

Aqueducts and Megawatts:
*Integrating the United States Army Corps of Engineers with
Operational Commanders*

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ABSTRACT

The United States Army Corps of Engineers (USACE) has played a role in every major conflict since the American Revolution, and has steadily been playing a more expansive role in the global war on terrorism (GWOT). Expeditionary operations conducted by American military forces since the terrorist attacks of 11 September 2001 have included missions that involve operational infrastructure development. Operational infrastructure development is the establishment and repair of power facilities, roads, airfields, ports, installations and communications systems by operational-level military commands. In the strategic environment of the 21st Century, the United States Army Corps of Engineers (USACE) possesses operational and tactical capabilities that can be decisive when integrated, leveraged, and properly utilized by operational commanders and their staffs.

American military officers can gain from a better understanding of the USACE; specifically, its composition, organization, and purpose; its engagement in recent operations in Afghanistan and Iraq; how its state-side components have been aligned with the regional combatant commanders; and what this suggests for the future. The USACE has the depth of engineering skill and the technical expertise to help commanders use operational infrastructure development as a means to create *lines of operations* for the application of national power. Moreover, the lessons from Afghanistan and Iraq show that the USACE's capabilities can create favorable second- and third-order strategic effects when properly integrated into a campaign. In the future, the USACE will play a larger role in expeditionary operations and should be familiar to planners who work at the operational level.

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Introduction

Expeditionary operations conducted by American military forces since the terrorist attacks of 11 September 2001 have included missions that involve operational infrastructure development. Operational infrastructure development is the establishment and repair of power facilities, roads, airfields, ports, installations and communications systems by operational-level military commands. As a term, operational infrastructure development is important for three reasons: (1) it occurs simultaneously with and after combat operations, (2) it better frames the strategic environment of the 21st Century than “post-conflict reconstruction,” and (3) it has emerged as a decisive strategic concept in the global war on terrorism (GWOT). In the strategic environment of the 21st Century, the United States Army Corps of Engineers (USACE) possesses operational and tactical capabilities that can be decisive when integrated, leveraged, and properly utilized by operational commanders and their staffs.¹

American military officers can gain from a better understanding of the USACE; specifically, its composition, organization, and purpose; its engagement in recent operations in Afghanistan and Iraq; how its state-side components have been aligned with the regional combatant commanders; and what this suggests for the future. Many officers do not understand how to integrate the USACE’s capabilities with the traditional war-fighting functions, and many questions persist. Is there a strategic requirement for the USACE in the 21st Century? How are the USACE trained, organized, and equipped, and what is their relationship to combatant commanders and their subordinates? How would an operational commander incorporate the USACE into their operational design? How can the links between operational commanders and the USACE be improved? Can the USACE be improved to better support 21st Century strategic

requirements? An analysis of the USACE and its capabilities can provide answers to these important questions and provide useful knowledge to planners on operational staffs.

The 21st Century Strategic Environment

Carl von Clausewitz once wrote that, “The first, the supreme, the most far-reaching act of judgment that the statesman and commander have to make is to establish by that test the kind of war on which they are embarking; neither mistaking it for, nor trying to turn it into, something that is alien to its nature.”² Recent expeditionary operations indicate that the nature of the GWOT requires USACE capabilities to be integrated with traditional combat power. In the 2002 *National Security Strategy (NSS)*, President George W. Bush alluded to this by urging the United States to capitalize on “this moment of opportunity to extend the benefits of freedom across the globe” by creating the “infrastructure of democracy” for peoples around the world.³ Published one year after the terrorist attacks on New York and Washington D.C., this document’s reference to “infrastructure” has broad implications for operational commanders and their staffs.⁴

Military organizations have historically participated in operational infrastructure development, and the Roman legions that constructed the roads and aqueducts of antiquity provide an excellent example. The embedded engineering skill within the legion gave it the capability to substantially improve the infrastructures of the environments in which it operated, enabling application of the other elements of Roman power. After defeating their enemies in battle, Rome’s legions would construct a network of roads, facilities, and aqueducts that connected socially and culturally diverse peoples to the forces of law, order, and civilization emanating from Rome. These legions constructed the aqueducts so well that many still stand today. These projects not only enhanced Rome’s national prestige, but gave resident populations visible and enduring evidence of changes to their lives for the better. When retired Marine

General Anthony Zinni wrote that in future conflicts, American military leaders will need to be as adept at war-fighting as at “interaction with the civilian population [of other countries] to actually be capable of reconstructing nations,” he implied that they need to be just as diverse.⁵

For better or worse, today America finds itself in a strategic situation similar to that of Rome in the first-Century A.D., in which all elements of national power (diplomatic, informational, military, and economic) are required for strategic success. The barbarians are at the gates. Moreover, as Rome learned centuries before, application of all elements of national power requires an investment in complex field engineering skill.

