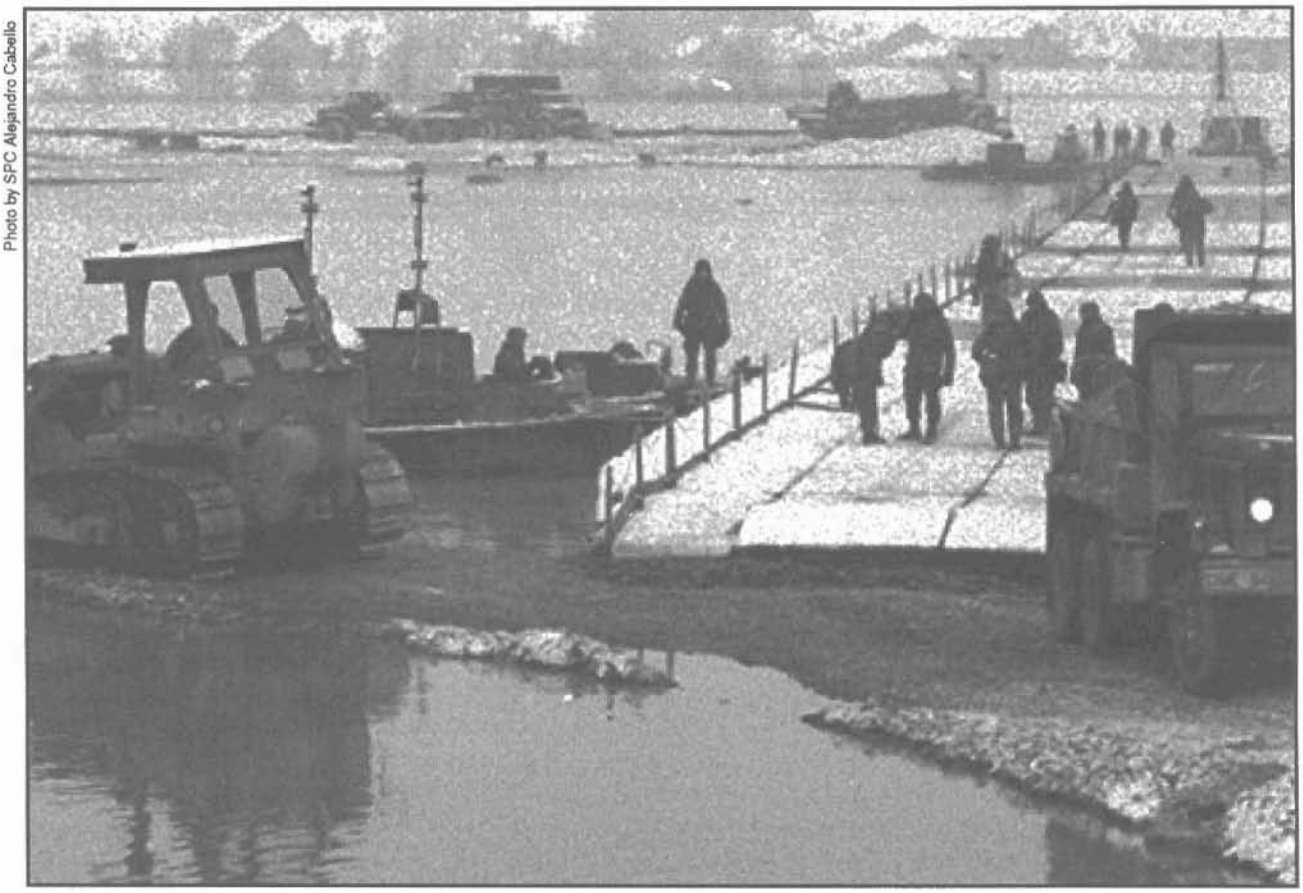
Engineers in Bosnia:
An Overview

By Major David L. Treleaven

In his often-quoted address to a graduating Officer Candidate School class in 1942, Major General Eugene Reybold, the Chief of Engineers, advised engineer officers to cultivate a sense of curiosity and an inquiring mind. "Never pass a bridge without giving thought as to its construction or as to how that particular piece of terrain might best be organized for defense, or as to how it might best be attacked if it were organized by the enemy."

As we learn more about engineer activities in Bosnia, it is clear that his advice is just as relevant today. The complexity of Operation Joint Endeavor has taxed engineer capabilities and resources, demanding more versatility than any other combat support force in the theater.

Photo by SPC Alejandro Cabello



U.S. Army soldiers from the 502nd Assault Float Bridge Company construct a floating ribbon bridge on the Sava River during Operation Joint Endeavor.



