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Emergency Employment of Army and Other Resources

FIELD FORCE ENGINEERING–UNITED STATES ARMY CORPS OF ENGINEERS SUPPORT TO FULL SPECTRUM OPERATIONS

ENGINEER PAMPHLET

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AVAILABILITY

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DEPARTMENT OF THE ARMY
U. S. Army Corps of Engineers
Washington, DC 20314-1000

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United States Army Corps of Engineers (USACE) provides vital public engineering services, during peace and wartime, to strengthen our nation's security, energize the economy, and reduce risks or mitigate the effects of disasters. As a part of that mission, USACE leverages its capabilities to provide technical engineering expertise, consequence management, and other support to the operational Army, military Services, and other federal agencies. Deployable teams, designed and trained to provide engineering expertise in operational areas, are the centerpiece of USACE support to military operations. In addition to enabling deployable teams, an extensive organizational and physical infrastructure provides reachback support from the entire USACE organization and its associates in other Services, agencies, industry, and academia. Field force engineering (FFE) describes these capabilities and their application in military operations. It is the means used by USACE to support operations. As part of the evolution of FFE, USACE has developed this engineer pamphlet (EP) to describe FFE, not only for the engineer Soldiers and their commanders who will employ USACE support, but also for the engineers and other technical experts assigned within the USACE FFE organization. This pamphlet describes what FFE is and does, who the various FFE elements are, when and where FFE support is integrated within supported operations, and how FFE provides support (its various applications). It also links FFE to Army, joint, and other doctrine. The primary doctrinal linkages are to field manuals (FMs) 3-0 and 3-34, and joint publication (JP) 3-34, with additional linkages discussed throughout the pamphlet.

1. Purpose. This pamphlet fills a fundamental role in describing FFE as the means for USACE support to full spectrum operations. It is organized in the following four chapters:

a. Chapter 1 provides a broad overview of FFE. The text briefly discusses requirements for engineer applications in full spectrum operations and then USACE as both a direct reporting unit of the Army's generating force and a unique entity capable of supporting operational forces with technical engineering and other expertise. Within this context, FFE is described as the means employed for this support.

b. Chapter 2 describes not only the teams and other elements specifically designed for FFE applications, but also the enabling and supporting infrastructure throughout USACE. The text includes a discussion of team organization, capabilities, and organizations chart.

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Technical Letter
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Engineering and Design

ADVANCED RELIABILITY ANALYSIS OF FATIGUE CRACKING IN HORIZONTALLY FRAMED MITER GATES

1. Purpose. A series of navigational locks and dams along the nation's inland waterways provide the ability to transport large tonnages of materials and goods efficiently over long distances. These facilities are operated and maintained by the U. S. Army Corps of Engineers and form a vital part of the transportation economy of this country. The lock miter gates, which are large steel structures that open and close to allow passage of vessels while maintaining required water pools at the dams, are critical components in this transportation system. Most of these miter gates are fabricated with welded steel plates using either horizontally framed or vertically framed designs. Cracking damage has become an increasing maintenance problem on these fabricated steel miter gates. The objective of this Engineer Technical Letter is to enhance and generalize the previously developed analytical methodology for fatigue crack evaluation with the goal of developing this methodology for miter gate fracture, fatigue, reliability, and repair.

2. Applicability. This Engineer Technical Letter is applicable to all HQUSACE elements and USACE commands having responsibilities for the planning, design, construction, and maintenance of civil works projects.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References. References are included in Appendix A.

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CHAPTER 1

Overview

"This is the first conflict where field force engineering concepts led to a total engineer regimental effort. The US Army Corps of Engineers (USACE) and forward engineer support teams in Iraq brought expertise to the strategic, operational, and tactical-level engineer effort. They evaluated and assessed the Iraqi infrastructure systems of power, water, and oil and helped solve field-engineering problems associated with bridging, power generation, and field sanitation. USACE provided a TeleEengineering kit that was a valuable link back to centers of expertise. In one instance, this link enabled communication with the very best experts on bridge design."

—Operation Iraqi Freedom,
Engineer Lessons Learned,
U.S. Army Engineer School

1-1. Engineer Applications in Full Spectrum Operations. The Army's operational concept, as detailed in FM 3-0, is full spectrum operations. This refers to the Army's ability to combine offensive, defensive, and stability or civil support operations simultaneously. The first three of these operations pertain primarily to U.S. military operations in foreign countries. The last operation, civil support, pertains only to support provided to civil authorities, such as in disaster relief and border security operations conducted within the United States and its territories. The broader operational environment (OE) is complex, and operational missions offer unique challenges. See Appendix B for additional discussion of an engineer view of the OE.

a. The Army has long defined offensive and defensive operations as a core mission. While stability operations have been predominant throughout the Army's history, the Army has only recently established stability operations as a core Army mission (see FM 3-0). JP 3-0 defines *stability operations* as an overarching term encompassing various military missions, tasks, and activities conducted outside the United States and in coordination with other instruments of national power to maintain or reestablish a safe and secure environment and provide essential government services, emergency infrastructure reconstruction, and humanitarian relief. The recognition of stability operations and civil support operations as core components of the Army mission greatly impacts how the Army organizes, trains, and conducts operations.

b. In addition to full recognition of stability and civil support missions, the Army now places greater emphasis on joint operations involving all U.S. military Service branches; multinational operations with allied and coalition forces; and interagency coordination with various U.S. and host nation (HN) governmental agencies and nongovernmental organizations (NGOs). Cooperation with these entities, along with the expanded role of civilian contractors, has numerous implications for the planning and conduct of operations. The Army seldom plans and conducts operations strictly with Army assets but, rather, plans for and integrates all applicable components of national power into its missions.

c. Engineer capabilities are a significant force multiplier to be integrated in full spectrum operations. Engineer operations modify, maintain, provide understanding of, and protect the physical environment. In doing so, these operations enable the mobility of friendly forces; alter the mobility of adversaries; enhance and enable the survivability and sustainment of friendly forces; contribute to a clear understanding of the physical environment; and provide support to noncombatants, other nations, and civilian authorities and agencies. Table 1-1 lists the primary tasks for the elements of full spectrum operations and describes engineer requirements typically associated with each element.

Table 1-1. Engineer requirements for each element of full spectrum operations

Offense	
Tasks: • Movement to contact. • Attack. • Exploitation. • Pursuit.	**Requirements:** • Predict the adversary's intent by gaining a thorough understanding of the threat, engineer threat capabilities, and how the terrain will affect operations. • Enhance the mobility for friendly forces, including a robust reconnaissance effort. • Enable the sustainment of friendly forces, including movement within the operational area. • Plan engineer operations to ensure a smooth, resourced transition from offensive to defensive or stability operations.
Defense	
Tasks: • Mobile defense. • Area defense. • Retrograde.	**Requirements:** • Use terrain products to visualize how best to shape the terrain, to include describing the best positions from which to defend. • Provide countermobility and survivability support, including significant construction efforts (as needed). • Enable the sustainment of friendly forces, including movement within the operational area. • Perform proper engineer planning to ensure a smooth, resourced transition from defensive to offensive or stability operations.

Table 1-1. Engineer requirements for each element of full spectrum operations

Stability	
Tasks: • Civil security. • Civil control. • Provision of essential services. • Governance.	**Requirements:** • Assess the OE, placing a greater focus on political and cultural considerations. • Provide nonlethal and constructive support, including engineer forces working among and in conjunction with civilians. • Enhance protection for friendly forces in the operational area. • Enable the sustainment of friendly forces, including movement within the operational area. • Provide support to noncombatants, other nations, and civilian authorities and agencies, as needed.
Civil Support	
Tasks*:* • Support to civil law enforcement. • Support to civil authority. • Provision of essential services.	**Requirements*:*** • Consider statutes and regulations that restrict the Army's interaction with OGAs and civilians during civil support operations. USACE provides a unique perspective within this element due to its extensive civil works experience. • Support relief and construction missions, including engineer forces working among and in support of civilian agencies. • Enable the sustainment of friendly forces, including movement within the operational area. • Provide support to civilian authorities and agencies, as needed.
Legend: OE OGA USACE	 operational environment other government agency United States Army Corps of Engineers

d. Commanders plan for the concurrent conduct of the elements of full spectrum operations in weighted combinations. At the operational level, Army forces conduct multiple component operations simultaneously. At the echelons above the brigade level, engineer requirements tend to be less influenced by the tactical tasks involved with the element of full spectrum operations. Operational echelon engineer requirements will be more influenced by the technical aspects of the requirements and simultaneously support all elements of operations. Division, corps, and theater army engineers progressively focus on more operational engineer requirements, which often include very technical aspects. Example operational requirements include—

(1) Theater level real estate planning and acquisition, such as facilities to support the reception, staging, onward movement, and integration (RSOI) of forces.

(2) Theater level environmental planning, assessments, and studies for base camps and other requirements.

(3) Construction management to establish or develop a sustainment base.

(4) Design and construction capability to create ports, airfields, roads, bridges, and other components of operational lines of communications (LOCs).

e. While combat-focused engineer applications can be destructive and lethal, many of the technical engineering applications are constructive and nonlethal in nature. There is an inherent complementary relationship between the use of lethal force and the application of military capabilities for nonlethal purposes. Although each situation requires a different mix of violence and restraint, lethal and nonlethal actions used together complement each other and create dilemmas for the opponent. Lethal means remain at the heart of offensive and defensive actions; however, nonlethal means are becoming increasingly important. Today's threat no longer fights "around" populations but rather "amongst" them. Unavoidable collateral damage may significantly impact the mission accomplishment since oftentimes that mission includes gaining and maintaining the support of the local populace. Commanders consider nonlethal applications when the achieved effects support the mission and other lethal methods, hence mitigating the risk of adverse effects if collateral damage results. Nonlethal, constructive actions can persuade the local populace to withhold support for adversaries and provide intelligence to friendly forces. This can force the enemy to choose between abandoning an area or exposing his forces to lethal combat. Commanders analyze the mission variables to achieve a balance between lethal and nonlethal actions. Engineer operations contribute significant combat power, both lethal and nonlethal in nature.

