

# Victory Sappers: V Corps Engineers in Operation Iraqi Freedom Part 1: The Attack to Baghdad and Beyond . . .

By Colonel Gregg F. Martin and Captain David E. Johnson

*“The sappers of the Victory Corps were all over the battlespace, providing value wherever they were employed . . . river crossing operations, building and maintaining infrastructure, conducting stability and support operations, repairing airfields, conducting combat operations—and much, much more . . . all done to an exceptionally high standard . . . each member of this high-energy team is a national hero.”*

*—Lieutenant General William S. Wallace  
Former Commanding General, V (U.S.) Corps*

**A** year after the fateful 11 September 2001 attacks, the United States began to assemble a “coalition of the willing” for the second phase of the war on terrorism—the liberation of Iraq. The United States and coalition allies built up forces in neighboring Kuwait and prepared for war. After diplomacy failed, the air and ground forces of the assembled coalition crossed the Iraqi border on 21 March, with V (U.S.) Corps leading the attack as the main effort. The attack, code-named Operation Iraqi Freedom, isolated Saddam

Hussein’s bases of power in Baghdad and Tikrit. The goal was to eliminate the regime quickly—with a minimum loss of life and destruction of civil infrastructure—in order to rapidly transition to Iraqi civil rule capable of ensuring peace, prosperity, and freedom for the Iraqi people.

U.S. Army engineers played a crucial role during the initial attack and continue to do so during the follow-on stability and support operations and rebuilding effort. Every element of the



An armored D9 dozer clears a road blocked by a destroyed vehicle.

## Report Documentation Page

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Engineer Regiment has contributed to the fight: Active and Reserve Components and civilians; combat engineers of every type (armored, mechanized, airborne, wheeled, air assault), combat heavy, construction, bridging, and topographic, as well as divers (see article on page 28), fire fighters, well drillers, and utilities/prime-power personnel (see articles on pages 52 and 55), facility engineer detachments and teams, and the U.S. Army Corps of Engineers (USACE). During initial combat operations, engineers assured the mobility of the ground forces, enabling coalition forces to move rapidly north and overwhelm Iraqi military forces. As the high-intensity fighting ebbed, engineers transitioned to stability and support operations, as well as humanitarian civic action (HCA), performing virtually every conceivable type of mission.

Although theater Army, Marine Corps, Navy, Air Force, and coalition engineers all played a vital role in the campaign, this article focuses on the V Corps engineer effort, and in particular, the role of echelon-above-division (EAD) forces. The article first looks at the planning that set the conditions for such a remarkable triumph. It then describes the decisive role that the V Corps engineers played, reviews some of the lessons learned from the campaign, and recommends ways for engineers to improve their performance on future battlefields. The authors concentrate mostly on the planning and high-intensity combat phases of the campaign, as the stability and support operations are still ongoing and the lessons to be learned are still emerging.

### **Engineer Plan and Task Organization**

**E**ngineer planners at V Corps and the various divisions did a magnificent job under very challenging conditions. These challenges came from the compartmentalization of information; the dispersion of key planners and units across multiple posts, countries, continents, and time zones; and the competing requirements of numerous simultaneous real-world missions.

The engineer plan was based on the emerging doctrine of “assured mobility.” To support this doctrine, it was crucial for commanders to understand the impact of terrain and weather on military operations. In the V Corps headquarters, the Terrain Analysis Platoon of the 320th Engineer Company (Corps) (Topographic), 130th Engineer Brigade, provided map and imagery analysis that yielded the V Corps commander and his staff products to visualize and understand the terrain. Moreover, each division had embedded terrain analysis teams that could provide similar analysis tools. Further, combat engineers throughout V Corps validated their charge as terrain experts, providing key analysis and timely decision-making products to the maneuver commanders.

Throughout V Corps and the divisions, the true testament of engineers was enabling commanders and staffs to “see” and visualize the terrain to a degree never before witnessed in warfare. The V Corps commander, deputy commander, chief of staff, and key members of the battle staff spent countless hours studying and analyzing special terrain products with

the V Corps senior terrain technician and his terrain analysts at their sides—helping key leaders comprehend the impact of the terrain in order to make the right decisions. The 320th Engineer Company and, in particular, the Terrain Platoon embedded in the V Corps battle staff, proved their incredible worth time and again throughout this campaign. Every effort should be made to retain this powerful capability at the corps level to ensure that battlefield commanders continue to have the right tools to make the very best decisions.