For *diplomatic* power to be successful when dealing with fledgling governments, these governments must first demonstrate to their people that they can provide for their basic needs of food, water, power, security, employment, and order. For *informational* power to be effective, people in expeditionary environments must have the electrical power to turn on their television sets, radios, and computers, while governments must have a communications plan to build legitimacy using these same platforms. For *military* power to be effective, governments must ultimately develop their own armed forces, with the right facilities, equipment, and training for their troops. And finally, the *economic power* of the United States cannot be projected without adequate ports and airfields to receive and ship commercial goods and a secure transportation network to get them to consumers. The USACE has the depth of engineering skill and the technical expertise to help operational commanders use operational infrastructure development as a means to create *lines of operation* for application of these other elements of national power.⁶

Enter the U.S. Army Corps of Engineers

The USACE’s operational infrastructure development capabilities can be a combat multiplier in the GWOT and shape the 21st Century to the strategic advantage of the United

States. The USACE is comprised of 35,000 civilians and 650 active duty Army soldiers. Approximately 361 officers (mostly majors and above) work at either the USACE Headquarters in Washington D.C., one of the eight Division staffs, or one of the 41 Districts in the field. The remaining 290 soldiers are in the 249th Engineer Prime Power Battalion based out of Fort Belvoir, Virginia.⁷

The USACE is not a typical Department of Defense organization because it receives its funding from two sources. Congress directly funds the Civil Works side, and the Department of Defense funds the military side. Because of strict fiscal guidelines, USACE planners watch the allocation of funds very closely and have developed one of the “best financial management systems in the world.”⁸ The USACE spends approximately \$15 billion annually supporting government agencies as diverse as the Department of Energy (DOE), the Federal Emergency Management Agency (FEMA), the Environmental Protection Agency (EPA), the Department of State (DOS), and the Department of Defense (DOD).⁹

An Army lieutenant general commands the USACE while also serving as the Chief of Engineers to the Chief of Staff of the U.S. Army. The USACE Commander’s responsibilities include water resource management within the United States, environmental management and protection, and infrastructure development and maintenance on U.S. military bases. It also includes disaster relief and humanitarian assistance around the world, and full spectrum engineer support to the combatant commanders.¹⁰

The USACE currently has eight standing divisions in the United States, each commanded by an Army brigadier general, plus the newly activated Gulf Regional Division (GRD) in Iraq, commanded by a major general (select).¹¹ Although the USACE has the ability to stand up additional districts and divisions to meet operational requirements (such as the GRD), its end-

strength does not increase when it does so and must make any expansions out of existing resources. Each division supervises about five districts led by Colonels. Overseas districts are in Korea, Japan, and Europe. The USACE Commander also commands two Engineer Construction Commands (ENCOMs) that are in the reserves with 225 soldiers each. An ENCOM can function as the nucleus of a command and control headquarters of a theater engineer command when activated, and has a legacy dating back to World War II.¹²

In 1945, General Douglas MacArthur foresaw “an enormous amount of construction and rehabilitation [required] on Luzon,” and formed an Engineer Construction Command (ENCOM) to take responsibility for all construction in the western Pacific.¹³ ENCOM had four subordinate districts (the Luzon Engineer District, the Leyte Engineer District, the General Engineer District, and the Construction Corps of the Philippines) to accomplish its mission. MacArthur viewed operational infrastructure development as an important part of his operational design and leveraged engineers to get him the required capabilities to conclude a successful campaign.¹⁴