1-2. Generating Force Support for Operations. The U.S. Army is the primary land component of the U.S. armed forces. It is a force, which continually evolves to meet strategic, operational, tactical, and organizational challenges. Organizationally, the Army has transitioned from a division-centric to a brigade-centric force. This force is more modular than the previous structure, enabling the Army to better deploy only the specific assets required to conduct and support a given mission. All units of the modular Army are assigned to one of the U.S. military's combatant commands. These forces are the Army operating force. Forces not assigned to a combatant commander (CCDR) remain assigned to the Department of the Army (DA). This is the Army generating force (see FM 1-01). These elements are primarily organized under tables of distribution and allowance (TDAs), although some generating force units have tables of organization and equipment (TOEs).

a. The generating force consists of Army organizations whose primary mission is to generate and sustain the operational Army. USACE is part of the generating force. Activities conducted by the generating force support the readiness and routine performance of functions specified and implied in Title 10, United States Code (10 USC). The generating force also

possesses operationally useful capabilities for employment by or in support of joint force commanders (JFCs). This pamphlet describes how operating forces can access and employ generating force capabilities, specifically engineering capabilities to support ongoing operations.

b. The primary functions of generating force capabilities are focused on the generation, readiness, and support of Army forces and not on the conduct of operations. Organizationally, generating force elements are typically not designed with armaments, transportation, or communication means comparable to operating force organizations. Logistics and other sustainment components may not be integrated within the generating force element, and their specialized equipment will typically require support from outside of the operational logistics system. Generating force support should be focused on functions in which the generating force possesses a clear advantage in terms of effectiveness and efficiency over operating forces. One example is in technical engineering. While operating force engineer units are organized in a scalable, modular, adaptable manner to support combat, general, and geospatial engineering requirements, generating force capabilities, possess a clear advantage in some of the most technical engineering and related specialized activities.

c. USACE is the Army's direct reporting unit assigned responsibility to execute DA and Department of Defense (DOD) military construction, real estate acquisition, and infrastructure development through its civil works program. In support of the Department of Homeland Security (DHS) and disaster relief missions, USACE has primary responsibility to execute Emergency Support Function (ESF) #3, *Public Works and Engineering*, under the National Response Framework (NRF). Most USACE assets are part of the generating force (see FM 1-01), but selected elements are designed to support the operational Army, to include forward engineer support teams (FESTs) and the 249th Engineer Battalion (Prime Power). The USACE mission to execute assigned responsibilities and support full spectrum operations is conducted through the following five major functions:

(1) Warfighting—provides engineering and contingency support to full spectrum operations.

(2) Disaster—provides response and support recovery to local, national, and global disasters.

(3) Infrastructure—acquires, builds, and sustains critical facilities for military installations, theater support facilities, and public works.

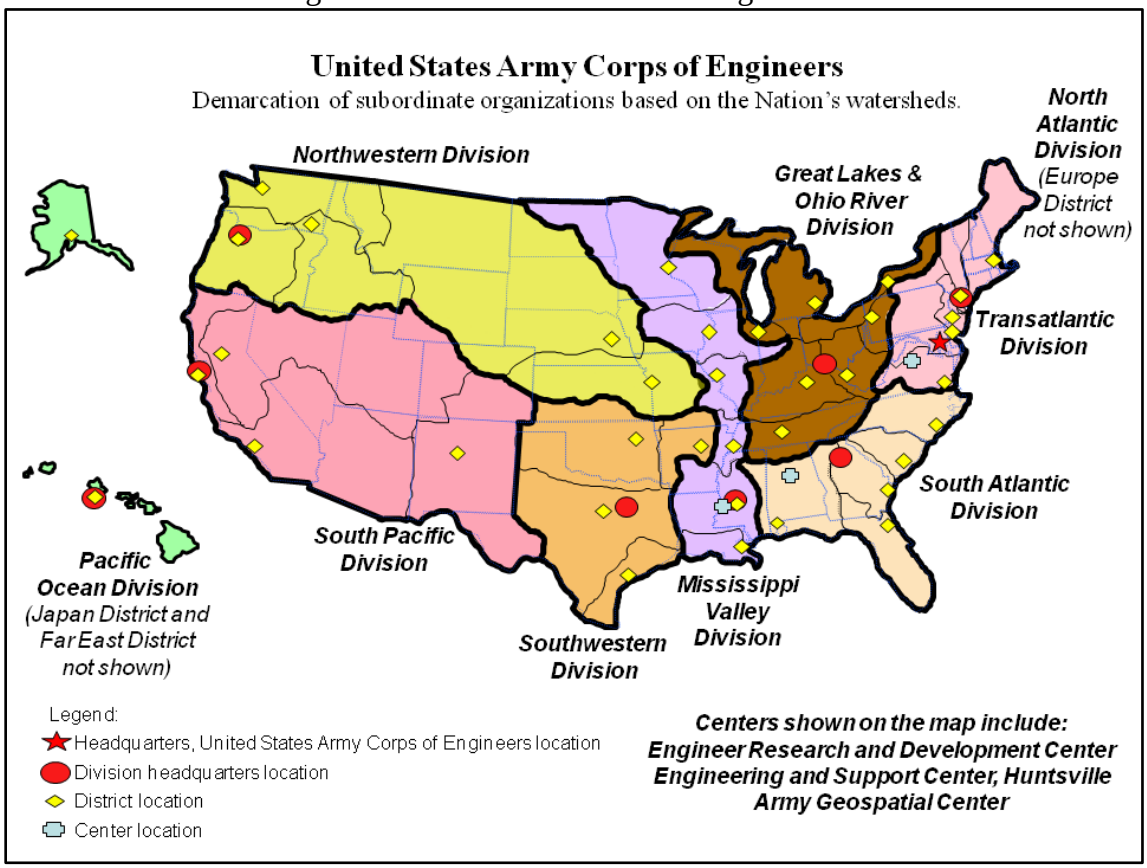
(4) Environment—restores, manages, and enhances ecosystems (local and regional).

(5) Water resources development—balances requirements between water resources development and the environment.

d. Organized into subordinate divisions, districts, laboratories and centers, USACE provides a broad range of engineering support to military departments, federal agencies, state governments, and local authorities in a cost-reimbursable manner. The division's orientation is

regional and provides broad interface with regional interests and management of division-wide programs. Division commanders provide executive direction to and management of subordinate district commands (the operating arm of the divisions). The districts maintain in-house capabilities in planning and design, engineering, construction, operations, project management (PM), and contract administration. The Engineer Research and Development Center (ERDC) is a distributed research and development command consisting of seven unique laboratories that conduct research and development in support of the Army and the other services. ERDC's laboratory and specialized expertise is available to support USACE and DOD through district and division commands. Additionally, USACE maintains several specialized centers of expertise at its districts that provide additional technical engineering services. Figure 1-1 provides an overview of the USACE organization (see Appendix C for specific discussion of the FFE organizations).

Figure 1-1. Overview of USACE organization



e. As part of its five major functions, USACE provides technical engineering assistance and contract support to joint forces deployed worldwide. USACE support provides for technical engineering and contract construction support, integrating its organic capabilities with those of operational forces, other Services, and other sources of engineering-related support. Reachback capability provides additional specialized data, research, and expertise when needed for design and other technical support in an operational area. The reachback process enables engineers and the commanders they support to exploit a myriad of nondeployed subject matter experts (SMEs).

1-3. Field Force Engineering Applications. FFE enables generating force engineer support to deployed operating forces. USACE is the proponent for FFE. It is provided by technically specialized personnel and assets (deployed or participating through reachback) or through operational force engineer Soldiers linked to reachback capabilities. TeleEngineering is the communications architecture that facilitates reachback when the existing communications infrastructure cannot support the mission. In the broadest sense, *FFE* is the application of the Engineer Regiment's capabilities across the range of engineer battlespace functions (although primarily general engineering intensive) and to support full spectrum operations through both reach and forward presence (FM 3-34) (see Figure 1-2, page 1-8). This pamphlet focuses more specifically on the application of USACE capabilities through FFE in support of full spectrum operations. These discussions are relevant to similar theater engineer command capabilities and FFE applications as well.

a. FFE leverages reachback to technical SMEs throughout the USACE districts, divisions, laboratories, and centers of expertise and is extended by USACE links with other Services, government agencies, and private industry. The USACE objective for FFE is to effectively leverage its generating force capabilities to provide technical engineer assistance, enabling engineer functions in support of an operational force. One of the ways USACE accomplishes this is by training, equipping, and maintaining specialized, deployable FFE teams. These deployable USACE organizations provide technical assistance and access additional technical support through the reachback process. Focus areas for deployable teams include engineer assessment, planning, and design considering HN infrastructure and may extend to support for development of HN technical capacity. Another way that USACE supports the operational force is through nondeployable teams that provide dedicated engineering assistance in response to requests from deployed teams or engineer Soldiers in the operational area. Focus areas for these teams include base camp development and access to other technical expertise. Base camp development provides technical assistance for base development engineering and planning and facilities design for base camps, including staging bases, forward operating bases, displaced persons camps, and similar requirements. The USACE Reachback Operations Center (UROC) is the primary hub for personnel to obtain technical expertise assistance through reachback.

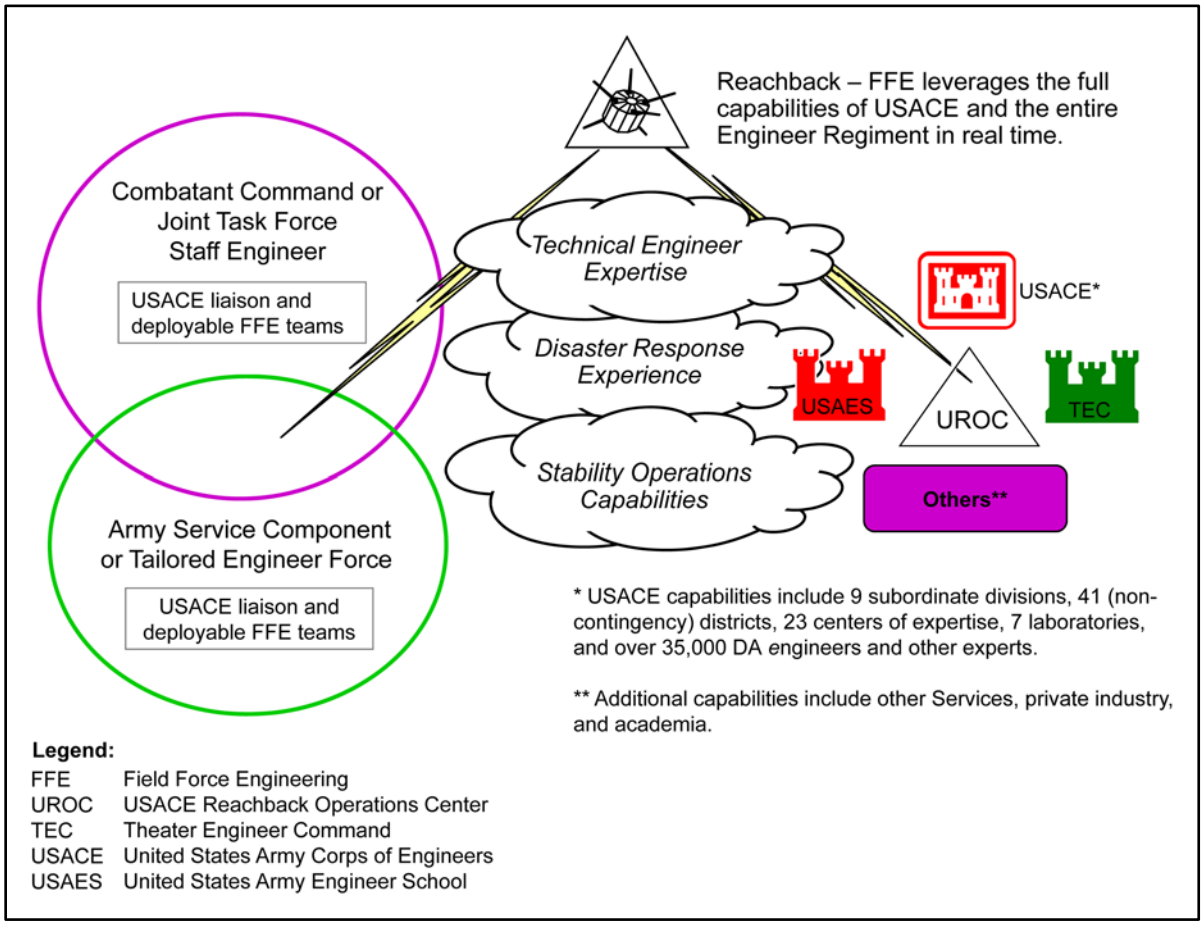


Figure 1-2. Leveraging USACE capabilities

b. From the Army's brigade-centric force, brigade combat teams (BCTs) and other brigades from a force pool are task-organized to a higher echelon headquarters—a division, corps, or theater army—as part of a force-tailored formation based on operational requirements. Engineer staff assigned to each echelon headquarters, along with engineer units in force-tailored formations, provide lethal and nonlethal roles in full spectrum operations. A variety of engineer forces are tailored to meet defined and anticipated requirements at each operational echelon. Through deployable elements and the additional support available through reachback, FFE is also tailored for applications at the operational and tactical levels.