For each phase of the operation, planners from the V Corps Staff Engineer Section (SES) estimated the engineer effort required to support the scheme of maneuver. Working with the 130th Engineer Brigade, the SES resourced subordinate units with EAD engineers to accomplish required tasks. The planners identified several missions that were critical to the Corps, such as breaching border obstacles; maintaining main supply routes (MSRs); clearing and opening Tallil Air Base for medical evacuation (MEDEVAC) and C-130 resupply operations; developing logistics support areas (LSAs) and convoy support centers; using bridging assets for multiple river crossings; constructing C-130 and unmanned aerial vehicle (UAV) airstrips and hundreds of helipads; clearing and opening Baghdad International Airport; and providing for the tactical mobility and survivability of the maneuver forces.

Key engineer units were sent to Kuwait relatively early in the deployment process because planners and senior leaders recognized the importance of getting engineers into the theater early.

The engineer plan maximized the support forward to the divisions and accepted risk in the corps rear area. The early-arriving EAD engineer units went to support the 3d Infantry Division (3ID), V Corps’s main effort. The 130th Engineer Brigade initially detached its organic 94th Engineer Battalion (Combat)(Heavy) and 54th Engineer Battalion (Combat), along with several multirole bridge companies and the 937th Engineer Group, to reinforce the 3ID division engineer (DIVENG) brigade and its organic units—the 10th, 11th, and 317th Engineer Battalions (Combat). The 94th was organized into force packages and tenaciously reduced obstacles, upgraded MSRs, constructed LSAs, built helipads and airfields, and prepared banks for river-crossing operations. The 54th provided critical combat engineer support to the divisional cavalry squadron, augmented the divisional engineers to weight the main effort, and provided command and control (C2) for both the border crossing and an assault float river crossing. Shortly before the attack, the 130th controlled just a single combat heavy company until follow-on EAD engineer units from Forts Lewis, Carson, and Drum arrived and were able to cross the line of departure. This decision was made to ensure that 3ID was properly weighted with EAD units and set for success.

Follow-on divisions also received EAD engineers. Each division ultimately received an engineer group headquarters to assist with the C2 of EAD engineers within the division’s area of operations. This arrangement allowed the divisions’ organic engineers to focus forward on providing mobility

support to the maneuver elements in the offense. Because the environment was so austere, the requirements for engineers outweighed their capabilities. Given the scarce engineer resources, the priority was to resource the main effort first, then resource the other divisions as additional units arrived. This kept only a modest engineer capability in the corps rear area until well into the stability and support operations phase of the campaign.

## Engineer Missions

**T**hroughout the campaign, V Corps engineers performed virtually every conceivable type of mission. In addition, they simultaneously deployed forces; conducted reception, staging, and onward integration (RSOI); attacked into Iraq; and conducted both stability and support operations and HCA missions—bringing together and fighting an engineer force from all components and every type of engineer unit, geographically dispersed over hundreds of miles in combat and over multiple time zones and continents during deployment.

During the attack to Baghdad, the 3ID DIVENG brigade was weighted with the 937th Engineer Group, the 94th Engineer Battalion (-), the 535th Engineer Company (Combat Support Equipment [CSE]), the 54th Engineer Battalion, and several multirole bridge companies. The 130th commanded and controlled the 864th Engineer Battalion (Combat)(Heavy) (plus two additional line companies) and the 642d Engineer Company CSE; the 565th Engineer Battalion, which included the 502d Engineer Company (Assault Float Bridge [AFB]), the 38th Engineer Company (Medium Girder Bridge [MGB]) and the 544th Engineer Team (Dive); and the 320th Engineer Company (Topographic). In addition to supporting 3ID, the 130th also provided EAD engineer support to the 101st Airborne Division and its organic 326th Engineer Battalion, the 82d Airborne Division and its organic 307th Engineer Battalion (-), 3d Corps Support Command, numerous V Corps separate brigades, the V Corps command posts, and Special Forces elements—all this while maintaining MSRIs and alternate supply routes (ASRs) stretching 500 kilometers from the Kuwait-Iraq border to Baghdad.