At the tactical level, the USACE’s doctrine of field force engineering provides operational commanders with two types of Forward Engineer Support Teams (FESTs): a FEST Advance (FEST-A) and a FEST Main (FEST-M). Field force engineering is intended to provide specialized and technical engineering support to an operational commander in an expeditionary environment. In general, FESTs are intended to “augment a military or governmental staff and provide engineering and master planning advice and assistance” to commanders and staffs.¹⁵

FEST-As are normally assigned to support a division, corps, Marine Expeditionary Force (MEF), or joint task force (JTF), and typically has five civilians and an Army Engineer Officer to lead the team.¹⁶ A FEST-A could include: 1) an electrical engineer, 2) civil engineer, 3) mechanical engineer, 4) contracting specialist, 5) property management specialist, and 6) an

Army Major or Lieutenant Colonel. Under the current system, these civilians are exclusively volunteers and cannot be ordered into a combat environment. Missions that a FEST-A could accomplish include: sewage treatment in a city; construction of schools, police stations, and government offices; and repair to various forms of communications infrastructure. A FEST-A utilizes host-country construction firms and would normally hire indigenous labor to complete its projects. A FEST-A could be embedded within a division/corps/MEF/JTF operations cell to advise the commander on technical engineering issues and exercise oversight on complex engineering problems within that unit's battle-space.

FEST-As deploy with tele-engineering kits, which are secure audio/visual devices with a VTC reach-back capability via satellite to districts, divisions, laboratories, and schoolhouses in the United States. With 144 tele-engineering kits in its inventory, the USACE is able to send out one with each FEST-A.¹⁷ This reach-back capability enables FEST-As to create favorable second-order effects by improving the quality of engineering in expeditionary environments, where well-built projects offer a lasting testimony to the power of the state.

A general officer or senior colonel heads a FEST-M with 30-100 people, depending on the mission. FEST-Ms provide a joint task force or land component commander with assistance in exercising command and control over USACE assets in their areas (i.e. several FEST-As), and focus on specific tasks such as extinguishing oil well fires or restoring electrical power (to use two examples from Operation *Iraqi Freedom*). FEST-Ms have more depth than FEST-As, better logistics and communications infrastructure, and include contractors and specialists with focused expertise to assist with more complex engineering problems. FEST-Ms can form into provisional districts if there is a need for an extended USACE presence in a campaign.

While the USACE has begun to play a more active role in expeditionary operations, its current mission statement does not place emphasis on this:

“Our mission is to provide quality, responsive engineering and environmental services to the nation. We plan, design, build and operate water resources and other civil works projects. We design and manage construction facilities for the Army and the Air Force. And we provide construction management support for other defense and federal agencies. Today, as always, we stand ready...engineers, scientists, real estate specialists and administrators alike to meet national security, emergency, and other national requirements.”¹⁸

As the USACE continues to play a larger role in the GWOT, its mission statement needs to catch up to better reflect its developing expeditionary culture. Retired Lieutenant General Jay Garner, commander of the Office of Reconstruction and Humanitarian Assistance (ORHA) during Operation *Iraqi Freedom*, has argued that the USACE alter its mission statement to increase emphasis on its expeditionary components:

“when I came back [from Iraq], I sent [Secretary of Defense Donald] Rumsfeld a memo recommending to him that we redefine the role of the Corps so that, in the future, we take the Civil Engineering assets of DOD and put that under the Corps of Engineers, and largely make the Corps of Engineers responsible for reconstruction in new areas that we go into, because they have the skill set to do it, and they have the people to do it.”¹⁹

As General Garner states, the USACE has the skills and critical capabilities such as responsive engineering, VTC reach-back to divisions and labs, and fiscal contracting power beyond that of operational units that could be pivotal to success in future expeditionary operations.

At the operational level, in January and February 2004 the USACE stood up the Afghanistan Engineer District (AED) in Afghanistan and the Gulf Regional Division (GRD) in Iraq to reflect the strategic importance of operational infrastructure development for coalition forces and civil societies in both theaters. Why the USACE moved from a peripheral role in these campaigns to standing up two major commands has profound implications for the future and offers insight into how the United States might be able to exploit an asymmetric advantage.