(1) The focus for engineer support at the strategic to operational levels includes force planning, engineer policy and doctrine development, and campaigns and operations execution focused primarily on the means and capabilities to generate, mount, sustain, and recover forces. Additionally, infrastructure development is a critical aspect of enabling and sustaining force deployments and places a heavy demand on engineer capabilities. Engineers at the strategic level advise on terrain; infrastructure, to include seaports of debarkation (SPODs) and aerial ports of debarkation (APODs); LOCs; air base and airfield operations; base camp development; joint

targeting; humanitarian assistance; environmental considerations; engineer interoperability; force generation; priorities of engineer support; and force protection.

(2) Many engineer support activities conducted at the strategic level are also performed at the operational level. Operational planning merges the planning and orders of the joint force, specific engineer missions assigned, and available engineer forces to achieve success. Operational engineer planners must consider the limitations of tailored engineer forces in both capacity and force strength. At the operational level, engineers recommend priorities for limited assets to mitigate risks. Engineers work with other staff members to analyze operational and mission variables. They seek opportunities or ways to contribute to operations by setting conditions for success and facilitating the commander's objectives. Engineers anticipate challenges or requirements and request capabilities to meet them. They develop geospatial products and services and make recommendations for sustaining and protecting the force. As the link to tactical engineer integration, operational planning ensures adequate capabilities are provided to accomplish support requirements at that level.

(3) Engineer support activities at the tactical level focus on support to the ordered arrangement and maneuver of combat elements (in relation to each other and to the enemy) that are required to achieve combat objectives. In the context of engineer operations, support at the tactical level focuses on combat engineering activities and capabilities. Engineer tactical planning is typically focused on support to movement and maneuver but also must consider sustainment and protection requirements not provided by the operational level. Engineer planners at the tactical level use the engineer assets provided by operational planners to support tactical mission tasks assigned to the combat maneuver units they support. With the support of the engineer, the subordinate commander ensures that engineer capabilities are effectively integrated into combined arms formations and the concept of operations. Engineer reconnaissance (both tactical and technical) is a critical capability to the combat maneuver commander at the tactical level.

c. Actual requirements for engineer forces, even after accounting for FFE and other resources available, will nearly always exceed tailored force capabilities. Deployable FFE teams must be considered a low-density, high-demand capability, as is typical with other engineer forces. Prioritization occurs by effectively applying tailored engineer forces against actual requirements. When necessary, reachback can also be employed to mitigate risk when the demand exceeds available resources. At each echelon level, engineer staff members recommend priorities to their commanders based on continuous assessments maintained through running estimates (which help organize requirements using the engineer functions). Chapter 2 of this pamphlet describes the specific FFE teams and cells designed to support each echelon. It discusses the various USACE and similar theater engineer command (TEC) capabilities that are organized to provide FFE-like applications.

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CHAPTER 2

Organization

"The Army does have inherent capabilities for the establishment, repair, and maintenance of critical infrastructure. The U.S. Army Corps of Engineers (USACE) is responsible for Army and Department of Defense military construction, real estate acquisition, and development of U.S. infrastructure through the civil works program. USACE also provides technical assistance and contract support to joint forces deployed worldwide."

—FM 1-01

2-1. Field Force Engineering Capabilities. FFE is provided by technically specialized personnel (mostly civilian) and assets (deployed or participating through reachback capability) or through operational force engineer Soldiers linked into reachback. The USACE organization for FFE includes teams with a variety of critical specialties and skills but also includes an extensive organizational and physical infrastructure necessary to enable reachback and to integrate FFE support to full spectrum operations. This section describes the USACE organization for FFE. It includes a brief description of similar capabilities within the two TECs. See Appendix C for a summary of the FFE organizations described in this section.

a. FFE teams, deployable and nondeployable, are the primary elements within USACE (and the two TECs which establish FESTs) that are organized, trained, and equipped to provide technical solutions to engineering and construction-related challenges. These elements deliver FFE to supported units through their engineer staff. FFE teams serve as forward planning, execution, or liaison teams to support full spectrum operations or offer dedicated reachback support to the deployed teams and engineer Soldiers in need of technical support. FFE teams are designed using standard organizational templates, including both TOE and TDA elements, but are flexible and can be augmented for specific missions (such as more structural or geotechnical engineers instead of civil engineers in response to a catastrophic earthquake). FFE teams will typically develop solutions employing their own available resources and have the capability to employ reachback to the entire array of expertise within the USACE laboratories or centers of expertise for more complex engineering issues.

(1) Deployable teams include the FEST-main (FEST-M), the FEST-advance (FEST-A), the contingency real estate support team (CREST), the environmental support team (EnvST), and the logistics support team (LST). These teams are force-tailored based on requirements identified through analyses of operational and mission variables. *Force tailoring* is the process of determining the right mix of forces and the sequence of their deployment in support of a joint force commander. (FM 3-0). Force-tailoring considerations for deployable FFE teams are discussed later in this chapter and in Appendix D. Appendix E describes integration of the teams within the supported formations. While these teams are trained and capable of plugging into the Army's modular force organizations from brigade (including the BCTs and functional and support brigades) through theater army and combatant command echelons, the density of available teams will require prioritization when the demand exceeds the availability. The demand

for FESTs will likely exceed the available force pool when the scope of an operation includes multiple headquarters operating at multiple echelons. In this case, the available FFE elements are tailored to support the force at the most appropriate headquarters and echelons, taking into consideration the operational and mission variables. Force tailoring considerations for the teams are described below and discussed later in this chapter. Chapter 4 discusses appropriate applications when considering the general and core mission capabilities of the teams.

(a) A FEST-M is a deployable team that provides construction management, real estate, environmental, geospatial, and other engineering support (typically at the theater echelon level) and can provide command and control (C2) for deployed FFE teams. This team would typically support a joint task force (JTF) or the land component of a JTF, either task-organized to that headquarters or to a supporting engineer headquarters. The FEST-M operates as augmentation to either the joint force engineer staff or the engineer headquarters element or may operate as a discrete headquarters element. It is designed to provide C2 for additional FFE elements when task-organized with those organizations. In some cases, the FEST-M may provide the base upon which a contingency USACE district is established in theater. The FEST-M element conducts a variety of core essential tasks in support of stability operations, consequence management or civil support, and technical engineering missions. It requires sustainment and security support from the gaining or supported unit.

(b) A FEST-A is a deployable team that provides infrastructure assessment, engineer planning and design, environmental, geospatial, and other technical engineering support (from theater to brigade echelon) and augments the staff at those echelons. This team could support any echelon configured as a joint force headquarters for smaller-scale contingencies or may be task-organized at corps, division, and brigade echelons when configured as an intermediate or tactical headquarters. The FEST-A operates as augmentation to either the supported force engineer staff or the supporting engineer headquarters. It is designed to receive task-organized CREST and EnvST elements when those capabilities are required. A FEST-A may also provide FFE support within an assigned area as a subordinate element of a FEST-M. The FEST-A conducts a variety of core essential tasks in support of stability operations, consequence management or civil support, and technical engineering missions. The FEST-A requires sustainment and security support from the gaining or supported unit.

(c) A CREST is a deployable team, which can acquire, manage, and dispose of real estate property on behalf of the U.S. government. This team could support any echelon but will typically be tailored to support an Army component headquarters configuration with support missions requiring real estate management. The CREST operates as augmentation to the supported force engineer staff or supporting engineer headquarters. It may also be task-organized to a tailored FEST. The CREST conducts real estate management tasks and should be deployed early in a contingency to facilitate the acquisition of real estate in support of the development of facilities for U.S. forces. It requires sustainment and security support from the gaining or supported unit.

(d) An EnvST is a deployable team that conducts environmental assessments, baseline and other surveys, and studies. This team could support any echelon, but will typically be tailored in

support of an Army component headquarters configuration with support missions requiring base camp development. The EnvST operates as augmentation to either the supported force engineer staff or the supporting engineer headquarters. It may also be task-organized to a tailored FEST. The EnvST conducts environmental management tasks in support of base camps and other technical engineering missions. The team should be deployed as an initial element to perform assessments and identify environmental hazards, and remain as one of the last elements to provide remediation actions and support for base closure. The EnvST requires sustainment and security support from the gaining or supported unit.

(e) An LST is a deployable team that coordinates sustainment support for deployed FFE or emergency management elements when those requirements exceed or are not provided by the operational force logistics system. This team typically supports the FEST-M when that team provides C2 for additional FFE elements. The LST could operate in support of RSOI for deploying FFE elements. The LST conducts force-specific sustainment tasks in support of consequence management, civil support, and stability operations. The LST requires sustainment and security support from the gaining or supported unit.