Photo by SPC Alejandro Cabello

An Abrams M1 tank, with a mine roller attached, searches for mines in a field along Route Ostrich in the zone of separation. The field will be used for a joint military mission.

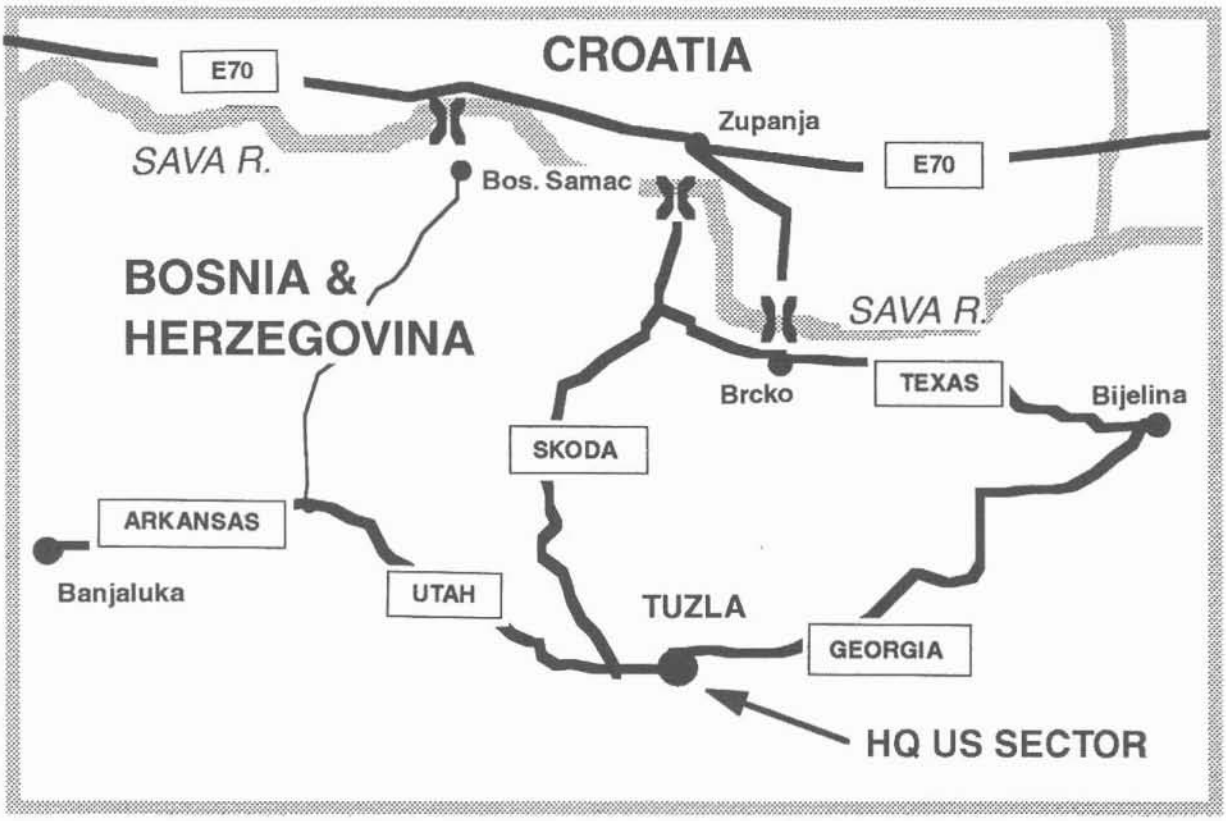
An example is the 1st Engineer Brigade of the 1st Armored Division. This mechanized combat engineer brigade, which normally has a strength of 800, deployed with 2,400 personnel! It received engineer unit attachments with widely different missions, including assault float bridge, combat support equipment, and power generating companies; fire fighting detachments; combat heavy and corps combat battalions; as well as two U.S. Air Force engineer squadrons and two U.S. Navy construction battalions. The brigade quickly bridged a major river, cleared hundreds of kilometers of supply routes, and employed its engineers in construction missions to sustain Task Force Eagle, the U.S. component of the Implementation Force (IFOR). The challenges extended to everyone in the command—every sapper, NCO, and officer.

Clearly we cannot cover the breadth of engineer success stories in Bosnia to date nor most of the relevant lessons learned. The information is largely not available, because the key players are still overwhelmed with operational concerns. However, this article presents a summary of accomplishments in the engineer battlefield functions.