The U.S. Army Corps of Engineers in Afghanistan

In May 2002, Central Command saw the need for an on-scene operational commander in Afghanistan and established Combined Joint Task Force 180 (CJTF-180) from the headquarters of the XVIIIth Airborne Corps.²⁰ CJTF-180 and the Office of Military Cooperation, Afghanistan (OMC-A) then received “the mission to help Afghanistan establish an Afghan National Army (ANA),” which would enhance the legitimacy of the new Afghan government of President Hamid Karzai.²¹ The first Afghan recruits began training at the Kabul Military Training Center (KMTC) in the fall of 2002 when the OMC-A Commander, Major General Carl Eikenberry, saw that the Afghan recruits did not have adequate billeting facilities after their projected graduation from entry-level training.²²

Correctly determining this to be an issue of strategic importance, General Eikenberry requested immediate USACE support from the Office of the Secretary of Defense (OSD). OSD immediately ordered the USACE to send a team to Afghanistan. In January 2003, Colonel Robert Derrick from the USACE Transatlantic Programs Center (TAC) left for Afghanistan with a four-person team to become the new OMC-A Engineer and the Officer-in-Charge of the newly created USACE Afghan Area Office.²³ This four-person Afghan Area Office steadily grew into what became the AED, with 112 people, by February 2004.²⁴ Through its stringent management of construction projects, close linkage with the on-scene operational commander, and use of field force engineering, the AED has made an enormous impact throughout Afghanistan.

The ANA’s barracks constructed at the KMTC under the supervision of the AED offers one example of how competent construction can create favorable second-order effects. When General Mohammed Farid Zarif, the Chief of the Construction Department for President Hamid Karzai’s Ministry of Defense, brought several village elders to see the new facilities at KMTC,

they “remarked to General Zarif that they didn’t believe that the U.S. was really serious about changing things in Afghanistan until they saw the construction effort by the Corps of Engineers on these military installations, and that made them believers. It changed their view of the world.”²⁵ The impressive infrastructure of the barracks helped to create legitimacy for the fledgling ANA among the populace and improved the morale of ANA troops by making military service a more attractive option for young people. It also provided a first-rate billeting facility in which soldiers from different ethnic groups could live together. In a country such as Afghanistan, with its long history of “warlordism” and tribalism, this was a major achievement.

The AED’s current projects include repair to the “Ring Road” around Afghanistan and construction of a large bridge between Afghanistan and Tajikistan to spur the local economies.²⁶ The “ring road” had previously been under the supervision of the State Department’s United States Agency for International Development (USAID), but the AED took it on because the USACE is better equipped to move funds faster to contractors and to ensure better quality of construction. The AED is also improving the irrigation system so that farmers who had grown poppies (which require little water) can grow alternative crops, thereby reducing the international drug trade.²⁷ The USACE and USAID are also currently planning to bolster Afghanistan’s electrical system, which will also create favorable second-order effects.

Cumulatively, these projects are “capacity building” for the Afghan people by teaching them construction skills, creating a market for building materials, and stimulating economic growth. It is also important to note that these projects are taking place under conditions in which combat has not actually stopped; operational infrastructure development is a simultaneously occurring battlefield activity. The success of Afghanistan’s national elections in September 2004 shows that the AED’s efforts at operational infrastructure development, coupled with other

American governmental programs and the will of the Afghan people to have a better life, is making a positive long-term impact in Afghanistan.

The U.S. Army Corps of Engineers in Iraq

In Operation *Iraqi Freedom* (OIF), the USACE participated in pre-war planning with Central Command for the critical role of protecting the oil infrastructure in the southern oil fields. Yet, as in Afghanistan, the USACE saw its role expanded in the months following the fall of Baghdad. The USACE's top priorities in Iraq were: 1) restoration of Iraq's oil infrastructure, and 2) restoration of Iraq's electrical power system. The USACE and Central Command achieved different degrees of success in each area, and the reasons are important when considering the role of the USACE in future scenarios.