(2) Nondeployable teams include the USACE UROC and the base camp development teams (BDTs). These teams consist of personnel possessing technical capabilities to fulfill a variety of complex technical problems submitted as reachback requests. The USACE UROC consists of both civilian and military personnel; its mission is to provide rapid, relevant, and reliable solutions to Soldiers and Civilians across the full operational and natural disaster spectrum in support of the Armed Forces and the Nation. The UROC supports the Warfighter and the Nation by providing cost-effective, superior customer service, and achieving customer (requestor) satisfaction in every area of reachback support. This “reachback” engineering capability allows US personnel deployed worldwide to talk directly with experts when a problem in the field needs quick resolution. Deployed personnel can be linked to subject matter experts (SMEs) within the US Government, Department of Defense (DoD), USACE, private industry, and academia to obtain detailed analysis of complex problems that would be difficult to achieve with the limited expertise or computational capabilities available in the field. While the UROC is capable of responding to a variety of complex technical problems, the team is also trained to exploit the entire array of expertise within the USACE laboratories, centers of expertise, base camp development teams (BDTs), USACE divisions and districts, other DoD or US Government agencies, or other organizations, as needed, for more complex engineering issues. A base camp development team (BDT) is a nondeployable team within a selected USACE district that can quickly provide base development engineering, master planning, and facilities design in support of FFE and other reachback requests for information (RFIs). The BDTs are managed and trained by the UROC and are OPCON to the UROC during their specified rotational readiness cycle. Focus areas for the BDTs are engineering-related planning and development issues involved in locating, designing, constructing, and eventually closing or transferring base camps. Note that base camp operations and maintenance activities are not within the scope of FFE support but may rely on FFE applications to address specific technical engineering requirements when necessary. The BDT’s resources and expertise are available to support FFE teams and operational forces through the USACE Reachback Operations Center (UROC).

b. The USACE organization for FFE includes an organizational infrastructure necessary to integrate FFE support within joint, interagency, intergovernmental, and multinational operations. From an alignment of USACE divisions with habitually supported combatant commands to the organization, training, and C2 of deployable FFE elements, the USACE organizational infrastructure institutionalizes an expeditionary mindset and focus on supporting the operational force. Goal number 1 of the USACE Campaign Plan is to "Deliver USACE support to combat, stability, and disaster operations through forward deployed and reachback capabilities". The USACE organization to integrate FFE support to full spectrum operations includes: liaison officers (LNOs) aligned with combatant command and Army Service component command headquarters, training and readiness relationships with TECs, administrative control (ADCON) capabilities for FFE elements (Chapter 3 includes additional discussion of ADCON considerations for FFE), and a variety of specialized capabilities available to address specific requirements.

(1) Within USACE, the Chief of Engineers has aligned USACE divisions and task-organized LNOs with combatant and theater army commanders to leverage USACE capabilities and integrate FFE support (see Figure 2-1). This relationship with the CCDR and the operational force allows direct liaison with USACE for resources to support engagement strategies and integration of FFE planning for contingency and major combat operations (MCO). The LNOs integrate, within the aligned headquarters engineer staff, to coordinate appropriate USACE and FFE support for theater security cooperation plans and operations. The habitually associated USACE divisions assist with the conduct of exercises in support of theater plans and coordinate with the USACE headquarters for required FFE support. USACE division commanders initially determine the mix of FFE capabilities required, based on the situation, and coordinate with the headquarters for additional resources as necessary.

(2) USACE provides TeleEngineering tools and training (as necessary) for any engineer headquarters to access reachback support. Additional FFE support may be integrated, as needed, at the engineer battalion or brigade echelons, which are typically focused on tactical-level operations. A close working relationship is maintained between USACE and the TECs. The TEC is the only organization designed for operational command of engineer capabilities at the echelons above corps level and will often provide C2 for the JFC, if an operational engineer headquarters is required. The TEC deployable command post (DCP) provides C2 for all task-organized Army engineer brigades and other engineer units and missions for the joint force, land component, or Army commander. When directed, the DCP may also provide C2 for engineers or other formations from other Service, multinational, HN, and contract construction engineers. The TEC typically serves as the senior theater or land component engineer headquarters. Deployable FFE teams may be task-organized with the DCP. USACE provides training and readiness oversight for the TECs and maintains direct coordination for support (including FFE support) of the combatant and theater army commanders. The 416th TEC includes a contingency response unit to provide staff augmentation to USACE divisions and districts as they support combatant and theater army commanders.

(3) In conducting its statutory and assigned missions, USACE generates capabilities that may be employed to benefit operational forces. As previously discussed, these capabilities add

significant technical engineering and other specialized expertise in support of full spectrum operations. As the employment of these capabilities has evolved into FFE, USACE has refined its organizational infrastructure to generate the required FFE elements but also to sustain those elements, even as they are tailored for operations. Within the USACE organization resides expertise to recruit, organize, train, equip, and provide human resources for the Soldiers and Army civilians that provide FFE support. Some of these ADCON areas of responsibility (AORs) must be retained by USACE (even for tailored and deployed FFE teams) due to the unique nature of the support required. Chapter 3 discusses considerations for ADCON support of deployed FFE teams. (See Appendix F, FFE training, for information on the force generation cycle used for FFE elements.)

(4) The USACE organizational infrastructure has institutionalized the mindset, expertise, and capabilities necessary to rapidly respond to the consequences of an attack or disaster. Within USACE, the emergency management community provides highly skilled specialists to meet public works and engineering needs during civil support and selected overseas humanitarian assistance operations. FFE leverages the extensive USACE experience in responding to civil support requirements. From the development of training products to the consultation with experts on consequence management, FFE capabilities benefit from the skills and knowledge resident within the organization. FFE also provides reachback capability for specific emergency management expertise needed in civil support or other operations. Chapters 3 and 4 provide additional discussion on the integration of FFE in civil support and on specific consequence management applications.

(5) The 249th Engineer Battalion (Prime Power), the Army Geospatial Center (AGC), and the ERDC are a few examples of unique and specialized capabilities within USACE available to address specific requirements. These elements are not considered solely FFE capabilities but are certainly available in support of FFE.

(6) Contract construction agents are not considered an FFE capability but, because these assets are often already operating in a selected theater of operations, they are included in this discussion of the USACE organizational infrastructure to support FFE. The Secretary of Defense has designated the USACE and the Naval Facilities Engineer Command (NAVFAC) as construction agents for the design and construction execution of U.S. military facilities worldwide. (The United States Air Force [USAF] is the designated DOD construction agent for military construction in the British Isles.) Each theater contract construction agent is uniquely designed and organized for the requirements specific to that theater. Construction agents develop and maintain in-depth expertise in engineering research and development for their designated areas. These USACE or NAVFAC construction agents may provide significant engineering capability to be leveraged in joint operations. Inherent in their mission support capabilities is a planning and engineering capability for advanced base and infrastructure development. Designated construction agents may be available to support engineering operations with technical assistance and contract support; FFE offers a means to coordinate that support. FFE elements provide an awareness of the construction agent’s organization and capabilities and access to their regional construction expertise.

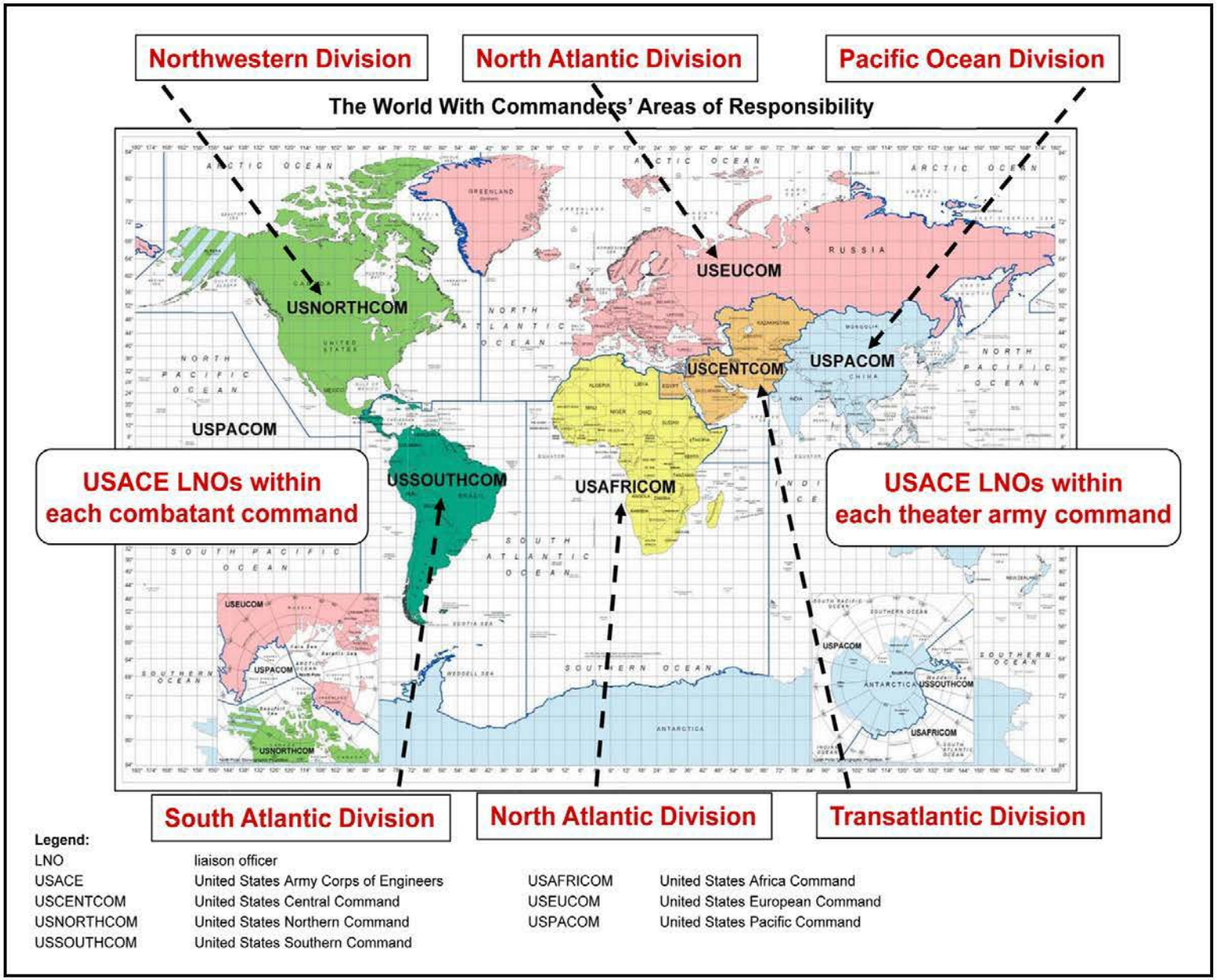

Figure 2-1.USACE relationships with combatant commands

c. UROC maintains a searchable website allowing deployed personnel and FFE teams the ability to search for information relating to their specific request. c. The UROC maintains the mechanisms to support computer-based modeling, data collection and exchange, and communication functions. Reachback support through the UROC is made possible by a variety of systems developed and maintained by the UROC, including both management systems and software/hardware technologies. UROC personnel, in coordination with BDTs, USACE CXs, USACE divisions and districts, Government and DoD agencies, and other organizations, provide technical assistance to requestors; whether it is providing technical answers to reachback requests or coordinating other requests, the UROC is a one-stop shop for reachback support. UROC websites and databases support reachback and FFE by offering a wealth of easily accessible, commonly requested information. Among the reachback technologies developed and supported by the UROC is the TeleEngineering Communications Equipment – Deployable (TCE-D), the tool used to enable reachback in the absence of adequate communications; thus, making reachback support available to deployed personnel. Other specialized systems and equipment are employed to improve the effectiveness and efficiency of reachback support by providing data collection platforms. See Appendix G for specific UROC contact information and descriptions of UROC technologies.

