BRIDGING THE GAP IN HOMELAND SECURITY:

62D ENGINEER BATTALION HELPS SECURE THE NATION'S BORDERS

By Lieutenant Colonel Alfonso Riera and Captain Richard T. Childers

The terrorist attacks of 11 September 2001 pushed the patrol of U.S. borders to the front line of national security. And today, security efforts along the southwest and northern borders continue to expand. The U.S. Border Patrol's heightened presence along the southwest border has burdened narcotic traffickers, alien smugglers, and other transnational threats to our country. In fiscal year 2004, border patrol agents seized more than 20,000 pounds of cocaine and more than 1.5 million pounds of marijuana—a street value of more than $1.9 billion.

Request for Assistance

In late summer of 2003, the U.S. Border Patrol, Del Rio (Texas) Sector Headquarters, requested assistance from Joint Task Force-North (formerly known as Joint Task Force-Six) to have a military engineer unit construct a bridge over Cuevas Creek on the U.S.-Mexican border near El Indio, Texas. The bridge would reduce the response time between two border patrol stations, increasing the capability to apprehend illegal immigrants of many nationalities and to interdict drug traffic.

The U.S. Border Patrol frequently requests military support from Joint Task Force-North, which detects, monitors, and supports the interdiction of suspected transnational threats within and along the approaches to the continental United States. The task force fuses and disseminates intelligence, contributes to the common operating picture, coordinates support to lead federal agencies, and supports security cooperation initiatives to secure the homeland and enhance regional security.

The 62d Engineer Battalion (Combat) (Heavy) accepted the construction challenge and assigned the mission to its heavy-construction company (Alpha Company). The battalion, a III Corps Army engineer asset, is one of few active-duty heavy-construction battalions; therefore, it is a highly sought-after resource.

Mission

In addition to erecting a three-span, nonstandard fixed Bailey bridge, the construction mission would include upgrading two access roads, operating a quarry pit, performing excavation and filling operations, complying with environmental requirements, placing hundreds of cubic yards of concrete, and constructing approach roads.

Project Planning

The project was a joint venture between the U.S. Army Corps of Engineers® (USACE) Fort Worth District, Joint Task Force-North, and the U.S. Border Patrol. USACE contracted a project management firm to coordinate the efforts of the project delivery team. Alpha Company developed the construction schedule, bill of materials (BOM), and equipment requirements. Due to logistics and time constraints, much of the required equipment was contracted from rental vendors. Construction materials were procured through USACE, using U.S. Border Patrol funding programmed specifically for border infrastructure.

Force Providers

On 14 July 2004, Joint Task Force-North and unit leaders coordinated the arrival of the advance party at the site, as well as all of the earthmoving equipment (both organic and rental). These force providers—made up of U.S. Army Reserve Soldiers from New York, Pennsylvania, Texas, and Minnesota—set up the base camp and prepared the ground work for the main body of Soldiers, cycling personnel on their annual training periods throughout the duration of the project. The Soldiers hit the ground running and organized into construction groups based on specific tasks. They erected and maintained all tents, shower and laundry facilities, and power and water systems. While the force providers maintained the camp and quality of life, the 62d Engineer Battalion concentrated on the construction mission.

Earthwork

The banks of Cuevas Creek were extremely steep, unstable, and covered in dense vegetation due to the unseasonable amount of rain the area had received during the 3-month project—more than is typically expected in a 5-year period. The earthmoving platoon created a borrow pit 6 miles away to provide material for the patrol road base and nonstructural areas of the project. Each pier and abutment location was overexcavated and built back with engineered fill, distributing the load of the shallow spread or "floating" footers. The engineered fill, which had to conform to Texas Department of Transportation standards, was delivered from a certified quarry. To minimize the excavation required along the banks, the Pro-Tec™ shoring system was used as an alternative to a standard trench box due to its ability to be advanced to greater depths and provide an open excavation, which was necessary to place the bridge piers.

Soldiers from the equipment platoon of the 62d's Headquarters and Support Company improved the existing trails on either side of the bridge into suitable all-weather patrol roads. More than 45,000 cubic yards of borrow pit, select fill, and native material was displaced and stockpiled during the initial earthwork phase. This material was used to restore the site's finished grade to its natural state at the end of the project.

Foundation System

The substructure design of the bridge was identical to a commercial-grade highway overpass—designed and built according to Texas Department of Transportation standards. The piers and abutments on either side of the gap were constructed roughly in the same phases. Accuracy was paramount during this period; any error made on the ground would be magnified as the structures went vertical. A maximum deviance was allowed (1/8-inch horizontal and 2-inch vertical) to ensure that the bridge would match the support points. The reinforced concrete substructure used more than 1,000 cubic yards of concrete and 22 tons of steel reinforcement.

