be opportunities for engineers to attend other military and civilian schools and seek engineer-specific professional development. Once these professionally trained and educated engineers are developed, they must be retained in the Army through financial compensation, assignment preference, promotion, or other incentives.

Most important, there must be an emphasis on training at all unit levels. All too often, great training is planned but not conducted due to more pressing matters. Despite these pressing matters, "Maintenance Monday" always takes place because it has high command emphasis. Commanders at brigade and battalion levels need to put as much emphasis on training as they do on maintenance. When training takes a back seat to maintenance, equipment is getting a higher priority than the Regiment's most important asset—its people. Training gives leaders the opportunity to practice their expert knowledge of leadership, planning, teaching, and supervising. It also provides repetition to ensure that expert knowledge is maintained and that junior enlisted Soldiers gain the expert knowledge they do not get at advanced individual training (AIT).

Taking Ownership of Jurisdiction

The Regiment's jurisdiction comes from its METL, and ownership of these tasks must be instilled to maintain that jurisdiction. One way to instill ownership is through training. By creating competent engineers, training also creates confident engineers who want to carry out their assigned tasks. Another way to maintain jurisdiction is to keep engineers engaged in their tasks. The current operations tempo addresses this issue reasonably well, but the one- to two-year periods between deployments typically are nonproductive in terms of producing real-world results. That is time when Soldiers—and the Regiment—did not have the opportunity to own their jurisdiction. Engineers must find ways to build real deliverables for real customers operating out of their home bases; they could support the needs of other community and government activities, such as other Army units, local communities, state agencies, national parks, other military Service branches, or other national agencies like the Department of Homeland Security. By keeping engineers engaged, the Regiment will maintain their skills, achieve real-world results, demonstrate to the world that engineers take ownership of their field of work, and build pride in the Regiment itself.

Another way to instill ownership of assigned tasks is to put engineers in the positions they want and are qualified to fill. The pilot "Green Pages" program does exactly this. Engineers who are motivated because they are doing what they are passionate about will take ownership of their assigned tasks.

Improving Legitimacy

The Regiment's engineering legitimacy ultimately comes from the assessment of its performance by those it serves. As long as the Regiment maintains its clients' faith and trust, it will continue to be home to a legitimate profession. To improve trust in its ability to accomplish its tasks, the Regiment must continue to deliver the products requested and must maintain, develop, and enforce its character, values, and standards. It should continue to teach and develop

A Soldier excavates an area with a hydraulic excavator for the placement of a new culvert.

An engineer surveys a grade to ensure that it meets specifications.

the Army values at the various commissioning sources, through the NCO Education System, and Army basic and AIT. In addition, it should institute a program modeled on the United States Military Academy's Cadet Leader Development Program that works to develop cadets into leaders of character during their four years at West Point. Constant discussions and refreshers about character and the Army values all the way down to the squad level would also be beneficial. To maintain and improve legitimacy, the Regiment must continue to maintain its standards. Poor engineer work always has a way of making itself known, and it generally does so in a dramatic way. No other single event can damage legitimacy more than an ignored standard that results in electrocution, fire, structural collapse, failed force protection measure, or any other engineering project failure.

Developing the Problem Solver

Given the difficulty of altering a person's mindset and thought processes, the easiest way to increase the number of critical problem solvers in the Regiment involves recruiting people who already possess the skill. Through its engagements with universities, the Regiment's effort to seek out candidates with engineering and technical degrees seems to be doing well. A second method to develop problem solvers is through training. Leaders at all levels must conduct training that forces the use of the problem solving thought process. Some methods include demanding the written use of troop-leading procedures, the MDMP, or other problem-solving method; providing only vague instructions (such as supplying only the commander's intent); and developing scenarios without stark black-and-white solutions. Such training not only develops problem solvers and real engineers, it instills the confidence necessary for Soldiers to take the initiative when they see an advantage, which is the foundation of mission command and the heart of how our Army operates.

Conclusion

The three officers in Mosul, despite their qualifications, felt they didn't deserve the title of real engineer and did not know how to define such a person. The confusion about which of the units wearing the castle best represents the real engineer is likely shared throughout the Regiment because of its broad METL. However, by examining how engineers carry out their missions, it is possible to define who they are. The real engineer is a professional problem solver. When the Regiment focuses its efforts on improving the ability to solve problems at all levels, it can and will develop more real engineers. That will improve the Regiment's ability to achieve its METL, meet its customers' needs, and serve the nation.

First Lieutenant Barron is a platoon leader in the 617th Engineer Support Company, 864th Engineer Battalion, Fort Lewis, Washington. He holds a bachelor's in civil engineering from the United States Military Academy at West Point, New York.

Endnotes

[1]Field Manual 3-34, *Engineer Operations*, 2 January 2004.

[2]Don M. Snider and Gayle L. Watkins, *The Future of the Army Profession*, McGraw-Hill, Boston, 2005, p. 43.