Central Command knew what Saddam Hussein had done to the oil wells in Kuwait during the first Gulf War and wanted to prevent a similar occurrence in 2003. Iraq's oil infrastructure was Central Command's top priority for the USACE.²⁸ The Army Chief of Engineers and USACE Commander, Lieutenant General Robert Flowers, tasked Brigadier General Robert Crear, Commander of the USACE Southwest Division in Dallas, Texas, to stand up a task force (FEST-M) to develop a contingency support plan to ensure that Iraq's oil wells stayed intact.²⁹ General Crear worked closely with contractors from Kellogg, Brown, and Root (KBR) in Houston, Texas, to develop a classified plan for restoration of Iraq's oil infrastructure. In February-March 2003, Crear's team deployed to Iraq with several contractors.³⁰ The Combined Forces Land Component Commander (CFLCC), Lieutenant General David McKiernan, exercised operational control of Crear's 60+-man task force and renamed it Task Force Restore Iraqi Oil (TF RIO).³¹

The Commander of TF RIO, General Crear, worked closely with the CFLCC staff and the Commander of the 1st Marine Expeditionary Force (I MEF) to integrate with the maneuver units which had the mission of seizing and securing Iraq's southern oil wells. Due to the speed of the maneuver units' advance and detailed prior planning between all of the staffs, coalition forces seized the majority of Iraq's oil wells intact. Iraqi forces did manage to set fire to nine oil wells, but with planning and close coordination between coalition ground commanders, TF RIO, and even Kuwaiti firefighters, coalition forces had all of the fires extinguished within five weeks.³² TF RIO then turned its attention to getting Iraqi oil production back to pre-war levels. TF RIO was able to hire 15,000 workers from the Iraqi South Oil Company (SOC) by meeting in Basrah with a skilled Iraqi engineer named Jabbar Ali al-Lueibi, who had the trust of the Iraqi workers.³³ Fourteen oil companies were subsequently brought back to work using a similar "blueprint."³⁴ By February 2004, TF RIO had restored Iraq's oil production to its pre-war level of 2.5 million barrels per day.³⁵

Crear's reflection on the success of TF RIO highlights the unique capabilities of the USACE:

"Who would have guessed that the USACE would be responsible for the oil infrastructure of Iraq? What other organization can do something like this given the secrecy and urgency of the mission? Given the urgency to deploy and employ, we are part of the Army, and can leverage the private sector."³⁶

TF RIO's performance in OIF shows that prior planning and close integration of USACE capabilities with the staffs of operational commanders can produce favorable strategic results.

Restoration and improvement of the electrical power system was another main area of concern for the USACE in OIF. Power often represents the most visible sign of order and stability in expeditionary environments. When T.E. Lawrence entered Damascus, Syria, after the defeat of Turkish forces in World War I, his first priority was to restore electrical power:

“The day was drawing in, the world was in the streets: riotous. We chose an engineer to illuminate the town that night. The resumption of street lighting would be our most signal proof of peace. It was done, and to its shining quietness much of the order of the first evening of victory belonged: though our police were zealous, and the grave sheikhs of the many quarters helped their patrol.”³⁷

Anticipating the challenges of post-conflict Iraq, the Director of Strategic Plans for the Joint Staff (J-5), General George W. Casey³⁸, ordered Brigadier General Stephen R. Hawkins from the USACE to stand up Joint Task Force Four (JTF-4) in December 2002 to begin planning for post-conflict reconstruction.³⁹ In early April after Baghdad had fallen, Central Command told Hawkins that Baghdad needed light and power immediately.⁴⁰ Hawkins quickly assembled the remnants of JTF-4 and prepared to face the same challenges that Lawrence had years earlier.

Hawkins formed TF FAJR (“New Dawn” in Arabic) from JTF-4 and immediately established new priorities for the distribution of power in Baghdad. Hawkins’ power priorities were: 1) hospitals, 2) potable water, 3) sewage, 4) domestic consumption, and 5) industrial base reestablishment for the oil infrastructure.⁴¹ Baghdad’s power requirements fluctuate depending on the season: 1800 megawatts from November to March for the heating season; 2800 megawatts from May to September for the cooling season; and no significant demand from March to May in the temperate season.⁴² By late April, the peak demand season closed in on TF FAJR.⁴³ In May 2003, the Iraqi people entered their peak demand season and overwhelmed TF FAJR with demands for power in an unstable, urban environment containing primarily Sunni Muslims. Power was the top priority for the Iraqi people, but coalition forces could not provide it to Iraq’s most populated areas in the season of highest demand. This had strategic implications. As Rome’s aqueducts had centuries earlier, megawatts can offer visible and enduring evidence of changes to peoples’ lives for the better, while at the same time connecting them to a safer world beyond their city.