V Corps would ultimately grow to a force of four-plus divisions and an armored cavalry regiment (ACR). However, the attack to Baghdad, destruction of the Iraqi Army, and forced collapse of the regime was conducted principally by 3ID, 101st Airborne Division, 82d Airborne Division (-), and the V Corps separate brigades, supported by the remarkably modest engineer force described in the preceding paragraph. After the fall of Baghdad, the V Corps engineer force grew to more than 19,000 soldiers in 3 brigades, 5 groups, 30-plus battalions, and numerous separate companies and detachments—an enormous force required and organized for subsequent combat, HCA, stability, support, and force bed-down operations that continue throughout Iraq. Some of the major missions include the following:

### Improve Bed-Down Facilities

One of the first tasks facing engineer units upon arrival in Kuwait was improvement of the austere bed-down facilities.

While most of the base camp construction was handled by theater engineers, V Corps engineers improved facilities by building protective berms, command posts, and ammunition holding areas; constructing helipads and nuclear, biological, and chemical decontamination sites; maintaining and upgrading roads; and providing numerous quality-of-life improvements such as gravel pads, electrical work, carpentry jobs, and drainage. In assembly areas in the open desert, engineers also found innovative ways to build gravity showers and burn-out latrines from the limited materials at hand. Currently, engineer units are focused on constructing force bed-down facilities throughout Iraq.

### Breach Border Obstacles

The first critical mission of the war was breaching the border obstacles. Before the attack, American and Kuwaiti engineers moved forward and cleared multiple lanes through the 5-kilometer-deep obstacle belt that marked the Kuwait-Iraq border. The 937th Engineer Group commander was the initial crossing force engineer—with the 54th Engineer Battalion commander serving as the crossing area engineer, responsible for the C2 of division forces as they passed through the breach lanes. Along each lane, combat engineers and military police manned traffic control points, with construction equipment and recovery vehicles nearby to remove blockages. The entire operation had been planned and rehearsed in detail before the attack; all key leaders in the division and corps drove through a full-scale mock-up of the border and the lane-marking system prior to execution. During the actual breach, once 3ID combat units had passed through the border, control of the crossing transitioned from division to corps, with the 130th Engineer Brigade's 864th Engineer Battalion commander assuming the role of crossing force engineer. This handover allowed the 3ID engineers to move rapidly north and focus on the forward fight.

### Clear and Repair Runways

The next major corps engineer mission was at Tallil Air Base, southwest of An Nasariyah. Capturing the airfield would allow the coalition to fly attack aviation, MEDEVAC flights, and C-130s closer to the front. A mechanized task force from 3ID, supported by A Company, 317th Engineer Battalion, captured the airfield; however, the runway and the surrounding facilities were unusable because of landmines, unexploded ordnance (UXO), craters, and protective berms. A team of engineers from the 54th, equipped with the M1 Panther II—a modified Abrams tank specially designed to clear minefields—cleared 200,000 square meters of the runway, allowing the first Apache attack helicopters to land. Then B Company, 94th Engineer Battalion, brought dozers, graders, and scrapers to finish repairing the runway for use by Air Force planes and to dig protective positions for the Patriot air defense batteries capable of defending the airfield against attack from Iraqi missiles. In less than 12 hours, the airfield was C-130 capable. Within two days, it was structurally capable of receiving all aircraft types, including C-5s.



**Engineer soldiers repair the airfield at LSA Anaconda, near Balad, Iraq.**

### **Maintain and Improve Supply Routes**

Maintaining and upgrading the hundreds of kilometers of MSRs and ASRs, ultimately stretching from the Kuwait border to Baghdad, was an enormous and critical mission. As V Corps attacked through As Samawah and on to An Najaf, fierce enemy resistance caused the Corps to divert traffic off the preferred paved highways and onto the inferior secondary desert route to the west, a move that allowed enhanced convoy security.

The huge volume of heavy-duty military traffic quickly deteriorated the already substandard Iraqi pipeline road, which had become the V Corps MSR. Much of the road had to be upgraded and widened to accommodate the thousands of heavy trucks hauling fuel, ammunition, water, and supplies to the forward units—only to return to Kuwait to retrieve more supplies and drive north again. Large stretches of the road disintegrated into “moon dust,” requiring the two combat heavy battalions and CSE companies to perform herculean efforts in maintaining and upgrading these routes under extremely adverse weather and combat conditions.