2-2. Unified Action. Army forces conduct operations as part of a joint force in unified action. Successful mission accomplishment requires understanding the OE; the role of the Army in unified action; and how Soldiers, leaders, and units accomplish missions through full spectrum operations. Unified action describes the wide scope of actions taking place within joint commands and highlights the synergistic application of all the instruments of national and multinational power, including the actions of nonmilitary organizations. Engineer capabilities are a significant force multiplier in joint operations and include resources from a variety of joint and other sources, in addition to Army forces. Each Service has core engineering units and capabilities that stem from their traditional roles and associations to meet specific operational needs and to support accomplishing a variety of mission requirements in any OE. The JFC also considers multinational, interagency, NGO, and intergovernmental organization (IGO) capabilities to better coordinate coherent activity, develop viable courses of action (COAs) and, when appropriate, properly integrate those activities into the joint operation. This section briefly describes the array of joint and other engineer capabilities available to the JFC and identifies capabilities that may have significant interaction with deployed FFE elements or impact the provision of FFE support. See JP 3-34 for further discussion of engineer participation in joint, interagency, and multinational operations.

a. Naval civil engineering forces are organized and equipped within the Department of the Navy to meet the requirements of expeditionary operations. The term *Naval civil engineering forces* includes the complementary but distinct capabilities of the Naval Construction Force (NCF) (also referred to as *Seabee*) and the business enterprise of NAVFAC. The NCF has rapidly deployable units of various sizes and configurations, tailored to provide responsiveness and flexibility. Seabees provide advanced base construction, to include airfields, LOCs, upgrades and maintenance repairs, battle damage repairs, underwater and amphibious construction, and logistic facilities construction. Both NAVFAC and the NCF provide engineering support to the JFC and to U.S. Marine Corps (USMC) forces at various levels, (USMC forces typically rely on

Naval civil engineering for general engineering support). USAF engineer forces include the business enterprise of the Air Force Civil Engineering Support Agency and the various organizations supporting all aspects of airfield operations, including a civil engineering squadron located at most installations. The USAF has the capability to rapidly deploy general engineer units—organized as part of an air and space expeditionary task force—to open, establish, and maintain airbase power projection platforms. These same units can deploy as detached units operating in support of specific missions and operational tasks, such as—

(1) Airfield pavement evaluations.

(2) Crash and fire rescue.

(3) Explosive ordnance disposal (EOD).

(4) Emergency management response.

(5) Airfield damage repair.

(6) Facility construction and maintenance.

(7) Utility systems construction and maintenance.

(8) Aircraft arresting system installation and maintenance.

(9) Airfield lighting and marking;

(10) Installation navigation aids.

When organized as Prime Base Emergency Engineer Force (Prime BEEF) and Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineer (RED HORSE) units, these general engineer units provide a broad array of general and geospatial engineering capabilities.

b. Other government agencies (OGAs) can support the JFC's mission objectives and greatly expand the capabilities of the joint force. This is true whether the response is international in nature or within the United States (such as during consequence management where engineers might provide support in cleanup efforts, which requires close coordination with other agencies). Coordination and a clear understanding of the commander's intent are critical aspects when synchronizing operational efforts involving multiple government agencies. The JFC will be required to coordinate with other agencies to achieve overall U.S. objectives. Joint force engineers should have an understanding of the capabilities of these agencies and their support functions. While U.S. OGAs may increase the resources engaged in a given operation, they may also increase and complicate coordination efforts. Stability operations are now regarded as a core U.S. military mission though the U.S. Agency for International Development; the Department of State will most likely be the designated lead agency. Since integrated civilian and military efforts are key to successful stability as well as for civil support operations, DOD

engineer personnel must be prepared to conduct or support stability operations by working closely with U.S. departments and agencies, foreign governments and security forces, global and regional international organizations, U.S. and foreign NGOs, and private-sector individuals and for-profit companies.

c. In addition to U.S. military engineer forces, multinational engineers can provide valuable capabilities. Multinational military units and civilian contractors, in addition to providing labor, material, infrastructure, and services, may possess certain engineering capabilities specifically adapted to the local environment. There are other benefits to the use of multinational military units and civilian contractors, but these benefits need to be weighed against their potential limitations. This mixture of capabilities may change during the phases of an operation and may require management across Service lines to ensure that the JFC has appropriate forces in place. FFE typically offers experience when interacting with civilian contractors.

d. HN engineer capabilities may be available if an adequate infrastructure exists. These capabilities may be preferred for their local expertise and when development of local capacity is desired. Potentially, this could include a wide array of civil and public works organizations. It is also increasingly common to contract for a wide range of engineer services with local or third-party national organizations and civilian contractors, though this option may require close supervision if technical capacity is lacking. These assets are typically used to free up military assets (minimizing the military footprint in theater) when requirements exceed military capabilities or when engineer operations and requirements are to be conducted in areas that are relatively safe from active combat. FFE elements will likely interact extensively with HN construction and engineering organizations and may become involved in the development of technical capacity.

e. Civil augmentation programs, such as the Army Logistics Civil Augmentation Program (LOGCAP), the Navy global contingency construction and contingency service contract programs, and the Air Force Contract Augmentation Program (AFCAP), also play a significant role in mission accomplishment by providing the JFC and joint force engineer with additional options and flexibility in general engineering and logistic support. Construction may be within the scope of any of these contract services. The Army LOGCAP is administered by the Army Material Command but includes an agreement for USACE to support contract construction requirements. FFE support is not intended to be applied in the management of LOGCAP or similar contracts; however, it can, and typically will, interact with the LOGCAP and other contract providers during various facilities design or other base development activities.

2-3. Tailoring Capabilities by Operational Configuration. Each operation is unique based on operational and mission variables. BCTs and functional and support brigades are attached to higher echelon headquarters—a division, corps, or theater army—as part of force-tailored formations based on operational requirements. Commanders organize their force for the operation and consider mission variables to determine the operational configuration for the headquarters. Because the demands of operations vary, there is no set engineer force structure or standard template for FFE support. A building block approach that is based on need is used to tailor the force and to ensure adequate FFE support. While echelons and operational

configurations do not dictate what FFE support must be tailored for an operation, considerations for the allocation of FFE elements and other support can be organized and described based on the operational configuration at each echelon (see Table 2-1 for a summary of tailoring considerations and refer to Appendix D for additional discussion).

a. By design, each geographic combatant command has an assigned theater army headquarters. A theater army performs two complementary functions for the combatant command. First, it is the Army Service component headquarters for all Army forces within the theater. In this capacity, the theater army is responsible for ADCON of all Army forces and support for Army, joint, interagency, and multinational forces operating across the AOR. Second, the theater army is organized and equipped with joint and multinational staff augmentation, as appropriate, to exercise operational control (OPCON) of joint and multinational forces within a joint campaign, while continuing to perform theater support responsibilities. Operational engineer forces and FFE support must be tailored according to the needs of the theater army, considering both support roles and operational responsibilities.

Table 2-1. Tailored FFE support considering echelon and configuration

Configuration	Echelon			
	Theater Army	Corps	Division	Brigade
JTF headquarters	USACE LNO+FEST-A with CREST and EnvST	FEST-M or FEST-A	FEST-A	FEST-A
JFLCC headquarters	USACE LNO+FEST-M with subordinate FEST-A (as required)	FEST-M or FEST-A	FEST-A	*Not Applicable*
Intermediate tactical headquarters	*Not Applicable*	FEST-A	*Not Applicable*	*Not Applicable*
Tactical headquarters	*Not Applicable*	*Not Applicable*	FEST-A	FEST-A (if available)
Army Service component headquarters	USACE LNO+FEST-A with CREST and EnvST	CREST and EnvST	CREST and EnvST	CREST and EnvST

Legend:

CREST	contingency real estate support team
EnvST	environmental support team
FEST-A	forward engineer support team-advance
FEST-M	forward engineer support team-main
FFE	field force engineering
JFLCC	joint force land component command
JTF	joint task force
LNO	liaison officer
USACE	U.S. Army Corps of Engineers

b. While the theater army headquarters maintains a regional focus, the corps headquarters can deploy to any AOR to provide C2 for Army, joint, and multinational forces. The corps headquarters can control a mix of modular brigades, divisions, and other Service or multinational forces. Unlike the theater army, the corps headquarters will have the support of a theater army as Army Service component command (ASCC), tailored to meet the needs of the AOR and equipped with regional expertise. Operational engineer forces and FFE support for the corps will be tailored to consider the needs of the specific mission, while incorporating operational and mission variables specific to FFE teams supporting the theater echelon. In some situations, the theater army will retain the necessary engineer and FFE support required for theater-wide support responsibilities but provide FFE elements task-organized to a corps for specific mission requirements.

c. The primary mission of a division headquarters is to serve as a tactical warfighting headquarters directing subordinate brigade operations. A division can control up to six BCTs with appropriate supporting brigades during the conduct of MCO. The division requires at least one of each of the five types of support brigades—combat aviation, fires, maneuver enhancement, battlefield surveillance, and sustainment—to have a complete combined arms team during the conduct of MCO. The secondary mission is to serve as a JTF or land component command headquarters for small contingencies. The division does not need additional Army augmentation but does require joint augmentation to act as a JTF or a joint force land component command (JFLCC) headquarters. Performing the functions of an Army Service component headquarters is a tertiary mission for a division headquarters but will not typically be required when configured as a JTF and requires significant additional Army augmentation when configured as JFLCC. In every operational configuration, the division (like the corps) will have the support of the theater army as an ASCC (tailored to the needs of the AOR and including regional expertise).

d. Since 2003, the Army has fundamentally shifted toward a brigade-based force. The transformation of the Army resulted in stand-alone division and corps headquarters. BCTs, modular support brigades, and functional brigades are pooled for use as part of expeditionary force packages that enhance the flexibility and responsiveness of the Army.

2-4. Tailoring Capabilities for Full Spectrum Operations. Army forces provide a mix of land combat power that can be tailored for any combination of offensive, defensive, and stability or civil support operations as part of a joint force. All major operations conducted overseas combine offensive, defensive, and stability elements executed simultaneously at multiple echelons. Engineer operations at higher echelons consist of technically focused tasks that simultaneously support offensive, defensive, and stability or civil support operations. The technical aspects of engineer tasks at higher echelons tend to be more essential to their effective application than tactical aspects. For example, from an operational-level perspective, the application of engineering efforts to repair and upgrade a road and its component bridges tends to retain a consistent set of technical tasks. Operational elements have less distinct impact than the technical aspects of the engineering tasks and, in fact, most operational-level engineering will simultaneously support all of the operational elements. The scale of support required will likely be more significant in tailoring appropriate FFE capabilities than the requirements unique to

operational elements. At tactical levels, the operational elements become more distinctive. FFE support must be provided based on the requirements generated by those elements.

a. For MCO, a significant portion of the tailored engineer force will be pushed, using command relationships in the task organization, to tactical echelons for close support of combat operations. This will be true for some general engineering capabilities and for most combat engineering capabilities; however, this scenario is unlikely for FFE capabilities other than reachback. In MCO, tactical echelon engineer planners are less likely to identify the technical engineering requirements for FFE support, at least initially. These requirements are not well defined, as the focus is primarily on tactical requirements to support combat operations. Tailored forces are pushed to subordinate echelons to address these requirements and add flexibility for maneuver commanders to react to unforeseen challenges and opportunities. Technical engineer and other FFE support will most likely be accessed in the form of reachback support from task organized at a higher echelon. Operational-level sustainment and other requirements compete for the same technical engineering capabilities; priorities are established to mitigate risk. FEST-As would only be task-organized directly in support of the mission in situations where extensive complex engineering problems are anticipated as an integral part of the tactical-level combat operation.

b. Planners always consider the transition from combat operations to follow-on stability operations. Stability operations are designed to establish a safe and secure environment and facilitate reconciliation among local or regional adversaries. Stability operations establish conditions that enable actions by civilian and HN agencies to succeed. By establishing security and control, stability operations provide a foundation for transitioning authority to civilian agencies and eventually to the HN. Once this transition is complete, commanders focus on transferring control to a legitimate civil authority according to the desired end state. Technical aspects of engineering support for stability operations receive greater focus, even at tactical echelons. Tactical echelon units conducting stability operations are more likely to interact with supporting FFE teams. While deployable FFE teams may not be available to tailor with every division or brigade headquarters, planners will likely use task organization to ensure that support is provided for each unit. For example, teams may be task-organized at a higher echelon to operate in and support multiple brigade areas.