Although the lessons from Afghanistan and Iraq are complex and still emerging, it is *clear* that with recognition of the USACE’s capabilities earlier, a more effective strategic result can be achieved. Moreover, it is important for operational commanders to request and get USACE assets into theater quickly, and then to integrate them with maneuver units much like MacArthur did in the Philippines. When operational infrastructure development is not integrated into an overall campaign plan, or stove-piped into strictly post-conflict scenarios, lasting success will be more difficult to achieve.

“Operationalizing” the U.S. Army Corps of Engineers

Four areas that could further “operationalize” the USACE are its: 1) alignment and linkage with operational commanders and awareness of its capabilities on operational staffs, 2) personnel staffing system, 3) role within the Department of Defense, and 4) representation on the Joint Staff. On 30 September 2004 the USACE Commander aligned five of his divisions to support the five regional combatant commanders:

South Atlantic Division (Atlanta, GA)	--	Southern Command
North Atlantic Division (New York, NY)	--	European Command
Transatlantic Programs Division (Winchester, VA)	--	Central Command
Pacific Ocean Division (Honolulu, HI)	--	Pacific Command
Southwest Pacific Div (TX) & HQUSACE (VA)	--	Northern Command ⁴⁴

The USACE Commander also assigned Liaison Officers (LNOs) to each of the regional combatant commands, the army component commands, and the three MEF commands.⁴⁵ These positive steps can better integrate the USACE’s capabilities with the staffs of operational commanders and point the way towards operationalizing the USACE.

First, educational sessions could be held to insure that commanders and staffs understand the capabilities of the USACE; from fielding FEST-As to conducting exhaustive and comprehensive engineering analysis of complex problems in state-side laboratories. With field

force engineering, expertise from among 35,000 USACE engineers can be brought to bear on a single problem. In the expanded, decentralized battlefield of the 21st Century, integration of kinetics with field force engineering can provide commanders with more options to deal with complex scenarios, and the LNOs can highlight this. USACE representatives could also participate in war-games with operational commands to improve command relationships, construct standard operating procedures, refine campaign plans, and build human relations.

Second, the USACE could overhaul its personnel staffing system to become a truly joint organization by taking officers from the other services. The rest of the military is already moving in this direction, and the USACE could use the additional help. Officers serving in facilities billets at bases and stations around the world could have a much larger impact in the GWOT by serving in the USACE, possibly leading a FEST. Facilities billets could be contracted out to civilians. This could further improve integration with operational commands as they, too, become more joint. In the Marine Corps alone, there are approximately 39 engineer officers serving in facilities billets that could add immense operational experience to the USACE.

Third, the USACE could fill a broader role within the Department of Defense by transforming into a “Joint Forces Engineer Command” (JFEC). Leadership of this JFEC could possibly rotate between the services, but it would be a functional command and could have additional forces assigned to it based on the mission and theater-specific requirements (somewhat similar to Transportation Command). The Commander of this JFEC could be a four star officer and would serve as the Chief Engineer for all of the armed services. This could provide the necessary weight in the inter-agency arena and with the combatant commanders while also elevating the importance of operational infrastructure development for future success in the GWOT. This could align service capabilities with real-world engineering requirements.

Finally, there are 90,000 military engineers in the U.S. armed forces that could benefit from direct representation on the Joint Staff to synchronize doctrine and training. The emergence of operational infrastructure development as a decisive strategic concept in the GWOT, coupled with the direction charted by President Bush in his *NSS*, portend that field engineering skill (tied closely to civil affairs) will be vital in future campaigns. The current Joint Staff organization does not provide the best alignment for the complex, interagency-laden environment expeditionary forces will operate in. An engineer general serving as a principal member of the Joint Staff could advise the Chairman and Secretary of Defense on operational infrastructure development requirements in a campaign, employment of USACE (or JFEC) assets in an expeditionary environment, and engineer integration with civil affairs and other federal and international agencies.