[3]Grant T. Hammond, *The Mind of War: John Boyd and American Security*, Smithsonian Institution, Washington, D.C., 2001.

[4]<*https://www.greenpages.army.mil*>, accessed 26 November 2010.

[5]<*http://www.usma.edu/opa/clds/index.html*>, accessed 26 November 2010.

Getting Back to Basics:

Building the Army Reserve NCO Corps From the Bottom Up

By Brigadier General Bud R. Jameson Jr. and Command Sergeant Major Steven M. Hatchell

"With IC–JLEAD, I intend to provide the NCOs of the Iron Castle Brigade with the training, tools, and mission to revitalize the Army Reserve's NCO Corps as the backbone of the force and be the key effort in completing the transition of the Iron Castle Brigade to a trained and ready operational command capable of rapidly mobilizing and deploying for any OCONUS [outside the continental United States] or CONUS [continental United States] mission."[1]

—Commanding General, 926th Engineer Brigade

With this commander's intent to guide them, the noncommissioned officer (NCO) leaders of the 841st Engineer Battalion launched into the Iron Castle Junior Leader Education and Development (IC–JLEAD) program in September 2010 at its headquarters in Miami, Florida. While still the "beta" version, this was the culminating event of an effort that had been more than a year in the making.

Transition to Operational Army Reserve

From observation of unit training and operations, the brigade commander had, shortly after assuming command, identified an apparent gap in the Army's junior NCO education system and began working with his command sergeant major (CSM) on the concept for a corrective program within the 926th Engineer Brigade. This shortfall was in the basic NCO leadership skills, tools, and understanding of the history, traditions, and authorities of the NCO Corps. While there was no single cause for this lack of NCO capabilities in the brigade, the command team believed it had developed over time for a variety of reasons—high individual operational tempo (OPTEMPO), in-theater promotion policies, delayed Noncommissioned Officer Educational System (NCOES) attendance, and the necessary focus on warfighting skills at the expense of a more balanced education—that were all part of the requirement to become an operational rather than strategic Army Reserve.

This transition to an operational reserve has vastly increased requirements for individual involvement and time commitment from NCOs at the unit level, including—

- Additional individual training (such as Composite Risk Management [CRM] and the Army Accident Avoidance Course [AAAC]).
- Additional individual readiness requirements (such as Periodic Health Assessment [PHA], online and medical visits, dental exams and follow-on treatment, and ever-changing immunizations).
- Frequent "to-be-done-immediately" Department of the Army or Department of Defense individual briefings or online requirements (such as suicide prevention and the Global Assessment Tool [GAT]) that have been added to the Army Reserve's unit training equation, but without additional inactive duty training (IDT) time beyond the traditional total of 196 hours annually (two days per month for twelve months).

The typical response by the company- and battalion-level commanders to meeting these new operational requirements has been to sacrifice traditional individual and collective training in favor of mass administrative events or individual Soldier time on computers at the Reserve Center. Within the brigade, this diversion of available time had particularly manifested itself in shortfalls of Army Force Generation (ARFORGEN)-related readiness goals, as well as specific training benchmarks.

Reserve Component ARFORGEN Model					
	Year 1	Year 2	Year 3	Year 4	Year 5
Unit Status	Reset	Train/Ready 1	Train/Ready 2	Train/Ready 3	Available
Training Focus	Individual Training/School	Collective Training Squad Level	Collective Training Platoon Level	Collective Training Company Level	Deployed

Technical Competence vs. Leadership Skills

When the 926th Engineer Brigade staff analyzed the various Army Reserve/ARFORGEN readiness metrics, they found that more than two-thirds were "Soldier issues" that should have been handled by the NCOs of the brigade in their everyday business of taking care of Soldiers. Yet, they weren't. The question was—Why? It didn't take long to discover that the NCOs of the brigade had largely matured under the past policies of focusing available IDT training time on technical competence at the cost of basic NCO leadership skills. These NCOs were great engineer technicians who were being paid more—via their promotions—for their greater knowledge and experience, but without the NCO skills necessary to be the military leaders for their Soldiers. And now, under ARFORGEN and the concept of an operational Army Reserve, even more was being expected of them.

Photo by Brigadier General Bud R. Jameson Jr.

A student poses a question for the group during the JLEAD seminar at the 841st Engineer Battalion in Miami, Florida, proving the wisdom of opting for seminar discussion rather than straight lecture-style training.

A Matter of Timing

In addition to the basic lack of NCO knowledge, there was also the matter of ARFORGEN-appropriate timing for the routine Army NCOES courses. In the case of the Warrior Leader Course (WLC)—the traditional "introduction-to-being-an-NCO" course for the Army—there could be up to a three-year delay between Soldiers' promotion to NCO rank and their ability to attend WLC due to ARFORGEN.