(1) In stability operations, supporting engineers assess the OE by focusing on the different aspects of the terrain and the friendly and threat forces' capabilities. Terrain products continue to have a great deal of importance, but political and cultural considerations may be more important than strictly a combat terrain analysis. Engineer units may be tasked to provide general support (GS) within a selected area to maximize the application of limited assets. Engineers also plan for engineer units operating among civilians or in conjunction with NGOs and other international organizations. Army forces establish or restore the most basic services and protect them until a civil authority or the HN can provide, protect, and sustain them. Normally, Army forces support civilian and HN agencies. When the HN cannot perform its role, Army forces may provide the basics. Essential services may include the following:

(a) Providing emergency medical care and rescue.

(b) Preventing epidemic disease.

(c) Providing food and water.

(d) Providing emergency shelter.

(e) Providing basic sanitation (sewage and garbage disposal).

(2) As in all operations, tactical echelons conducting stability operations will access reachback FFE support from a deployed FFE team task-organized at a higher echelon. Additionally, FFE teams will likely be employed in impacted areas for infrastructure assessments and surveys to determine requirements. In situations where extensive complex engineering will be required for the restoration of essential services, a FEST may be task-organized directly in support of the tactical echelon responsible for the area. Engineer elements with appropriate FFE support may be tasked with supporting or managing capacity building programs (both military and civilian) during stability operations. The responsible engineer staff assesses technical capacity and includes consideration for these requirements in the conduct of stability operations. Depending on the scale of the stability operation and the complexity of problems determined through consideration of mission variables, appropriately task-organized FEST-M, FEST-A, and other elements may be applied to provide required technical engineer support.

(3) For larger-scale stability operations, commanders may organize multifunctional provincial reconstruction teams as part of a longer-term effort to transition the functions of security, governance, and economics to provincial governments. The reconstruction team is a potential combat multiplier for engineer efforts supporting stability operations. These teams provide expertise to programs designed to strengthen infrastructure and the perception of local governments. The provincial reconstruction team focuses on developing institutional capacity for governance, security, and reconstruction. An assigned engineer on the staff of the team assists in developing the team's economic development work plan, including assistance projects. The team emphasizes the construction of infrastructure, including schools, clinics, community centers, and government buildings. The provincial reconstruction team also focuses on developing capacity through training and advisory programs. FFE efforts must be coordinated with the provincial reconstruction team and in some cases will be necessary to enable their mission.

c. DHS is the primary federal agency in charge of reducing the vulnerability of the United States in domestic incidents, emergencies, and disasters. Local responders (first responders and private organizations), state-level responders (National Guard and others), and federal responders are all coordinated in a federal response that may include civil support operations. DHS is responsible for two primary documents describing national policy and procedures for effective and coordinated multiple-organization incident response operations. The National Response Framework (NRF) provides federal guidance and procedures, including what organizations are involved based upon the type of incident and the level of required response. The NRF provides guidance on who does what at the local to federal levels, including private and volunteer

organizations and NGOs. USACE has extensive public works and engineering responsibilities, which frame ESF #3 under the NRF, and supports other designated lead agencies within their respective functions. USACE relies primarily on its emergency management community of practice to provide necessary ESF #3 and other required response assistance. FFE support is tailored to support operational engineer and other military forces when they conduct civil support operations. Selected FFE capabilities may also be applied in lieu of response and other emergency management elements working directly with FEMA, if required.

(1) U.S. Northern Command maintains standing JTFs for operations in the United States. USACE provides emergency management cadre to each of these JTFs, as required. Additionally, any corps or division headquarters may be required to provide civil support. Civil support operations address the consequences of natural or man-made disasters, accidents, and incidents within the United States and its territories. Consequence management focuses more specifically on mitigating the impact of terrorist attacks. Army forces work with state and federal officials to help restore and return control of services to civil authorities as rapidly as possible. As a result of disaster or attack, state and local governments' capacities may be reduced or overextended. Army forces may also provide C2, protection, and sustainment to government agencies at all levels until they can function normally. As in all operations, tactical echelons conducting civil support will access reachback or support from a deployed FFE team task-organized at a higher echelon. Additionally, FFE teams will likely be employed in impacted areas for infrastructure assessments and surveys to determine requirements. In situations where extensive complex engineering will be required for the restoration of essential services, a FEST may be task-organized directly in support of the tactical echelon responsible for the area. Depending on the scale of the operation and the complexity of problems determined through consideration of mission variables, appropriately task-organized FEST-M, FEST-A, and other elements may be applied to provide required technical engineer support.

(2) Selected FFE capabilities may be tailored for employment in lieu of USACE emergency management elements. FFE teams include capabilities with direct application in the emergency management community of practice. These teams may be tailored in lieu of selected emergency management elements in USACE emergency response operations.

CHAPTER 3

Integration

"That was visionary . . . where Engineers link up with a CINC (combatant command) and get inside a CINC's (combatant commander's) staff, and get inside a CINC's initiatives, and get inside a CINC's master planning . . . great ideas . . . ."

—General Thomas A. Schwartz,
Commander, U.S. Pacific Command

3-1. Combined Arms. FFE is applied as an integral part of combined arms operations. Engineer operations, including FFE, contribute significantly to the total means of force a military formation applies in operations. Commanders conceptualize force in terms of combat power. Combat power includes a unit's constructive, information capabilities, and disruptive and destructive force. The Army employs combat power through combined arms. Combined arms are organized through tailoring and task-organizing Army forces to optimize the elements of combat power for a particular mission. **This chapter describes the combined arms application of combat power as it relates to where FFE support is integrated.**

a. Combined arms is the synchronized and simultaneous application of several arms—such as infantry, armor, field artillery, and engineer—to achieve an effect that is greater than if each arm was used separately or sequentially (see FM 3-0). Engineer forces and capabilities are distributed widely throughout the combined arms force. Command and support relationships are established at every echelon and within echelons among forces conducting varying operations. FFE teams are typically distributed within these combined arms formations by establishing a command or support relationship from the FFE element to an engineer staff or to an engineer unit headquarters. Additionally, FFE reachback support is widely distributed throughout the combined arms force provided to operational force engineer Soldiers. The relationships established when tailored FFE support is task-organized within the combined arms force consider decentralized execution—the preferred method of C2.

b. Each maneuver force echelon (down to brigade level) has an organic engineer planner and staff element to integrate engineers into the combined arms fight. The engineer staff element is responsible for understanding the full array of engineer capabilities (combat, general, and geospatial) available to the force and for synchronizing them to best meet the needs of the commander. The section of assignment and grouping of engineer staff varies among echelons and unit types. Depending on the echelon and type of unit, engineer staff members may be assigned within an operations section (common among Army staffs), under a logistics section (common in joint staffs), under an engineer section (common in combined staffs), or dispersed within numerous staff sections. The organization of the assigned staff to meet the unique requirements of the headquarters and situation is ultimately determined by the commander. These engineer staff elements also represent and integrate the FFE support capabilities within their combined arms staff organizations. Engineer applications are integrated into full spectrum operations by the engineer staff identifying requirements along with the combined arms staff

counterparts within warfighting functions. See Appendix E for a description of engineer requirements associated with warfighting functions.

c. Engineer integration in the staff provides a critical linkage for effective FFE support in the conduct of operations. The staff's primary function is to help the commander and subordinate commanders exercise control. Commanders organize the staff into command posts (CPs) and form cross-functional cells to expand their ability to control operations. The engineer staff provides the engineer perspective of requirements and capabilities within these cells. They use the engineer functions to group capabilities and activities together to assist in organizing those capabilities, and they coordinate with combined arms counterparts using warfighting functions to identify and organize requirements. FFE applications are integrated in operations within the headquarters staff. The technical expertise associated with FFE may also be used to assist the staff in identifying the most appropriate requirements for FFE applications. The engineer in the combined arms staff can access this type of FFE support through reachback or may have a deployable team task-organized to augment the staff and assist in conducting operations.

d. At the higher echelon headquarters, engineer analysis and planning perspectives tend to consider the broad operational-level requirements and operational design, collaborating with subordinate tactical echelons to fill in the detail. The operational echelon engineer planners may initially have only a broad outline of the engineering capabilities required to provide tactical-level support. These requirements are refined as tactical-level planning occurs. As units are identified to participate in an operation, higher echelon engineer staff members collaborate with tailored engineer units to gain depth for their view of the OE and to add to their planning and problem solving capability. This collaboration also extends the subordinate engineer's planning, preparation, and execution horizon. FFE support for the conduct of operations can contribute significantly to the collaborative analysis and planning for technical and other specialized engineer applications. Both the higher echelon engineer staff and the tailored engineer units will access FFE support through reachback. Additionally, deployable FFE teams may be task-organized to assist either or both sides of the collaborative effort.

e. Engineer staff members working to integrate engineer support in combined arms operations may employ FFE expertise to assist in identifying, understanding, and appropriately applying FFE support. Staff members will also organize special groups to focus on specific problems and assist in the conduct of operations. Commanders at each echelon may establish working groups, boards, or cells to manage and coordinate functional or multifunctional activities. Engineer staff will be key members on many of these groups and may chair construction-related groups. Working groups conduct staff coordination at the action officer level and prepare materials for decisions presented to boards. Boards establish policies, procedures, priorities, and oversight to coordinate the efficient use of resources. Cell formations combine personnel from various sections on a headquarters authorization document to integrate key functions, such as cells focused on construction priorities. Significant FFE support may be applied to assist various working groups, boards, or cells in managing engineer-related activities. See FM 3-34 for a discussion of selected engineer working groups, boards, and cells.

f. The engineer staff within a combined arms headquarters provides a critical linkage for integrating FFE support; the engineer coordinator is a key member of that staff. An engineer coordinator is designated at each echelon including the JFC, the JTF, and the ASCC to assist the commander in executing and controlling engineer operations and planning future missions. Usually the senior staff's engineer officer is designated and is responsible for coordinating engineer assets and operations for the command (see FM 3-34). They ensure a coordinated effort among the assigned engineer staff assisting the commander in exercising control over engineer forces in the operational area. They may also act as the senior engineer advisor to the commander or that role may be assigned to a senior engineer force commander. The engineer coordinator is responsible for coordinating the functional control of all engineer forces—including FFE elements and other capabilities—in support of the unit. They coordinate functional control by—

(1) Using staff engineer cells, supporting engineer headquarters organizations, and FFE elements to gather and refine relevant information impacting all engineer functions within the operational area.