### **Build LSAs**

The two combat heavy battalions and CSE companies also built five enormous corps and division LSAs that leap-frogged from southern Iraq, north to Baghdad, and beyond to Balad, which was conquered by 4th Infantry Division (4ID) in mid-April. While the divisions were still in direct contact with nearby enemy forces, engineers built these critical logistical support bases that included construction and maintenance of UAV runways, C-130 and larger airfields, hundreds of helipads, cargo distribution centers, convoy support centers, fuel bag

farms, water distribution points, field hospitals, enemy prisoner of war holding areas, and hundreds of kilometers of force protection berms, as well as improvement of nearby MSRs. After the fall of Baghdad, engineers began to focus on force bed-down and quality-of-life improvements in the LSAs and forward operating bases.

### **Provide Survivability/General Engineering Support**

While divisional engineers fought the close fight, EAD engineers provided critical survivability and general engineering support for divisional, corps, and Special Operations Forces all over the battlefield, to include the battles for As Samawah, An Najaf, Karbala, and Baghdad. With such a relatively small engineer force operating over several hundred kilometers of battlespace, the key to success was in splitting battalions, companies, and platoons into small, mobile teams based around functional capability. While the battalion headquarters managed large projects like constructing an LSA, these smaller modules were given orders to move rapidly to the needed locations and aggressively execute high-priority missions. The impact was enormous as these modules maneuvered independently around the battlefield, rapidly providing critical engineer support. The standard package consisted of a dozer team, a bucket loader, a small emplacement excavator (SEE), a dump truck, and a vertical squad. This module could move rapidly and make an immediate and significant impact in handling a wide variety of survivability and general engineering missions. Based on the mission, enemy, terrain, troops, and time available (METT-T), this package was easily augmented with other equipment to handle larger missions. The flexibility, power, and speed of these

modules ensured that units received responsive engineer support throughout the V Corps area of operations.

### **Construct and Repair Bridges**

The ability to cross rivers was key to V Corps's operational maneuver. The Iraqi army rigged nearly all of the major bridges across the Euphrates River for demolition and succeeded in damaging several. Fortunately for V Corps, most of the key bridges were captured at least partially intact. Engineers emplaced numerous MGBs across damaged spans and conducted one AFB crossing under fire, just south of Baghdad. This heroic assault across the Euphrates River, the last natural barrier between the coalition forces and Baghdad, set the conditions for the final attack on Baghdad. Shortly after the fall of Baghdad, in Saddam Hussein's hometown of Tikrit, the 565th Engineer Battalion assumed control of a combined arms task force of more than 1,000 soldiers and emplaced a 536-meter AFB over the Tigris River in support of the 4ID. This became one of the longest float bridges ever built in a combat zone. It was completed on 28 April, Saddam's birthday, and was therefore nicknamed the "Birthday Bridge." The damaged fixed bridge was later reopened with two Mabey-Johnson logistic support bridges, also constructed by the 565th. During subsequent stability and support operations, engineers have emplaced numerous Mabey-Johnson bridges and MGBs throughout Iraq. In addition, a heavy dry support bridge was emplaced for the first time in combat, in support of the 101st Airborne Division in northern Iraq.

**The "Birthday Bridge," over the Tigris River, is one of the longest float bridges ever built in a combat zone.**



### **Conduct Urban Operations**

Engineers played a key role in the urban battles of As Samawah, An Najaf, Karbala, and Baghdad. Combat engineers provided excellent mobility support, fighting alongside tanks and infantry. During military operations on urbanized terrain (MOUT), engineers knocked down walls with M9 armored combat earthmovers (ACEs) and explosives; cleared roads blocked by mines, destroyed vehicles, or rubble with armored D9 or mine-clearing armor-protected (MCAP) D7 dozers; built hasty road blocks for force protection and traffic control; and destroyed caches of weapons and ammunition. Although many missions were not standard engineer tasks, engineers from many units exhibited technical and tactical proficiency and an excellent ability to improvise. Of particular note, the armored D9 dozers were tremendously effective in MOUT, as they were the lead combat vehicles into several urban battles.