In the Army Reserve, ARFORGEN is a five-year cyclical process (see table above). Within this five-year cycle of increasing individual and unit readiness, individual training is only permitted—or funded—during Year 1 (and, selectively, Year 2). In the latter years, the shift of emphasis to committing available time and funding for collective training and unit readiness generally precludes continued individual education.

Yet, each year the promotion system continues to create new NCOs. While this is certainly necessary and proper, it nonetheless creates the conditions under which new NCOs could conceivably be promoted for up to three years before ARFORGEN permits them to attend NCOES to "learn how to be an NCO"! The Reserve Components cannot maintain their readiness levels according to their operational reserve requirements if the NCOES isn't better synchronized with NCO promotions and ARFORGEN expectations. While the brigade leadership continued its analysis, ongoing feedback from both theaters of conflict (as well as comments from the Inspector General of the Army) only confirmed the need for an education program—separate from the Army's institutional education system—to give junior NCOs the tools to succeed.

Students prepare to role-play during the resiliency training phase.

Front and Center: NCO Leadership Skills

Before he retired, Lieutenant General R.S. Whitcomb, the Inspector General of the Army, cautioned the general officer leadership:

"As I leave the Army, my number-one concern is the leadership skills of the young sergeants and officers—they are without peer in the world at warfighting, but in my opinion, some of those leader skills have not been taught by us by coaching and mentoring or have atrophied. This is not all attributable to the pace of operations. We are experts at talking 'to' and 'at' the troops, but how good are we at talking 'with' troopers? How good are we in understanding that fear and concern don't stop when the mission is ended? Part of that is the 'stuff' of garrison life but really transcends to the 'stuff' of Army life.... This is going to get harder, but nothing will be more important to the 'life and breath' of our Army, and you all are the ones [who] set the example...."[2]

The CSM of the 926th was reassigned, and for five months the brigade operations sergeant major continued the staff development process until a new top NCO arrived at the brigade. One of his first priorities was to take the commanding general's intent and translate it into reality as quickly as possible. The challenge was to distill all the varied input—from individuals who earnestly felt their topics were absolutely necessary for first-line leaders to be successful—into something applicable across the variety of engineer companies of the brigade.

Decentralizing Instruction

Additionally, the CSM decided that the best target audience—the closest to the individual Soldiers—would be those selected for promotion to sergeant/E-5 or those who had been already promoted to sergeant/E-5 but had yet to attend WLC. The command team opted to centrally develop the program of instruction (POI) for standardization of the content, but to decentralize execution by tasking it out to the six battalion CSMs to conduct at their various locations. Not only would this reduce the costs and ensure that the battalion-level CSMs were stakeholders in the whole effort, but it would also enable the senior NCOs of the respective battalions to absorb the IC–JLEAD curriculum through "learning by teaching."

Two-Day IDT

While a three-day POI would have been preferable, the uncertainty of additional training funding for the program drove the final topic list to only those subjects that could reasonably be fit into a two-day IDT weekend. This constraint also ruled out the field-craft and theater-specific topics that the students would learn at WLC and/or at their mobilization station before deployment.

Course Content

For the initial presentation, the brigade command team settled on a course content that included the following:

- History of the Army and Federal Reserve History and Heritage of the NCO Corps
- Duties, Responsibilities, and Authorities of the NCO
- Sergeant's Time Expectations
- Junior Promotion Process Update
- First-Line Leader Responsibilities: Sponsorship of Soldiers; Counseling of Soldiers; and Purpose and Use of Leader Books
- Required Online Training and Soldier Readiness

"In addition to being a beta test of the curriculum and mode of instruction, this session would also be for observation by, and demonstration for, the CSMs and senior trainers for the remaining five battalions."

- Understanding the Noncommissioned Officer Evaluation Report (NCOER)
- Reserve Retirement System
- First-Line Leader's Role in Comprehensive Soldier Fitness—also known as "Resiliency Training"

Small-Group Discussion

Additionally, the brigade CSM agreed with the commanding general that the need to get as much of this information successfully absorbed by the students in the time available precluded any traditional "platform instruction" lecture or "death by PowerPoint®" techniques, opting instead for small-group, guided discussion as the appropriate mode of training.

Army Values and Soldier Fitness

The final requirement was that all such group discussion would be facilitated through the dual lenses of Army Values and Comprehensive Soldier Fitness—all vignettes, all examples, all discussions—would thus inculcate these basic Army tenets in the future junior NCOs from the start.

Beta Test Session

The next step was for the brigade CSM to select which of the six battalion CSMs would conduct the "beta test" and coordinate its execution. Because of its advanced placement in the ARFORGEN cycle—thus entitling it to command focus at all levels to set it up for a successful deployment—he decided on the 841st Engineer Battalion in Miami, Florida. In addition to being a beta test of the curriculum and mode of instruction, this session would also be for observation by, and demonstration for, the CSMs and senior trainers for the remaining five battalions.