(2) Establishing and maintaining effective communication with supporting engineer staff cells, engineer units, FFE elements, and multifunctional CPs.

(3) Using a running estimate and coordination with supporting elements to compute resource, force requirements, recommend priorities, and task organization for missions.

(4) Developing specific missions and conveying them to subordinates through orders and annexes.

(5) Using supporting unit CPs and FFE elements to assess, report, and anticipate change and identify unforeseen requirements.

g. At theater army and combatant command echelons, the engineer coordinator is provided significant assistance by the USACE LNO to coordinate FFE support. The LNO provides assistance in gathering and refining relevant information impacting all engineer functions but with a specific focus on more technical and specialized engineer considerations. The LNO provides significant assistance in establishing and maintaining effective communication with the habitually associated USACE division and any supporting FFE and other USACE elements. The LNO will provide input to the engineer staff's running estimate, including specifically those resources and capabilities necessary for technical engineering requirements. The LNO also contributes during the preparation of plans and orders to appropriately task FFE support. At both the theater army and combatant command headquarters, the engineer staff must consider engineer requirements for specific operations in the AOR and requirements for AOR-wide support. Similarly, the LNO assists the engineer staff in both operational responsibilities and AOR-wide support responsibilities.

h. The provision of a subordinate or supporting engineer headquarters unit will help the combined arms commander exercise C2 for engineer operations. These headquarters also provide

another critical linkage for effective FFE support. Any senior engineer commander allocated will provide significant advice to the gaining or supported commander in addition to command of task-organized engineer forces. The supported unit engineer coordinator establishes and maintains a collaborative relationship with the engineer force commander and his headquarters to ensure a coordinated engineer effort. The allocation of engineer headquarters units is considered in tailoring the force and will vary dependent on analysis of operational and mission variables. As described in Chapter 2, the modular engineer force includes three echelons of engineer headquarters units: TEC, engineer brigade, and engineer battalion. The multifunctional support brigade, the maneuver enhancement brigade (MEB), is capable of C2 for engineer forces in cases where engineer support is integral to the multifunctional mission. These elements will, dependent upon task organization, and other mission variables, provide C2 for much of the tailored engineer force, FFE elements, and other support.

3-2. Task Organization. Army commanders build combined arms organizations using command and support relationships (see FM 3-34 for discussion on command, support, and other relationships). Command relationships define command responsibility and authority. Support relationships define the purpose, scope, and desired effect when one capability supports another. Each of the three types of BCTs and the armored cavalry regiment are organized with organic engineer company level units. The functional and multifunctional support brigades, including the engineer brigade and the MEB, do not have organic engineer units assigned but must be task-organized with these forces. Additional engineer units augmenting a brigade are task-organized to the supported unit in either a command or support relationship; any engineer forces tailored in support of echelons above the brigade must also be task-organized with those forces. **This section describes command and support relationships as they impact how FFE support is integrated within combined arms operations.**

a. Planners at all echelons carefully consider the appropriate command or support relationship needed for each situation. For engineers specifically, the decision is typically a balance between responsive support and flexibility to distribute the low-density and high-demand engineer forces. Command relationships are used when the most responsive employment of augmenting engineer units is required. For example, a FEST-A attached to a BCT would provide the BCT commander the most responsive technical engineer support available through FFE. Attached engineer units are temporarily associated with the gaining unit. They return to their parent unit when the reason for the attachment ends. OPCON relationships are more temporary and may be only for a given mission. In both attached and OPCON relationships, the augmenting engineer unit is tasked and provided priorities by the gaining unit. A significant consideration in the OPCON relationship is that administrative- and sustainment-related support responsibilities remain with the parent engineer unit, unless other coordination is conducted with the gaining unit for certain classes of supplies. However, in both cases, the gaining unit retains responsibility to furnish project funding and construction materials required to support their missions. Command relationships emphasize responsiveness to the gaining unit commander but limit flexibility for distributing support outside of the task-organized formation. A division tailored for operations with multiple BCTs and other brigades but with only one FEST-A would likely retain a command relationship at division level to distribute FFE (the FEST-A) support

division-wide. Support relationships may be established for more balance between responsiveness and flexibility.

b. Commanders establish support relationships when subordination of one unit to another is inappropriate, such as when there are limited engineer capabilities that must support multiple BCTs. Support relationships are used when the greatest flexibility to distribute engineer forces across an area of operations (AO) is required. Support relationships are graduated from an exclusive supported and supporting relationship between two units—as in direct support (DS)—to a broad level of support extended to all units under the control of the higher headquarters (as in GS). Support relationships do not normally alter administrative- and sustainment-related support responsibilities of the parent engineer headquarters (except that supported units have the responsibility to furnish project funding and construction materials required to support their missions).

(1) In a DS relationship, an engineer unit receives missions from the supported unit. A DS relationship is typically used when it is anticipated that a change to an engineer task organization may require frequent shifting of an engineer unit to multiple locations. The logistics system can best support this in a DS role where the parent unit remains responsible for logistics and other types of support to the unit.

(2) In a GS relationship, an engineer unit receives missions from its parent engineer unit. The parent unit supports the maneuver element as a whole. GS is appropriate when central control and flexibility in employing limited engineer forces is required. A GS relationship is typically used when a supported unit's higher headquarters identifies a mission requirement within the subordinate echelon AO or accepts responsibility for a requirement identified by the subordinate. In either case, the requirement must be coordinated with the impacted unit responsible for the AO, and any missions must be executed through close coordination with that unit.

c. An Army headquarters that receives another unit through attachment assumes responsibility for ADCON requirements, unless modified by directives or orders. For example, when an Army division commander attaches an engineer battalion to a BCT, the BCT commander assumes responsibility for the unit training, maintenance, resupply, and unit-level reporting for that battalion. ADCON is the direction or exercise of authority over subordinate or other organizations with respect to administration and support, including organization of Service forces, control of resources and equipment, personnel management, unit logistics, individual and unit training, readiness, mobilization, demobilization, discipline, and other matters not included in the operational missions of the subordinate or other organizations (see JP 1-02). For units operating at the tactical level (division, brigade, and below), ADCON normally follows the operational chain of command. When Army forces are attached to a combatant command, the administrative chain of command switches to the receiving headquarters (through the gaining ASCC). The gaining ASCC and parent command may specify ADCON responsibilities retained by the parent command. For deployable FFE elements, attachment to a combatant command results in the gaining ASCC assuming ADCON for all responsibilities not specifically retained by USACE. Consideration must be made when task-organizing tailored FFE elements for the

unique (generating force) nature of support required for FFE elements. USACE may retain select ADCON responsibilities (such as human resources support for civilian team members or maintenance and resupply for specialized equipment) when FFE elements are attached to a gaining combatant command. USACE typically retains responsibilities to provide support within the business management functions of its deployable FFE teams (for example contract law support for contract construction). Alternatively, consideration must be made for select administrative and sustainment responsibilities to be assumed by the gaining ASCC when FFE elements are task-organized with an OPCON relationship. A FEST-A may be task-organized in an OPCON relationship to a JTF-configured corps, but responsibility for common items of supply such as food, fuel, and repair parts, and maintenance support may be specifically transferred as well. Table 3-1 provides considerations for shared ADCON responsibilities in task-organized FFE elements.

Table 3-1. Consideration for ADCON responsibilities in task-organized FFE elements

Administrative Control Activity	Responsibility
Recruiting team members.	Retain as USACE responsibility.
Organizing teams.	
Training individuals.	
Equipping teams (including research and development).	
Mobilizing and demobilizing reserve component members.	
Administering human resources.	
Supporting business management functions.	
Servicing and repairing equipment.	Transfer to gaining ASCC.
Training teams.	
Supplying teams.	
Legend: ASCC Army Service component command USACE United States Army Corps of Engineers	

d. Command and support relationships for FFE elements tailored to support an operation will be based on mission variables. Some generalizations can be described for consideration in determining the specific relationship most appropriate for a given mission.

(1) USACE LNOs are assigned to the USACE division aligned with the combatant command or ASCC for which they are the LNO. This relationship enables the combatant commander the most response capability from the LNO and aligned division while much of the ADCON remains with the USACE division.

(2) During routine operations, the FEST teams are assigned to the USACE headquarters and attached to USACE divisions for C2 of training and other ADCON responsibilities. FEST-As are further aligned with a host district in order to leverage opportunities to train within the

district on technical competencies. FEST-As routinely operate within the host district and rely on that district for development and maintenance of the engineer and other technical expertise necessary for their team members. During deployment, FESTs will typically be OPCON to a gaining headquarters or engineer unit. Again, this relationship enables the gaining commander the most responsive employment of the FEST while much of the ADCON remains with the USACE division and headquarters. USACE would typically coordinate for some of the common sustainment support from the gaining command (see Table 3-1). CREST, EnvST, and LST teams will most effectively be attached to a FEST. If a FEST is not available, these teams could be task-organized as OPCON to a gaining headquarters or engineer unit, although only with coordination for common sustainment support (see Table 3-2, page 3-12).

(3) Nondeployable FFE teams are assigned to USACE districts. They are organized in DS of a mission, area, or operation, based on a rotational cycle. The UROC coordinates the rotation of BDTs within the cycle.