Mobility

Bosnia has tested engineers across the full range of mobility missions: bridging, route clearance, route maintenance, countermine operations, and obstacle reduction. Many of the lessons are fundamental. A moving army needs bridges, and engineers must build, reinforce, or classify them. Battlefields have fortifications that engineers must know how to destroy. In Bosnia, cold temperatures have made these tasks more difficult. Snow must be removed, and frozen ground has caused route proofing to be unpredictable. Bosnia reminds us to heed the basics and train for realism.

Bridging. The greatest single engineer challenge to date was the crossing of the Sava River near Zupanja, Croatia (see map, page 20). This mission was the largest operationally required river crossing since World War II. It was also the first real contingency use of the ribbon bridge. The crossing was conducted under extreme conditions. As engineer equipment was poised to cross, a



thaw caused the Sava's width to swell from 300 to 600 meters. The flood plain where most of the equipment was marshalled became flooded. Despite these handicaps, engineers used Chinook helicopters to deploy ribbon bridge sections into the river while other engineers rebuilt the approaches. Their efforts paid off when the bridge was finally completed at 1000 hours on 31 December 1995. When the water receded, engineers built a causeway across the flood plain.

Bridge-erection boats initially held the floating bridge against the current, but that was a temporary solution. Two float bridges are now anchored in place with a shore guy and boat combination to allow two-way traffic across the river. Work is ongoing to design a satisfactory semipermanent overhead cable system, but several anchoring systems have been tried already with limited success. Doctrinal and technical publications will be updated to reflect techniques learned and shortcomings identified during the Sava River operation.

The 130th Engineer Brigade now controls the entire crossing operation from a command post in Camp Harmon, on the Croatian side of the Sava River. Two ribbon bridge companies (the 502d from Hanau, Germany, and the 586th from Fort Benning, Georgia) and a platoon from the 535th Combat Support Equipment Company in Grafenwehr, Germany, operate the crossing site.

The Cold Regions Research and Engineering Laboratory deployed a bridge team to Zupanja to research alternatives. Using historical data from the Croatian Hydrometeorological Institute, the lab is developing predictions for when the spring thaw will occur. It is also evaluating an objective method for predicting the thaw.

There are several options for establishing a permanent fixed bridge. One alternative is to hold the float bridge at Zupanja in reserve and construct a Compact 200 bridge at Brcko, Croatia. The Compact 200 is a panel bridge manufactured in Great Britain. Similar in concept to the time-honored Bailey bridge, which is also a British design, it uses

advanced alloys that give it greater strength. An interim solution is to construct a Bailey or medium girder bridge (MGB) at the site. But before new spans can be built, damaged spans must be removed. Sappers from B/23 Engineer Battalion have completed the explosive demolition and cleanup of two spans at Brcko.

Another proposal under consideration is to hire a Hungarian contractor, Hidepito, to construct a combination rail/one-lane-traffic floating barge bridge with a military load class of 100. The proposed site is about 20 kilometers west of Zupanja, at Bosanka Samac. The contractor has arranged to lease the barge system from Hungarian Cold War stocks.

To date, engineers have emplaced a seven-bay MGB and numerous armored vehicle-launched bridges (AVLB) throughout Bosnia. Additional bridges have been brought into the theater, enhancing freedom of movement for both civilians and IFOR units. The AVLB is a real workhorse that is being used to reinforce existing bridges, replace blown bridges, and span dry gaps. Engineers emplaced wooden decks in the open centerline of the AVLB to prevent small cars and horses from falling through.

Engineer soldiers are heavily involved in classifying bridges. They identified bridge reconnaissance as an area that needs more emphasis during the predeployment training at the Combat Maneuver Training Center.

Route Clearance. The engineers' biggest challenge in Bosnia at this time is clearing and proofing hundreds of kilometers of roads and supply routes. Mines continue to be the deadliest threat to our soldiers. Since the arrival of the IFOR, there have been 14 mine incidents in the theater, 10 of them involving U.S. forces. One incident was fatal, and four others produced serious injuries. Of these incidents, two occurred because soldiers failed to follow procedures outlined during their mine-awareness training. (See article on page 11.)

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Zone of Separation (ZOS). By far the most dangerous mission is the proofing of lanes through the zone of separation (ZOS), a no-man's-land along the confrontation lines between the former warring factions. A commonly heard term is "punching a hole in the ZOS." This is a coordinated operation in which U.S. forces provide security and engineer expertise to the factions who actually clear the mines from roads that cross the ZOS between former front lines. The factions work from their respective sides but, due to distrust, often leave before completing the operations. When they are finished, M1 mine rollers proof the lanes. The "holes" are essential to restore the normal prewar flow of civilian traffic.