With all this planning and coordination to guide them, the CSM and senior NCOs of the 841st Engineer Battalion successfully executed the mission with a class of seventeen. This first training session wrapped up with a student-led after action review (AAR). The prevailing student consensus throughout the AAR was appreciation for the opportunity to hone their junior leader skills and network with the senior leaders facilitating. Additionally, the AAR produced some good feedback that was used to further adapt the POI for the next session at the next battalion. Specifically, the command team approved adding a session—to be held before the actual first day of classroom instruction—that would familiarize the student NCOs with the new physical readiness training (PRT) program, according to Training Circular 3-22.20, *Army Physical Readiness Training*, and how to conduct a training session. With the fielding of the new Army Service Uniform, there will be a demonstration block added on the wear and inspection of both the Army Class A and Service Uniforms (likely with an instructor with intentional uniform violations).

The JLEAD session concluded with the formal presentation of the brigade's version of the NCO Creed, 841st Engineer Battalion's JLEAD completion certificate, and a follow-on brainstorming session on the way ahead with the gathered CSMs and trainers from all six battalions, led by the brigade CSM and commanding general.

Investment in Future NCO Leaders

This junior NCO education program is a work-in-progress. The content and presentation will continue to be refined through successive iterations across the brigade, so as to keep them current. For example, the next iteration will address the new structured self-development requirement to familiarize the new NCOs with the concept and expectations. The leadership of the 926th Engineer Brigade is committed to investing in the development of the future NCO leaders of the Army Reserve.

Brigadier General Jameson commands the 926th Engineer Brigade in Montgomery, Alabama. In 2003, he served as the acting Warrior Brigade commander at Fort Polk, Louisiana, and deployed to Iraq in 2007 as deputy team leader of an embedded provincial reconstruction team. He holds a bachelor's from Gonzaga University in Spokane, Washington, and a master's from the United States Army War College, Carlisle, Pennsylvania.

Command Sergeant Major Hatchell is the command sergeant major of the 926th Engineer Brigade in Montgomery, Alabama. His deployments include Desert Storm and Operation Iraqi Freedom, Tallil, Iraq. He holds a bachelor's from Excelsior College of New York State.

Endnotes

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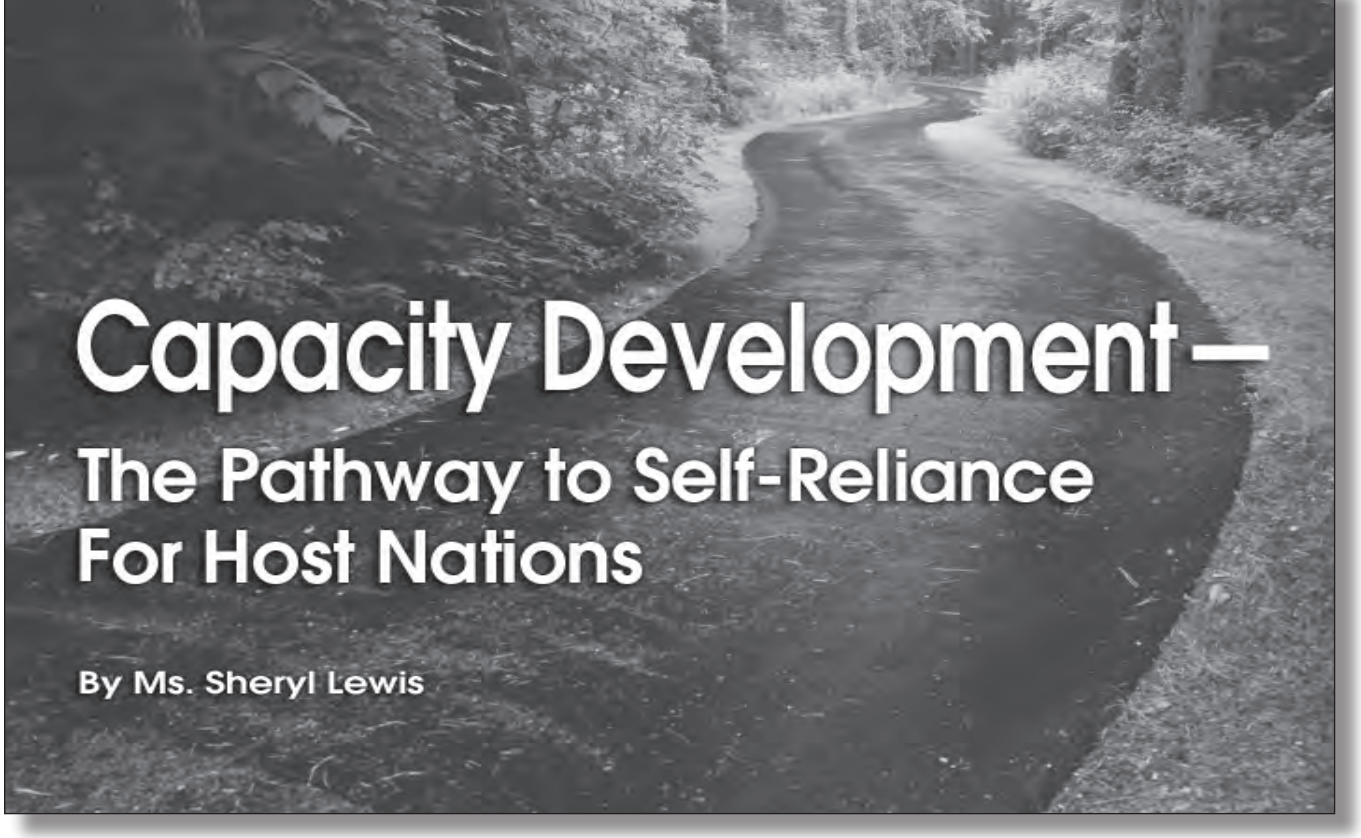