### **Repair Infrastructure**

As the southern cities of As Samawah, An Najaf, and Karbala were liberated, engineer assessment teams began working with local civic leaders in assessing and beginning the repair of Iraqi infrastructure—often only a few blocks from where the fighting continued. Forward Engineer Support Teams (FESTs) from USACE were key to this effort, as was a strategy to hire local Iraqis to provide construction materials, equipment, and services as rapidly as possible to repair and build Iraqi civil infrastructure, as well as military infrastructure and bases. This strategy had two purposes: to put Iraqis back

*“The one BOS that has been consistently critical at every phase of the campaign—from the border obstacle breach, all the way through the attack, to current stability and support operations—and has performed uperbly and come through big time for the Corps at every turn . . . has been the engineers . . . The engineers have been the most flexible, versatile, multipurpose, and important force—from start to finish—in the campaign . . .”*

*—Major General Walt Wojdakowski  
Deputy Commanding General, V (U.S.) Corps*

to work as quickly as possible in rebuilding their own country, which would generate employment, stimulate the economy, and generate pride in themselves and their communities; and to mitigate the theaterwide shortage of both engineer troops and construction materials. Initiated by the 130th Engineer Brigade early in the campaign at LSA Bushmaster in southern Iraq, this effort grew steadily, reaching new heights with 3ID in Baghdad, and it continues to be a main effort of coalition forces throughout Iraq.

### **Provide Community Assistance**

During the transition from combat operations to stability and support operations, engineers played a key role in civic action operations. The most prominent example has been “Task Force Neighborhood,” an initiative of then V Corps commander, Lieutenant General William Wallace, whereby coalition forces help Iraqis clean up and rebuild their country—one neighborhood at a time. The basic concept is to put engineers in command of a combined arms task force consisting of construction equipment and soldiers and medical, dental, military police, civil affairs, psychological operations, public affairs, combat camera, and explosive ordnance disposal (EOD) personnel.

The original Task Force Neighborhood was in Baghdad in support of 3ID. The V Corps commander gave the mission to the 130th Engineer Brigade, which put the 94th Engineer Battalion in charge. The V Corps commander directed the task force to go into the poorest neighborhoods of Baghdad first to help the people who were most neglected and disadvantaged during Saddam’s reign. The effect was dramatic and significant, as engineers provided much-needed assistance for the community’s immediate needs, made assessments of their long-term requirements, and reassured them of America’s positive intentions. Engineers hired and employed hundreds of local Iraqis to help do cleanup and repairs. Together they hauled away thousands of tons of accumulated trash, cleaned up and repaired numerous schools and hospitals, disposed of thousands of UXO, repaired playgrounds and sports facilities, and worked to restore basic services. Such efforts have been instrumental in improving relations with the local communities, getting Iraqis to rebuild Iraq, and paving the way for the eventual return of Iraqi civil government. This concept has become the cornerstone of current stability and support operations efforts, with each of the divisions developing its own version of Task Force Neighborhood, to include the innovative Task Force Graffiti and Task Force Pothole developed by the 101st Airborne Division in Mosul. Perhaps an Iraqi journalist in Baghdad best summed up the value of

Task Force Neighborhood when he said, “No one has ever cared about this neighborhood or these people before, until you, the Americans, came. Thank you.” (For more information, see articles on pages 42 and 62.)

### **Perform Nonstandard Missions**

Throughout the campaign, engineers performed a wide variety of nonstandard missions that were critical to the success of V Corps. These missions included conducting boat-mounted riverine patrols; hauling, storing and destroying captured enemy ammunition and equipment; burying dead enemy soldiers; collecting, hauling, and disposing of enormous quantities of trash and garbage; and performing numerous civil-military support operations to help the Iraqi people. In taking on and accomplishing these important non doctrinal missions, the engineers of V Corps enhanced the historic reputation of Army engineers as being the most flexible, multifunctional, can-do, make-it-happen soldiers on the battlefield.

## **What Went Well**

### **Assured Mobility Concept**

Operation Iraqi Freedom validated the emerging doctrine of assured mobility. In a dynamic operational environment, engineers should focus on ensuring the uninterrupted mobility of the maneuver forces as an outcome, rather than a specific task or battle drill. During the operation, engineers succeeded by using terrain analysis to anticipate potential problems, providing technical advice to maneuver commanders, developing flexible organizations able to anticipate and react quickly under rapidly changing circumstances, and training to the highest level of individual and collective competence.

### **Aggressive, Rapid Execution**

The key to aggressive, rapid execution was moving small modules rapidly to the decisive point on the battlefield where they could make an immediate impact. A solid but partial solution on the battlefield NOW is far better than a more complete and thorough solution that is too late. We were all amazed at the engineer effects that these small modules could deliver at the decisive time and place in the corps-level fight.

### **Training Philosophy**

Much of our success was due to a home station training philosophy that concentrated on “doing less better.” Training on the core battle tasks at individual, crew, squad, and platoon levels helped develop soldiers, junior leaders, and units that are flexible, adaptive, and competent—capable of adjusting to new situations and finding innovative solutions to problems.