U.S. engineers are part of the clearing teams and provide expertise, detection capability, and demolitions. They advise the senior maneuver commander for the clearing operation and provide blades to collapse trenches and bunkers in the ZOS. Because most bunkers are squat, well-built structures that are reinforced by earth revetments, they are not easily reduced. The CEV is extremely valuable in this role since it is an ideal and survivable platform for reducing bunkers and other fortifications. In the 3/5 Cavalry sector alone, engineers have destroyed more than 262 bunkers with the CEV! It is also useful in removing debris in high-threat areas along main supply routes. Engineers have reduced fortifications with demolitions, but using the CEV's main gun has not been authorized.

Countermine Operations. There are 30 sets of M1 mine rollers and 11 sets of M60 mine rollers in Bosnia. Additional M60 chassis tanks have been deployed for IFOR engineers. When the soil is frozen, it acts as an ice bridge over buried mines, so rollers must make three passes to clear a route. The first pass disturbs or cracks the frozen soil, the second pass ideally detonates the mine, and the third pass proofs the area. However, some mines detonate after the proofing, sometimes even after several other vehicles have travelled the proofed tracks. It is apparent that many mines in Bosnia have deteriorated and their performance is very unpredictable.

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Vehicle-mounted detection systems and remote detection systems exist but are not yet proven.

The Robotic Technology Insertion Activity (RTIA) at Fort Leonard Wood coordinated the deployment of several pieces of equipment for mobility support and validation in Bosnia. They also conducted predeployment train-ing with USAREUR engineers. The equipment includes:

- *Panther*—a robotic control package for M60 chassis tanks, which are used in a number of applications such as mine rolling and blading.
- *Badger*—a remotely controlled 5-ton truck with full-width mine-detecting coil and a standoff detection and marking system.
- *Miniflail*—a robotic flail that clears a footpath. This equipment has been used by Special Forces and is a veteran of such contingency areas as Afghanistan, Eritrea, and Kuwait.
- *Pointman*—a remotely controlled robot equipped with cameras that allow its controller to manipulate it into tight places to remove or neutralize explosives.
- *Barret .50-Caliber Sniper Rifle*—a weapon for the long-range neutralization of exposed mines and unexploded ordnance.

The 1st Armored Division has established a Mine Awareness Center (MAC), which consolidates faction minefield reports and publishes them for distribution. In the U.S. sector alone, more than 3,700 minefields have been reported. Most of them are concentrated in an area 2 to 3 kilometers wide along the ZOS. The MAC is tasked to plot untranslated minefield reports which appear on overlays using an entirely different grid system than that used on U.S. maps. Plotting requires a slow manual process of transferring minefields drawn on former warring faction maps to U.S. maps using terrain association.

Snow Removal. In addition to organic graders and bucket loaders, snow plows for the small emplacement excavators (SEE) were sent to Bosnia. UNIMOGS, German trucks similar to the SEE, were also deployed from Germany. Salt spreaders, which mount on 5-ton trucks, are being sent from CONUS.

Countermobility

Although the primary engineer focus in Bosnia has been on mobility, countermobility was an early force-protection priority for engineers. Checkpoints had to be built rapidly and manned by U.S. forces. Engineers were key in constructing barricades and mobile obstacles to control the flow of traffic at these checkpoints.

Survivability

Force protection is being done in tiers. Military engineers enhanced IFOR protection with an initial standard of triple concertina and berms around base camps, fuel farms, and key facilities. Towers and bunkers will follow. Engineers executed some sandbagging, but this is largely a unit responsibility.

Sustainment

A wide variety of engineer units have worked around the clock to construct life-support facilities at 23 base camps in Hungary, Croatia, and Bosnia-Herzegovina. A pattern similar to that used in Somalia and Haiti has developed. Military engineers quickly build essential facilities, and the Logistics Civilian Augmentation Program (LOGCAP) contractors under the Brown & Root Services Corporation take over the operation and improve them. LOGCAP contracting activities throughout the theater are managed by the Transatlantic Division of the U.S. Army Corps of Engineers.

Many of the problems that have occurred elsewhere with LOGCAP are being repeated in Bosnia. Often Brown & Root competes with Department of Defense logistics for the same ports, roads, and airfields. Brown & Root personnel experience many of the same difficulties as military engineers. They need petroleum, oil, and lubricants; prescribed load lists; and security. A persistent problem is the lack of a civilian economic base to draw from in Bosnia. Departing United Nations units have often declined to sell their generators, pumps, tools, vehicles, furniture, and fixtures. As a result, Brown & Root has had to bring in equipment they thought would be available in country. In addition, required background checks have slowed Brown & Root's hiring of local nationals.

Despite these problems, living conditions continue to improve for U.S. forces in

(Continued on page 29)