Capacity Development—
The Pathway to Self-Reliance For Host Nations

By Ms. Sheryl Lewis

"Capacity development is the building of human, institutional, and infrastructure capacity to help societies develop secure, stable, and sustainable economies, governments, and other institutions through mentoring, training, education, and physical projects; the infusion of financial and other resources; and most important, the motivation and inspiration of people to improve their lives."[1]

Lieutenant General Henry J. Hatch (Retired)

Capacity development has increasingly gained worldwide recognition as fundamental to effective governance, capability enhancement, ownership commitment, and successful program and project operation and sustainability. The U.S. government's experience in reconstruction of infrastructure in Iraq and Afghanistan—and the response and recovery actions from natural disasters in the United States, Haiti, and elsewhere—have helped raise the issue of capacity development to the forefront of our government's policy. Both U.S. civilian and military agencies are revising their methods and approaches to include capacity development as an integral part of their planning for programs and projects.

According to Secretary of Defense Robert Gates, "The capabilities of the United States' allies and partners may be as important as its own, and building their capacity is arguably as important as, if not more so than, the fighting the United States does itself."[2]

There are many complex issues that can affect the success of programs and projects. Capacity development allows us to influence the outcomes by focusing on areas where we have some degree of control. Solutions to capacity development range from simple to complex, from short duration to long duration, and from low-dollar investment to very expensive. Responsible planning for each program or project requires increasing the likelihood of success in our operating environment. Effective capacity development requires forethought, planning, coordination, and commitment of all parties involved, with the common objective of achieving sustainable results.

The United States Army Corps of Engineers (USACE) has employed capacity development methods for decades, often as a means of preparing and equipping owners of infrastructure and other engineering products and services to manage, operate, and maintain them in a sustainable manner. USACE uses various training, teaching, and mentoring programs aimed at strengthening public and private sector management, engineering, and technical capabilities to support the self-reliance of host nations.

USACE Role

With more than 34,000 civilians and Soldiers, USACE has delivered management, engineering, and technical services to customers in more than 100 countries on a reimbursable basis. The mission areas are managed under three primary directorates: military programs, civil works, and contingency operations. Work is conducted by staff at headquarters, divisions, districts, laboratories, and centers.

Services include all engineering disciplines, construction, integrated water resources management and flood protection, hydropower generation, environmental protection, emergency response and recovery, and research and development. Some USACE partners on international programs

and projects are the unified combatant commands, Army Service component commands, and United States Agency for International Development. Capacity development is important since it increases the likelihood that the program or project will be sustained—and the intended positive impacts realized. This has the following benefits:

- Conditions are improved for people in the host nation.
- The host nation is better able to manage its affairs without relying on external support.
- The program or project is more likely to be successful over the long term, so the investment made by the U.S. government is better protected.

Building Partner Capacity

The Army has a broader role than that of the warfighter. Responsibilities include all areas of full spectrum operations, as outlined in Field Manual 3-0, *Operations*. This document, along with other directives, requires the Army to strengthen important capabilities that can be deployed in a variety of circumstances in support of our National Security Strategy. The Army Posture Statement for 2008 states, "Operations in the future will be executed in complex environments and will range from peace engagement to counterinsurgency to major combat operations. This era of persistent conflict will result in high demand for Army forces and capabilities."[3] The Army Campaign Plan for 2010 specifically addresses the need to focus on building partner capacity through security cooperation as a means to shape and prevent future conflict and strengthen U.S. partners abroad.

USACE is aligned with this broader mission and is accustomed to working as an enabler in any environment in full spectrum operations. USACE is well positioned to support the U.S. government with a structured, yet flexible, approach to capacity development that can be of benefit under any conditions, from stable peace to general war.