## **Terrain Analysis**

The engineer terrain analysis and visualization capability returned great dividends, allowing maneuver commanders at all levels to understand the effects of weather and terrain on military operations and enabling engineers to anticipate and adequately resource potential requirements. At the corps and division levels, dedicated topographic units provided support for planning staffs. At the battalion level, many engineer units had developed tactics, techniques, and procedures (TTP) for providing responsive terrain analysis support directly to their supported maneuver commander. Our success in this arena—both at corps and division levels—demonstrated the value of the 320th Engineer Company (Topographic) and validates the requirement for a topographic company and its terrain platoon at corps level.

## **Engineer Headquarters**

Engineer headquarters played an important role as C2 nodes in the campaign. EAD groups and battalions were able to command and control forces at critical nodes, freeing up the engineer brigade and the divisional battalions to focus forward on the close fight. Engineer headquarters are particularly well suited for this task because these critical nodes are often located at potential mobility bottlenecks. For example, engineers controlled the Iraq-Kuwait border crossing, the Karbala Gap crossing, and multiple crossings over the Tigris and Euphrates Rivers. At the Birthday Bridge in Tikrit, the 565th Engineer Battalion controlled a 1,000-soldier task force of engineer, infantry, air defense, and signal units and coordinated additional support from a combat heavy battalion, a corps wheeled battalion, and numerous bridge companies. Although current wisdom from the business schools advises organizations to flatten and reduce the numbers and layers of headquarters, this runs counter to our experience in this campaign, where several levels of engineer headquarters multiplied benefits rather than inhibited success.

## **Combat Heavy Battalions and CSE Companies**

The combat heavy battalions and CSE companies were critical throughout the entire campaign. They were the tip of the spear for the border obstacle crossing and in providing tactical mobility across rough desert terrain—often out in front of attacking armored forces. These units maintained MSRs and constructed LSAs and convoy support centers along the hundreds of kilometers of roads between the Kuwaiti border and Baghdad. Without this effort, V Corps would not have been able to push follow-on units or supplies forward along the substandard Iraqi road network. They constructed or repaired five airstrips, hundreds of helipads, hundreds of kilometers of force protection berms, and much more. They built the access and egress ramps and performed the bank preparation that enabled river-crossing operations. The superb effort of our combat heavy battalions and CSE companies guaranteed the operational mobility, and enhanced the tactical survivability, of coalition forces. Every effort must be made to increase the number of these enormously capable units in the Active Component force structure. The notion that these types

of units can or should be replaced by contractors is sheer foolishness. And this campaign proved it.

## **Embedded Key Enablers**

Infrastructure repair and construction were enhanced when key enablers and competencies were embedded inside of executing units. Critical elements were a construction management section with solid technical engineering expertise, a civil affairs team, Arab linguists, and dedicated contracting support.

## **Reach-Back Capabilities**

One of the new capabilities that engineers brought to this campaign was the ability to reach back to military and civilian engineers and harness their experience and expertise. This began with the FEST-Augmentation (FEST-A), which provided technical assistance and the ability to access USACE resources around the world. FEST-As have been critical throughout the campaign on both military and civil engineering. Another critical asset was the TeleEngineering Tool Kit, which enabled engineer reconnaissance teams to send pictures and measurements back to the Engineer Research and Development Center or the Waterways Experimentation Station for technical assessments, bridge classifications, and engineering solutions. These kits were widely used all over the battlefield, from damaged runways, bridges, and electrical power stations to MSRs, helipads, and demolitions work. In addition, they provided a powerful communication capability that allowed engineers to conduct daily videoteleconferences for communication, coordination, and situational understanding. Finally, cooperation and on-site technical advice (which started at the Campo Pond bridge training site in Hanau) between military and civilian engineers paid off with the emplacement of Mabey-Johnson bridges in combat.

## **D9 Dozer and M1 Panther II**

These two items were big winners in combat and should be programmed and fielded into the Army inventory. They must however, come with organic transportation, communications, crew-served weapons, and dedicated operators.

## **Engineer/Sapper Spirit**

Engineers were everywhere on the battlefield, and their hallmark was an amazing can-do spirit. The V Corps commander frequently praised his Victory Sappers for their enthusiasm and “any mission-anywhere-any time” attitude. Their initiative, flexibility, adaptability, dedication, and professional expertise were incredible. Their team spirit in supporting the commander was second to none. Their raw courage and bravery on the battlefield were an inspiration to all.

