

Engineer Civil Action in Cambodia

By First Lieutenant Peter M. Friedewald

In spring 2011, Soldiers from the 544th Engineer Company, 52d Engineer Battalion, traveled to Cambodia to participate in Operation Angkor Sentinel 2011, a multinational training exercise sponsored by U.S. Army Pacific and the Royal Cambodian Armed Forces. The exercise, led by the 204th Maneuver Enhancement Brigade, Utah Army National Guard, included U.S. Navy Seabees and participants from the Mongolian and Indonesian armed forces. The exercise included an engineer civil action project, a medical civil action project, and a command post exercise. The ultimate goal of the exercise was to increase the capabilities and professionalism of the developing nations' militaries while strengthening the bonds between our countries.

The 40-Soldier element from the 544th Engineer Company spearheaded the engineer civil action project. The 544th is a vertical engineer company composed of Soldiers with a variety of skills, including concrete and masonry specialists, carpenters, plumbers, and electricians. Surveyors, heavy equipment operators, and welders from throughout the 52d Engineer Battalion also joined the team to enhance construction capabilities. Soldiers of every military occupational specialty represented helped ensure the success of the project.

The engineer civil action portion of the exercise consisted of two projects in Kampong Speu Province, southeast of the capital city of Phnom Penh. The 544th Engineer Company Soldiers constructed a primary school facility and performed major renovations on a rural medical clinic. Both projects were enhanced by Seabees, who placed and improved wells for the facilities and surrounding villages.

School Construction

Construction of the Pothivong Primary School was a significant undertaking. In the span of 8 weeks, 544th Soldiers turned a 6-hectare swath of jungle into a walled compound containing a 9- by 27-meter, three-room schoolhouse, a three-stall latrine building with a septic tank and leach field, a well, and a playground. The structures were built in the Cambodian style of reinforced concrete, column-and-beam framework and finished with locally made clay bricks, interior and exterior cement stucco finish, and interlocking concrete roof tiles. The school now



Photo by Staff Sergeant Whitney Houston

Children greet 544th Engineer Company Soldiers on their way to the jobsite.

serves 120 local children who previously could not attend school or had to walk or ride a bicycle more than 3 miles to the nearest facility.

The American and Cambodian contingents brought their individual strengths to the project. Early on, 544th Soldiers contributed their skills and expertise in concrete operations, placing more than 80 cubic meters of concrete in the footers and monolithic foundation. The Americans demonstrated

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE APR 2012	2. REPORT TYPE	3. DATES COVERED 00-00-2012 to 00-00-2012			
4. TITLE AND SUBTITLE Engineer Civil Action in Cambodia		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Army Engineer School, Engineer Professional Bulletin, 464 MANSCEN Bldg 3201 Ste 2661, Fort Leonard Wood, MO, 65473		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	Same as Report (SAR)	4	



Photo by Specialist Derek Schopps

Soldiers guide a section of five trusses as a crane lifts it onto the schoolhouse roof.

their very high standards for timber formwork to the Royal Cambodian Armed Forces engineers and instructed them on how to mix concrete to achieve maximum strength. The Cambodians proved to be highly adept at fabricating rebar cages, laying bricks, and applying stucco wall coatings and accents. Most of the tools used were locally purchased and were much more rudimentary than those the U.S. Soldiers were accustomed to using. The Cambodians used tools such as simple levers, water levels, and intricate rebar bending jigs made from scrap wood and nails with great skill and ingenuity. Throughout the project, both contingents learned from each other and adapted new techniques, lending the effort efficiency and momentum.

The most significant challenge of the school project came after a major design flaw was identified in the

A Cambodian soldier applies cement stucco to a classroom wall.

plans, which called for a reinforced concrete roof ridge beam to span 8 meters over each classroom while supporting the weight of the roof system. Based on their construction experience, 544th leaders determined the design to be unsound and



Photo by Staff Sergeant Whitney Houston



American and Cambodian engineers work together to lift rebar into place.

unsafe. Dissatisfied with the Cambodian head engineer's alternatives, U.S. project leaders developed a new plan to build a truss system. The trusses had to be made of steel, since available lumber was of poor quality and American-style timber trusses would lack longevity in the Cambodian climate. At this point in the project, the diverse skill sets of the U.S. team members became mission-essential. Welders from the Forward Support Company, 52d Engineer Battalion, welders from the Cambodian contingent, and a handful

of vertical engineers worked around the clock for 9 days to fabricate, join, and place the 31 trusses, roof purlins, and fascia. The truss system was a great success; and as a result, the school is a very sound, high-quality structure.

Clinic Renovation

For their second project, 544th Soldiers renovated a dilapidated rural clinic. The clinic, staffed by a physician and a single nurse, provides rudimentary medical care to about 500 villagers. The renovation included the replacement of more than 2,400 concrete roof tiles, extensive painting, and the installation of a gravity-fed plumbing system. Battling "project creep" was a challenge during this project. The plumbing system was in serious disrepair, and the removal of the existing roof tiles exposed rotting timber. These challenges provided an excellent unexpected opportunity for carpenters and plumbers to practice their trades.

While it was rewarding to the Soldiers to dramatically improve the clinic facility, the project was also beneficial because of the community involvement

A 544th Engineer Company medic treats a Cambodian girl in a village near the jobsite.




at the site. One of the unit medics, a licensed practical nurse, helped deliver several babies and treated local children for burns, infections, and other minor ailments. In one instance, he undoubtedly saved the life of a child suffering from tetanus. The experience left a lasting impression on the Soldiers who worked on the project.

Lessons Learned

Construction Meetings. Daily construction meetings were extremely important. These meetings were initially very frustrating due to the language barrier, different construction management styles, and incongruent time and material estimations. Royal Cambodian Armed Forces leaders were hesitant to contribute during these meetings at first; but as the project progressed, the meetings became easier and more productive. Good communication was a necessity.

Contracting. Before deployment, the 544th Engineer Company trained multiple contracting officer representatives. Establishing a good relationship with the contracting officers and going into the project with personnel who understood the requirements, methods, and limitations of the contracting process allowed the unit to procure materials and equipment in a timely manner. Effective contracting allowed the 544th to make the major, unanticipated design changes that the project demanded.

Reachback. Although leaders were able to overcome a major roof system design flaw and produce a sound and safe structure, a great deal of stress, effort, and risk could have been avoided by leveraging the capabilities of U.S. Army Corp of Engineers reachback programs. Units should identify reachback programs and communicate with U.S. Army Corp of Engineers subject matter experts throughout the planning and execution phases of construction. The U.S. Army Corps of Engineers Reachback Operations Center can be reached at <uroc@usace.army.mil> or 1-877-ARMY-ENG. Their Web site address is <<https://uroc-redi.usace.army.mil/default.aspx>>.

While the Angkor Sentinel 2011 civil action projects provided an excellent, diverse construction training opportunity for the 544th Engineer Company, the best thing about the mission was the community involvement. Soldiers traveled to and from the jobsite every day through crowds of smiling children who were immensely grateful for the hard work put into the projects. Missions such as this one, sponsored annually by U.S. Army Pacific, provide a welcome change of pace for engineer Soldiers who have thus far spent the deployed portions of their careers in combat zones. Angkor Sentinel 2011 was a wonderful opportunity to help people and support international peace and cooperation. 

First Lieutenant Friedewald is a platoon leader in the 544th Engineer Company and was the project officer in charge.