Whole-of-Government Approach

President Obama signed the Presidential Policy Directive on Global Development in September 2010. This directive requires U.S. government organizations to—

- Adhere to a policy that is focused on development outcomes for host nations.
- Increase the government's effectiveness as a partner nation.
- Promote development and "harness development capabilities spread across government in support of common objectives."[4]

The whole-of-government approach requires U.S. government organizations to coordinate their efforts when assisting host nations. Achieving the right balance of "Defense, Diplomacy, and Development"—the keystones of the whole-of-government strategy[5]—for a situation requires a coordinated effort between military and civilian agencies. Each organization has expertise that can be leveraged to optimize the results. This means that a specific mission must be addressed as a system, with each organization contributing the right expertise at the right time. The ability to view the context of an entire issue through the knowledge and perspectives of multiple players provides the best potential for an optimal solution.

Building on Lessons Learned

The valuable lessons learned on missions and specific projects over the years have taught USACE that the appropriate level of capacity development must be planned into the process; it does not "just happen." This planning not only involves defining the right level and approach for capacity development (scope) but also providing sufficient time and funding (schedule and budget) to conduct the capacity development activities at the program and project levels, to track performance, and to measure the outcomes over time.

The following themes stand out when lessons learned are reviewed in programs and projects that have applied capacity development:

- The host nation must be an advocate for the program or project as a whole and fully support the specific capacity development actions developed by the stakeholders.
- Capacity development must often be applied through the efforts of an integrated, multidisciplinary team with combined skills to match the situation. The stakeholder group must include representatives from the host nation but may also be composed of those from the United States, other national governments, multilateral organizations, nongovernmental organizations, and the private sector.
- Consistent, effective capacity development takes place only when it is planned and budgeted in a program or project. This integration begins in the early planning phases to ensure that capacity development is not added later as an "unfunded mandate."

Framework and Process

USACE determined that a more formalized process for the planning and implementation of capacity development was needed to ensure that it is consistently addressed on its international programs and projects. The approach was designed to be compatible with the processes of other organizations involved in capacity development worldwide. This includes a framework with three levels, as shown in Figure 1, page 63:

- Enabling Environment Level—Provides the structure of laws, regulations, policies, and guidance to support the organizations.
- Organizational Level—Provides management requirements and guidelines for the organization and an environment in which individuals excel at their assigned tasks.

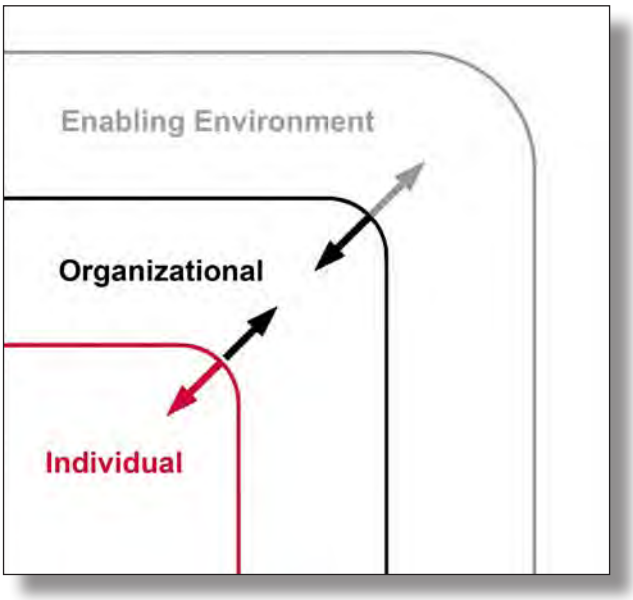

Figure 1. USACE Capacity Development Framework

- Individual Level—Works in an established organizational framework to maximize performance through continuous improvements, while increasing experience, knowledge, and technical skills.

The framework clarifies the structure under which capacity development takes place. These levels are not intended to operate independently, but rather as a system with each level complementing the others. Capacity development activities are interdependent in and between levels, and program or project success is unlikely unless capacity development is integrated across all three levels. USACE typically works in the organizational and individual levels on its programs and projects, but may be in a position to influence decisions made at the enabling environment level in certain cases, such as through its role as a leader in integrated water resource management.

USACE developed a five-step process to be used with all international programs and projects. The formality of this process is intended to drive consideration of capacity development needs; it does not mean that "one size fits all." The process must be flexible and tailored to fit the planning and implementation needs of each program and project. The five steps shown in Figure 2 are integrated into the normal program or project planning and implementation processes.