## **What Needs Improvement**

### **An Aging Fleet of Equipment**

Despite their superb performance, engineer units have some of the oldest equipment in the Army. For combat engineers in particular, much of the equipment was unable to adequately support the maneuver units.



*Armored Vehicle-Launched Bridge (AVLB).* Based on the M48/M60 chassis, the AVLB is both slow and difficult to maintain under the best of circumstances; continuous operations and an extremely austere logistics environment made the task even harder. The maintenance problems were exacerbated by recovery problems. The AVLB should be replaced by the Wolverine. Much of the construction equipment in combat heavy units and CSEs is in the same condition and must be replaced.

*M113 Engineer Squad Vehicle (ESV).* The ESV often lagged behind the maneuver forces it was supposed to support. In addition, it did not offer enough protection against enemy fire. Despite their need for mobility support, some maneuver commanders became unwilling to commit their scarce engineer assets forward into the fight for fear of losing them to enemy fire. The Army must outfit armored engineers in an appropriate vehicle that can keep up with the maneuver forces it supports and that offers adequate force protection.

*Mine-Clearing Line Charge (MICLIC) and the Volcano.* These two key engineer weapon systems—both mission-essential in the combat training center environment—did not meet expectations. During Operation Iraqi Freedom, the Volcano was never fired, and only one MICLIC was fired. For scatterable mines, the release authority was held at the Combined Forces Land Component Commander level; during a rapidly moving campaign against an ill-defined enemy, it is nearly impossible to identify a target and get timely approval to use scatterable mines during a short window of opportunity. For breaching, a more effective technique was either to physically remove the mines or to conduct a mechanical breach with a D9 or an MCAP D7 dozer; an M1 Panther II; a tank with a plow; or an M9 ACE. Given the real-world limitations of both the MICLIC and the Volcano, we should invest in other means to accomplish the intended effects.

### **Signal, C2 Package, and Logistics Support**

For EAD engineers, three special shortfalls emerged: First, although EAD engineers operate throughout the division and corps battlespace, they often were not high enough on the priority to receive dedicated support from corps signal assets and often operated away from divisional signal support. Without the ability to communicate, EAD engineers lost some of their ability to operate independently, provide the mobility portion of the common operational picture, or to serve as key C2 nodes for the division. Second, EAD engineers did not have the same C2 hardware and software that the division was using. This diminished their ability to see and understand the battlefield to the same degree as their maneuver brethren. Third, the logistics systems were not flexible enough to support the dynamic and fast-moving role that EAD engineers played within the division and corps areas of operation. In particular, maintenance (especially Class IX) and construction materials (Class IV) were a constant challenge. These issues need to be worked hard before the next conflict.

### **Rapid Helipad Construction and Dust Control**

There was an enormous demand on engineers to rapidly construct hundreds of helipads in the desert. The dust, dirt, and sand caused dangerous brownout conditions that damaged the aircraft and caused several crashes. The best and fastest method to meet the demand for helipads was to install Mobi-Mat pads. Fast to emplace and extremely effective, this material should be purchased in sufficient quantities and issued to both divisional and EAD engineer units—PRIOR to crossing the line of departure.

### **Recommendations**

**C**ontinue to develop assured mobility into doctrine. Develop corresponding mission-essential task list changes, training models, evaluation tools, and TTP for implementing the doctrinal framework. Organizations need to include enhancers such as topographic, engineer reconnaissance, and reach-back capabilities. For example, each division and separate maneuver brigade or ACR needs a FEST-A. TeleEngineering Tool Kits must be fielded to every engineer battalion and ACR engineer company. Another critical component of assured mobility is the ability of engineers to conduct MOUT effectively. (See article on page 32.)

Combat engineers supporting maneuver forces need comparable training and modern equipment to be combat capable and relevant for the maneuver commander. In particular, engineers need a more survivable and capable squad vehicle, preferably one that uses the same chassis as the infantry and armor it supports. Sappers also need equivalent enhancers, such as thermal sights and night-vision capability. MOUT training should receive greater emphasis and Engineer Qualification Tables should include mounted gunnery so that engineers are better trained to fight alongside tanks and infantry. Engineers should be included in fielding distribution plans with the maneuver units they habitually support—and not as separate fieldings.