The bridge abutments were built on a shallow spread foundation bearing on 4 feet of engineered fill, compacted to 100 percent maximum dry density according to worldwide

Aerial view of scour apron preparation

standards. Standing 15 feet tall, they were topped by a cap and corbel that allowed the finished bridge deck to sit even with a reinforced concrete approach slab. The abutments were finished by placing multitier wingwalls to confine the base of the approach road.

The two bridge piers also used shallow spread foundations resting on 5-foot subfooters of engineered backfill. The reinforcing steel for each pier stem was preassembled into six 7- by 30-foot rigid mats, which were placed using a 40-ton crane. The 33-foot piers had to be placed in four phases—footers, lower pier stem, upper pier stem, and pier cap—according to the limits of the Symons™ forms rented for the project.

Erosion Control

The project site was located in a flood plain at the lowest point in the watershed. The height of the bridge's superstructure was designed to be above the flood elevation level of the 50-year storm (equivalent to receiving 2.7 inches of rain in 3 hours). Erosion control was particularly important, especially with the shallow spread foundations of the piers and abutments. The risk, as with any bridge over a water feature, is that moving water will erode the engineered fill from under the piers or abutments, undermining the footings and causing the bridge to fail. To ensure that this would not occur, a 50- by 150-foot scour apron was constructed on either bank, 6 feet under the finished grade. The most important feature of this scour apron was the 6-foot cutoff walls that bordered the perimeter of the apron below the maximum calculated scour depth. To further protect the integrity of the finished slope, the unit anchored Pyramat® (a geosynthetic lining material) over the finished grade to prevent erosion while the slope becomes revegetated.

Bridge Launch

The bridge came directly from the company, with some tailor-made components to match the substructure. The rocking rollers on the abutment seats and the pier caps had to be raised on nearly 3 feet of cribbing to meet the elevation of the abutment corbel and approach slabs. Two John Deere™ 410 tractors were used to position the panel trusses during assembly; however, the tried and true "lay-hold-heave" method was used for all other components. Once the bridge had spanned the gap and was jacked down onto the bridge shoes, the company placed the stringers, decking, and curbs.

Lessons Learned

During this project many quality-control lessons were learned. Unlike most missions, many external civilian and military quality assurance/quality control (QA/QC) personnel were on hand to bridge the gap between the Soldiers' skill level going into the project and the civilian industry standard. When many parties are involved in oversight of a project, all QA/QC personnel have to agree on the standards before the work is completed. One way to ensure that this happens is to have Soldiers build a mock-up, or test section, before full-scale construction begins. This ensures that everyone knows exactly what is required and prevents undue frustration and needless work. Other considerations include the following:

- Keep a daily QA/QC log; use it to identify trends and stop potential problems.
- Get approved modifications *in writing*; keep them on hand.

On any project of this magnitude, proper BOM management is critical. Material should flow in and out of a centralized

An engineer flag flying high during the launch

Finished bridge launch

point where it is accounted for and protected from the elements. Important considerations include the following:

- Assign a BOM manager who is responsible for accepting, inventorying, and safeguarding materials.
- Develop a material-tracking matrix that incorporates fabrication and/or shipping lead times.
- Beware of the temptation to use the material for purposes other than what it is specified for.

Using prefabricated, hand-set panel forms has its pluses and minuses. On the plus side, their cost effectiveness, light weight, and strength allow large-scale projects to be constructed quickly using fewer man-hours than standard timber forms. Panel forms can be used as "slip" forms; the bottom sections can be stripped off, then reused to place sections above as soon as the concrete achieves a specified strength. The risk with using panel forms is that they will "float" up when concrete is being placed, primarily due to their light weight. A solid connection with the base or footer is critical. Other considerations include the following:

- Check all pinned panel connections before placement.
- Do not overvibrate concrete during placement.

Project Completion

Although project completion was originally planned for 2 months, heavy rains and technical problems added another month to the schedule. But the project provided a training and leadership opportunity that would be difficult to duplicate within the military training environment. The Soldiers were able to greatly increase their survey, design, and horizontal and vertical construction skills. The result is a highly confident group of engineer Soldiers who will take these experiences and use them during future military missions.

The mission incorporated specialists from other military services and agencies to make it a true joint and interagency operation. Joint Task Force-North Marines provided logistical planning and construction support, while Army planners assisted with base camp setup and teardown.

A great partnership developed among Joint Task Force-North, the 62d Engineer Battalion, the U.S. Border Patrol, and the members of the project delivery team. The mission—a win-win situation for all involved—was a complete success. Thanks to the great efforts of our brave men and women in uniform and the professionals of our civilian workforce, one more gap at our nation's borders has been bridged.

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