Implementation

The USACE business practice has been working to build a strong foundation for the adoption of a formalized capacity development planning

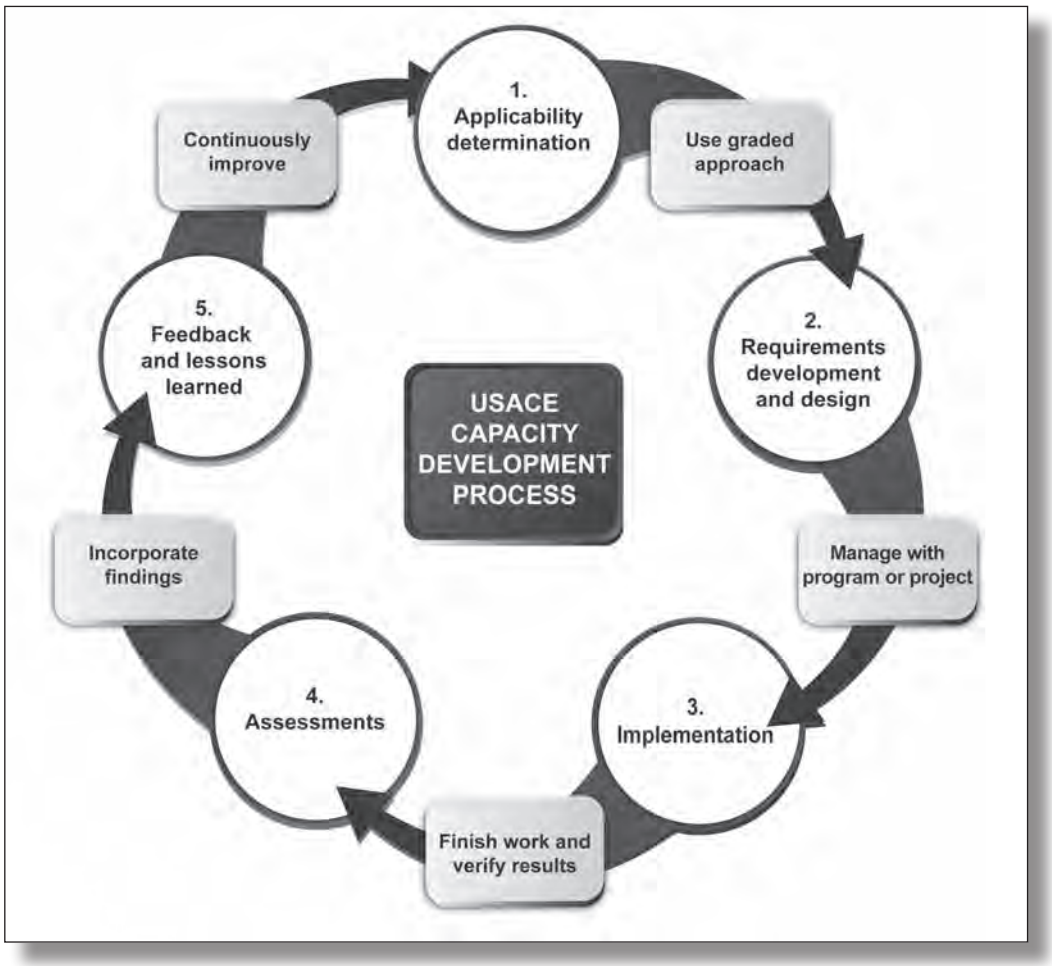

Figure 2. USACE Capacity Development Process

and implementation process, including policy and guidance documents, directives, and a series of online training sessions for its staff. The following initiatives are some of the capacity development activities presently underway on the USACE international programs and projects:

- *Africa*—USACE is building civil affairs capacity in the Kenyan army engineers to increase their appreciation for, knowledge of, and ability to build shared visions among populations affected by disasters and development efforts, thus enhancing the engineers' ability to create a sense of stability and security for local communities in affected areas.
- *Europe*—The Civil-Military Emergency Preparedness (CMEP) mission is to build all-hazard national and regional consequence management capacity. CMEP personnel have conducted 76 events in 28 countries since 1998, including Warsaw Initiative countries, Swaziland, and Guyana. The CMEP mission has now expanded worldwide.
- *Central and Southeast Asia*—The Afghan Engineer District–North (AED–N) is building the capacity of Afghan military engineers through its ongoing internship and outreach efforts with the National Military Academy of Afghanistan (NMAA). Internships are of fered to graduates of NMAA at the lieutenant level for a period of 21 weeks. At the completion of the internship, the lieutenants return to NMAA to teach civil engineering classes. In addition, the District participates in bimonthly NMAA faculty seminars and provides training on topics such as engineering, construction, safety, project scheduling, and leadership.
- *Middle East*—The Gulf Region District is working to support Iraq's ability to operate and maintain infrastructure through the following programs: training Baghdad's city workers on proper operations and maintenance of public water, sewage, solid waste, and transportation infrastructure; updating curriculum at Al Anbar University's Engineer College to meet current accreditation standards; and providing on-the-job train ing for 45 Iraqi associates who serve as construction and quality assurance representatives, public affairs officers, and program managers.
- *Central and South America*—The International Center for Integrated Water Resources Management, in collaboration with the National Water Authority—Autoridad Nacional del Agua (ANA)—of Peru and the World Bank, held a four-day workshop in Arequipa, Peru, with Chili River basin stakeholders focusing on building the capacity of the ANA planning staff to lead the implementation of Shared Vision Planning workshops in four other Peruvian basins. Follow-on workshops are being held to train local ANA staff on developing the hydrological modeling and decision support tools for collaborative water planning with stakeholders in the local basins.