During combat operations, EAD engineers will be task-organized in functional teams to perform specific missions. To prepare for combat, units should develop, train, and employ force enhancement modules (FEMs) designed around capabilities rather than units. (See “Transforming the 130th Engineer Brigade... One Step at a Time,” *Engineer*, May 2001, pages 52-60; and “Operation Enigma Strike: Testing the Deployability of the 130th Engineer Brigade FEMs,” *Engineer*, April 2002, pages 41-43.) Deployments and decentralized training are the preferred mediums for training the junior leaders who will form these modules and operate independently across wide areas of operation. Such leaders must be flexible, adaptive, and innovative—able to make things happen based on a clearly articulated and understood commander’s intent.

Engineers must work more closely with the Ordnance Branch on EOD. The requirement for the destruction of weapons caches, ammunition dumps, and UXO quickly outstripped the resources of the EOD units, and combat engineers picked up

the excess. With greater mutual cooperation and training, combat engineers and EOD specialists could work together to relieve much of the workload for routine demolitions and free up dedicated EOD teams for unusual situations or emergencies.

Two months after the capture of Baghdad International Airport, there were virtually no international construction contractors operating in Iraq, and military construction units continue to perform nearly all heavy construction. That contractors could or would do what the military engineers have done during combat and the early stages of stability and support operations is an ill-conceived fantasy, with no basis in reality. And this operation has clearly demonstrated that fact. EAD engineers are critical enablers for divisions during sustained operations. The Army needs to retain as many combat heavy battalions and CSE companies on active duty as possible. The general engineering effort they provide is an engineer core competency that cannot be contracted to civilian engineers during combat operations. The Engineer Regiment must champion this cause, as most of the Army never sees these units in action. General engineering requirements are usually ignored in peacetime training and computer-based Warfighter exercises—or they are performed by civilian companies like Brown & Root—and therefore the force regularly underestimates their value.

All EAD engineer units must be structured to operate independently and form multiple functional modules for particular missions (for example, a C2 headquarters for a river crossing, an MSR team, and an airfield team), to include personnel and equipment for C2. Consider developing

On behalf of all the Victory Sappers, we express our deepest thanks, respect, and admiration to Lieutenant General William S. Wallace, the former V Corps Commanding General. His clear intent and power-down leadership ensured that his sappers always knew what to do and took the initiative to get the job done—ALL OVER the battlefields of Iraq. VICTORY!

In addition, the authors would like to acknowledge the visionary leadership and work of previous 130th Engineer Brigade commanders. Many of their initiatives came to fruition on the battlefields of Iraq, where Army engineers have never been better. SAPPERS IN!

For more information and a video on the V Corps engineers during Operation Iraqi Freedom, see the 130th Engineer Brigade Web site “130th OIF Interactive History” at NIPRNET <<http://www.130thengineers.army.mil>> or SIPRNET <148.35.87.68>.

multifunctional battalions with an extremely robust C2 infrastructure. As an example, the 565th Engineer Battalion (Provisional) performed great service during the crossings of both the Tigris and Euphrates Rivers. This battalion should be formally recognized, activated, and manned.

C2 systems such as the Force XXI Battlefield Command - Brigade and Below (FBCB2) and Maneuver Control System (MCS) need to be standardized and pushed to lower levels, particularly for EAD engineers. Engineers also need greater long-range communications capability; terrain information is particularly bandwidth-intensive and overwhelms tactical communications nets. Engineers also need greater transportation capability in order to remain mobile.

Non-modified table of organization and equipment (MTOE) enablers, such as the M1 Panther II and the D9 dozers, were great and must be added to the MTOE along with the supporting prime mover, communications capability, and a mounted .50-caliber machine gun.

## Conclusion

*“Operation Iraqi Freedom was and is an engineer’s war. During the fight, and even more now, the engineers are critical. We cannot do without the engineers.”*

*—Major General Walt Wojdakowski  
Deputy Commanding General, V (U.S.) Corps*

The Engineer Regiment provided outstanding support to V Corps during Operation Iraqi Freedom. Although the engineers accomplished all of their missions and enabled V Corps to accomplish its historic mission to liberate Iraq, there are many lessons to learn from the high-intensity phase of the war, and there will be many more as we fight to win the peace. Learning these lessons and continuing to develop highly motivated, professional soldiers, units, and leaders—with the right doctrine, equipment, and TTP—will ensure that the Engineer Regiment is ready again the next time the nation calls.



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