Conclusion

Operational infrastructure development is an important dimension of the GWOT and its integration with the war-fighting functions is critical for strategic success. Operations in Afghanistan and Iraq illustrate that the USACE is the best-suited organization to take the lead in these types of missions. Operational commanders can gain options, leverage, and strategic depth by integrating USACE capabilities into their campaign designs. Moreover, complex field engineering can offer operational commanders an asymmetric capability that can be exploited. The USACE has taken the first steps towards adapting to the requirements of 21st Century warfare, but more can be done. With the USACE poised to play an even greater role in expeditionary operations, it is critical that operational commanders and their staffs understand USACE capabilities. The USACE has important operational and tactical capabilities that can be decisive when integrated, leveraged, and utilized by operational commanders and their staffs.

Notes

- ¹ For this paper, operational commanders are three-star headquarters and higher.
- ² Carl von Clausewitz, translated by Peter Paret, *On War*, Princeton: Princeton University Press, 1984, p88.
- ³ President George W. Bush, *National Security Strategy of the United States of America*, September 2002, Preface; p. 21.
- ⁴ Ibid.
- ⁵ Tom Clancy with Tony Zinni, General, USMC (Ret.), *Battle Ready*, New York: G.P. Putnam's Sons, 2004, p 438.
- ⁶ Joint Publication 3-0 gives lines of operation a three-dimensional aspect that enables commanders to visualize application of means of power through a logical design that integrates the various capabilities of their forces.
- ⁷ Fritz, Interview with Bowers, 10 November 2004.
- ⁸ Ibid.
- ⁹ Ibid.
- ¹⁰ Sotirin, Interview with Bowers, 10 November 2004.
- ¹¹ A stateside USACE Division contains approximately 500 personnel, with 15-30 officers and about 470 civilians; while a division in support of a operational campaign, such as the GRD in Iraq, contains 50+ officers.
- ¹² Sotirin, Interview with Bowers, 10 November 2004.
- ¹³ Dr William C. Baldwin, "Army Engineers in Post-War Reconstruction: The Philippines, Japan, and Germany, 1945-1947," Office of History, Headquarters, U.S. Army Corps of Engineers, pp 1-6.
- ¹⁴ Ibid.
- ¹⁵ CJTF-7 FEST-A Command Briefing, 130th Engineer Brigade OPD, 2 October 2003.
- ¹⁶ USACE Concept Brief, "Field Force Engineering, Initial Modular Concept," 9 November 2004
- ¹⁷ Ibid.
- ¹⁸ Command Briefing, "Who We Are," www.usace.army.mil/commander.html, 8/1/2004
- ¹⁹ Garner, Interview with Lonquest, 7 January, 2004.
- ²⁰ Center for Defense Information, "Operation Enduring Freedom: Forces in Play around Afghanistan, the Arabian Sea, and the Horn of Africa," www.cdi.org/terrorism/forces-1119.cfm, [10 December 2003]
- ²¹ Derrick, Interview with Lonquest, 23 December 2003.
- ²² Ibid.
- ²³ Ibid.
- ²⁴ Pease, Interview with Bowers, 10 November 2004.
- ²⁵ Conte, Interview with Lonquest, 11 August 2003.
- ²⁶ Pease, Interview with Bowers, 10 November 2004.
- ²⁷ Ibid.
- ²⁸ Lonquest, Interview with Bowers, 1 September 2004
- ²⁹ Crear, Interview with Rudd, 25 June 2003.
- ³⁰ Ibid.
- ³¹ Ibid.
- ³² Ibid.
- ³³ Wright, Background Task Force – Restore Iraqi Oil, p 6.
- ³⁴ Ibid, p 7.
- ³⁵ Ibid, p 10.
- ³⁶ Crear, Interview with Rudd, 25 June 2003.
- ³⁷ T.E. Lawrence, *Seven Pillars of Wisdom: A Triumph*, New York: Anchor Books, 1991, p 650.
- ³⁸ General Casey is currently the Commander of Multi-National Forces, Iraq (MNFI).
- ³⁹ Hawkins, Interview with Rudd, 23 June 2003.
- ⁴⁰ Ibid.
- ⁴¹ Ibid.
- ⁴² Ibid.
- ⁴³ Ibid.
- ⁴⁴ Lieutenant General Carl Strock, "Memorandum for Commanders, Directors and Chiefs of Separate Offices HQUSACE, dated 30 September.

⁴⁵ Fritz, Interview with Bowers, 10 November 2004.

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