Summary

Capacity development is now part of the normal planning process for the USACE international programs and projects. Successful results can generally be tied back to early planning, integration, and advocacy for capacity development. USACE will continue to be strong advocates and leaders in capacity development in support of sustainable outcomes for host nations.

Ms. Lewis is the USACE national program manager for capacity development and has overall responsibility for the capacity development business practice, which includes direction and guidance, policy development, oversight and monitoring, and training. She also serves as the USACE Interagency and International Services representative and coordinates with interagency customers and partners to support USACE missions in the United States Central Command area of responsibility, including Iraq and Afghanistan. She previously served as director of capacity development and strategic policy for the Army's Iraq Project and Contracting Office in Washington, D.C., and served with the Coalition Provisional Authority both in Washington, D.C., as the private sector development assistant, and in Baghdad, Iraq, as the governance office assistant. She holds a master's in international commerce and policy from George Mason University.

Endnotes

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[3]Pete Geren and George W. Casey, *A Campaign Quality Army with Joint and Expeditionary Capabilities: Army Posture Statement, Fiscal Year 2008*. Posture Statement presented to the 110th Congress, 2d session, Washington, D.C.: U.S. Department of the Army, 2008, p. 2.

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[5]Jim Garamone, "New National Strategy Takes 'Whole-of-Government' Approach," U.S. Department of Defense—News, Washington, D.C., May 27, 2010. <*http://www.defense.gov/news/newsarticle.aspx?id=59377*>, accessed 19 January 2010.

Prime Power School Opens at Fort Leonard Wood

By Ms. Amy Phillips and Ms. Diana McCoy

The United States Army Corps of Engineers (USACE), Kansas City District, recently completed a $30 million state-of-the-art school and handed it over to the 249th Engineer Battalion (Prime Power) in a ribbon-cutting ceremony at Fort Leonard Wood, Missouri, on 22 November 2010. The facility will house the United States Army Prime Power School, which moved from Fort Belvoir, Virginia, under the 2005 Base Realignment and Closure program. The building is a unique school for a unique unit. The 249th is the only prime power production unit in the Army and the only active duty unit assigned to USACE. The battalion generates commercial-grade electricity from 600 volts to 69,000 volts at up to 3.2 megawatts and provides this electricity to military installations and federal relief organizations during operations ranging from training to disasters to war.

The battalion's Soldiers hold the military occupation specialty (MOS) 12P, prime power production specialist, and the Prime Power School is the only school that trains this MOS.

The 77,000-square-foot facility replaces three World War II-era warehouses at Fort Belvoir that had been converted for the Prime Power School. The new school houses administrative offices, conference rooms, classrooms, instruction laboratories, an auditorium, equipment training areas, and outdoor equipment testing for the 12P Soldiers.

Administrative staff had already begun to occupy the building when the first class of Soldiers in the new facility began in January. According to the USACE command sergeant major, since the Engineer School is already at Fort Leonard Wood, it only makes sense—and is part of the natural progression—to bring the Prime Power School here.

The USACE District used the early contractor involvement (ECI) delivery method with this project due to tight budget constraints. The District has been a champion of the ECI method, because it provides flexibility and allows incorporation of lessons learned throughout the duration of the project.

Even though initially there wasn't money to fund the project, ECI enabled the District to make changes in the design to get the project under budget.

Construction on the project began in February 2009 with the contractor performing under tight constrictions, keeping the project on schedule, and maintaining high-quality work. The United States Green Building Council (USGBC) gave the Prime Power School a Leadership in Energy and Environmental Design (LEED) Silver certification, and ninety-two percent of the construction waste was recycled. The facility uses a number of high-tech systems to conserve energy. For example, it has highly reflective roofing material that minimizes heat infiltration. Sensors in the rooms detect both motion and natural light and conserve energy by automatically adjusting the amount of artificial light—depending on whether the room is occupied and how much natural light is present.

Photo by Robert "Brandon" Tobias

The new 77,000-square-foot United States Army Prime Power School, constructed by the USACE Kansas City District at Fort Leonard Wood, Missouri, is on track for LEED Gold certification.

Major General David Quantock, commanding general of the Maneuver Support Center of Excellence and Fort Leonard Wood, officially accepted the new Prime Power School as he cut the ribbon on "a state-of-the-art prime power facility." Even though it is certified LEED Silver, initial feedback from the USGBC indicates that the facility should be LEED Gold, since the training facility has set a new standard for environmental stewardship. According to the deputy commander of USACE, it is on track to be the first certified LEED Gold facility ever built at Fort Leonard Wood.

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