3-3. Conduct of Operations. Full spectrum operations follow a cycle of planning, preparation, execution, and continuous assessment. Each phase of the cycle includes a variety of activities and processes, which define the combined arms staff's interaction to exercise control of operations. The activities may be simultaneous and are usually not discrete; they overlap and recur as circumstances demand. Collectively, the operations process provides the context in which the combined arms staff conducts operations. The operations process, while simple in concept (plan, prepare, execute, and assess), is complex in execution. Commanders and staffs use the operations process to integrate numerous processes and activities consisting of hundreds of tasks executed throughout the headquarters. The application of engineer capabilities must be integrated within this ongoing process. This section describes the operations process and the variety of activities and processes as opportunities for when FFE support is integrated through **task organization within the combined arms operation.**

a. Engineer operations are typically complex, resource intensive (time, manpower, equipment, and materials), and require extensive and proactive coordination. A successful engineering effort involves identifying engineer requirements and the relevance of those requirements to supporting the concept of operations early enough to complete the effort and achieve the desired impact. Ideally, engineer requirements would be identified early enough during planning of a sequential process and be completed during preparation. This may occur for readily identifiable, typically operational echelon requirements but is far less likely for the majority of the engineer effort. While activities of the operations process may be sequential (especially at the start of an operation), after operations have begun, the command often conducts parts of each activity simultaneously. Planning is continuous. While preparing for or executing an operation, commander's plan, (or refine plans) for branches and sequels. Preparation is also continuous whenever a command is not executing an operation. Preparing begins when a unit receives a mission. It always overlaps with planning and continues through execution for some subordinate units. Assessing is continuous and influences the other three activities. Subordinate units of the same command may be in different stages of the operations process. Opportunities to identify the relevant engineer requirements, including the more technical FFE support

requirements, occur throughout the process (conduct of operations) and continuously at each echelon.

b. The engineer staff uses a running estimate as a guide or workbook to navigate the operations process. The running estimate provides a logical thought process, an extension of the analysis of the OE, and a foundation for analyses of mission variables when additional missions are received. The staff running estimate is used throughout the operations process of the supported force commander and is continually refined. This estimate allows for early integration and synchronization of engineer considerations into combined arms planning processes. In their running estimates, staff sections continuously consider the effect of new information and update assumptions, friendly force status, effects of enemy activity, civil considerations, and conclusions and recommendations. The development and continuous maintenance of the running estimate drives coordination among the staff engineer, supporting engineers, the supported commander, and other staff officers in the development of plans and other activities in the operations process. For technical engineering or other FFE-related support considerations, the engineer staff may rely on significant input from the USACE LNO, the deployable team, or the reachback element to update their running estimate.

c. Planning is the means by which the commander envisions a desired outcome; lays out effective ways of achieving it; and communicates to subordinates his visualization, intent, and decisions. Commanders use their staff and integrate input from subordinate commanders into their planning processes. Engineer leaders must understand and be integral participants in the planning processes impacting engineer operations at their echelon of employment. Supporting engineer unit commanders and leaders conduct parallel planning processes to identify requirements early and provide appropriate input to the higher commander's process. Geospatial support elements and engineer staff planners integrate directly within the planning staff at each echelon to participate in the planning process. As previously mentioned, FFE support may be an integral part of planning focused on more technical or specialized engineer requirements.

(1) A primary function for the USACE LNO at the combatant command and ASCC levels is to facilitate effective planning at the operational level. The LNO's relationship with the combatant command and theater army enables direct liaison with USACE for resources to support theater engagement strategies, contingency planning, and major operations. The habitually associated USACE division commander, through the LNO, supports the deliberate planning of the combatant command and ASCC engineer staffs. The USACE division commander's staff develops USACE support plans in coordination with the operations staff at headquarters USACE. Two considerations of particular concern at the operational level are funding and construction standards.

(a) Adequate funding must be available to undertake early engineer reconnaissance and acquisition of facilities to meet requirements, whether by construction or leasing. Funding constraints are a planning consideration. The commander articulates funding requirements for the construction and leasing of facilities by considering the missions supported and the amount of funds required. Funding requirements include facility construction, associated contract administration services, and real estate acquisition and disposal services. Facility construction

planning must be routinely and repetitively accomplished to ensure that mission-essential facilities are identified well in advance of the need and, wherever possible, after on-the-shelf designs are completed to expedite facility construction in time of need.

(b) Engineer planners must consider the construction standards to be established by CCDRs and ASCCs for their AOR. Specific examples of construction standards include the Red Book in the United States European Command (USEUCOM) and the Sand Book in United States Army Central Command (USCENTCOM). These constantly evolving guidebooks specifically establish base camp standards that take into consideration regional requirements for troop living conditions and, therefore, have a major impact on projects such as base camps and utilities. Because availability of construction materials may vary greatly in various AORs, standards of construction may differ greatly between them. CCDRs also establish standards for construction in operation orders (OPORDs) and fragmentary orders (FRAGOs) that may take precedence over guidebooks. Planners must understand the expected life cycle of an engineering project to apply these standards. Often the standards will be markedly different, depending on whether the construction is a contingency or intended to have an enduring presence. See JP 3-34 for additional discussion on theater construction standards.

(2) Planning is a form of decision making. Not all decisions require the same level of planning. Commanders make hundreds of decisions during operations in an environment of great uncertainty, unpredictability, and constant change. The commander makes some decisions very quickly. Other decisions are deliberate, using the military decision making process (MDMP) and a complete staff to create a fully developed and written order. The MDMP is defined in detail in FM 5-0. The joint operations planning process is described in JP 5-0. MDMP is a planning tool that establishes procedures for analyzing a mission; developing, analyzing, and comparing COAs against criteria of success and each other; selecting the optimum COA; and producing a plan or order. The MDMP applies across the range of military operations and is used by commanders and their staff to organize their planning activities, to share and ensure a common understanding of the mission and the commander's intent, and develop effective plans and orders. See FM 3-34 and FM 3-34.400 for a description of engineer considerations in the MDMP.

(3) Engineer operations must be directed and synchronized through planning as one of the critical activities in the operations process, but many engineer activities also require critical reasoning, technical skills, and problem-solving techniques, which form the base logic for the planning processes (see FM 5-0). Engineer operations will involve the use of some functionally unique analytic tools to solve construction, design, facilities, and other engineer specific problems. FFE support will be particularly significant in these processes. Note that engineer-related planning processes would ideally be synchronized with operations planning activities; however, they typically are not. The command will likely conduct parts of the operations process simultaneously, especially when an FFE- supported engineer cell is focused on specific problems requiring these tools.

(a) Master planning is a continuous analytical process, which involves the evaluation of factors affecting the present and future development of an installation (see Technical Manual [TM] 5-803-1). While not stated, the steps of the process also have application to the

development of base camps since the development of an installation or a base camp shares many of the same goals. The modular engineer force includes an engineer facilities detachment (EFD) with expertise in master planning. The unit provides additional facility engineering planning and supports base development, to include master planning, construction design and supervision, and contractor supervision. The EFD also provides capability to assist in operations and maintenance of base camps. FFE support, both deployable and reachback, provides another source for expertise in master planning but is not designed to support base camp operations.

(b) Planners use the PM system described in FM 5-412 as a tool for the process of coordinating the skill and labor of personnel using machines and materials to form the materials into a desired structure. Today, when engineer planners are focused on general engineering tasks, they rely extensively on the Theater Construction Management System (TCMS) and other technical support software to produce the products required by the PM system. These products include the design, the activities list, the logic network, the critical path method or Gantt chart, the bill of materials, and other products. Effective products produced during the planning phases also greatly assist during the construction phase. FFE provides critical expertise and support needed in PM and TCMS. For products not provided by these tools, reachback support from UROC can be obtained to meet the mission requirements.

d. Preparation is defined as activities performed by units to improve their ability to execute an operation. Preparation includes plan refinement; rehearsals; intelligence, surveillance, and reconnaissance (ISR); coordination; inspections; and movement (see FM 3-0). Execution is putting a plan into action by applying combat power to accomplish the mission and using situational understanding to assess progress and make execution and adjustment decisions (see FM 3-0). In stability operations and civil support operations, combat power is applied mainly for constructive purposes. The opposite is the case in combat operations. Assessment is the continuous monitoring and evaluation of the current situation; particularly the enemy and progress of an operation (see FM 3-0). Assessment involves the continuous monitoring and analysis of the OE to help the commander and staff understand the current situation and how it is evolving during operations. Engineer staff remains integrated **within the combined arms operations** process, and as they conduct parts of each activity simultaneously, opportunities for "when" FFE support must be integrated will be identified**.**

3-4. Integration in Civil Support. *Civil support* is Department of Defense support to US civil authorities for domestic emergencies and for designated law enforcement and other activities (JP 3-28). Civil support includes operations that address the consequences of natural or manmade disasters, accidents, and incidents within the United States and its territories. Army forces conduct civil support operations when the size and scope of events exceed the capabilities or capacities of domestic civilian agencies. During civil support operations, unified action includes local and state government agencies. USACE views civil support operations from two perspectives: from its responsibilities on behalf of DOD and under public law to respond according to the NRF, and from its responsibility to provide appropriate generating force support to operational Army forces. FFE is designed to support full spectrum operations and may be applied in civil support from either or both perspectives. **This section describes considerations for integration of FFE support that are unique to civil support operations.**

a. The Army National Guard is often the first military force to respond on behalf of state authorities. In this capacity, it functions under authority of Title 32, U.S. Code, or while serving on state active duty. The National Guard is suited to conduct these missions; however, the scope and level of destruction may require states to request assistance, including military forces, from federal authorities. U.S. Northern Command maintains a standing JTF for operations in the United States, or another corps or division headquarters may be tailored to provide civil support. Army forces work directly with state and federal officials to help restore and return control of services to civil authorities as rapidly as possible. Army forces provide C2, protection, and sustainment to government agencies at all levels until they can function normally.

(1) Army commanders will assume a support role to one or more designated agencies. The deploying headquarters will likely be configured as a JTF and interact directly with the designated lead agencies. Disaster operations are typically conducted in phases including the response, recovery, and restoration. The role of the military is most intense in the response phase, decreasing steadily as the operation moves into the recovery and restoration stages.

(2) FFE support may be tailored or employed via reachback for the technical or specialized engineer requirements. Additionally, FESTs are trained in tasks directly related to consequence management (see Chapter 4) and may be able leverage coordination with other USACE elements involved in the response to add depth to the understanding of the operational area.

b. USACE responds under uniquely assigned civil emergency management responsibilities and authorities to support state and local officials with flood fight assistance or on behalf of the DOD to support FEMA according to the NRF.

(1) Flood fight authority is assigned in Public Law 84-99 and funded under the Flood Control and Coastal Emergencies appropriation. The most commonly used elements under this authority are the USACE emergency management staff, facilities, and supplies including emergency operations centers and flood fight operations. Repair and rehabilitation of levees within the USACE program damaged by floods is also included.

(2) Interagency response during civil support operations is governed by the NRF, which delegates responsibility to various federal agencies for ESFs. Each lead agency is responsible for planning and coordinating response within their assigned ESF. USACE is assigned on behalf of the DOD as lead for ESF #3. The ESF's are deployed by disaster declaration in support of FEMA. Under the NRF, FEMA authorizes USACE through mission assignments and provides funding for required response capabilities. Most missions are accomplished by contracting for private capabilities. USACE has developed specialized response capabilities including organization of elements focused on planning for and contracting appropriate response capabilities for the most typical missions. Typical missions and the number of USACE planning and response teams (PRTs) are shown in Table 3-2. In addition to responsibility for specific ESF #3 related missions, USACE provides a cadre of emergency response staff to coordinate support at various response operations centers. USACE will staff federal, state, regional, and field centers as required. FFE may be applied in support of the USACE ESF #3 response including

reachback support for the cadre or PRTs as needed but also including deployment of FFE elements in lieu of a PRT if required.

Table 3-2. Response missions and number of elements

Response Mission	Number of Elements*
Emergency power	7
Potable water	2
Ice	2
Debris removal	7
Contaminated debris removal	3
Housing and critical public facilities	8
Temporary roofing	6
Infrastructure assessment and response	4
District support	5
Commodities	7
* Number of teams adjusted frequently according to requirements.	

CHAPTER 4

Application

"Never tell people how to do things. Tell them what to do and they will surprise you with their ingenuity."

—General George Patton

4-1. Technical Engineering Support. FFE teams are designed to provide technical engineering support. Technical engineering support includes a variety of tasks that support operational forces and also a menu of tasks that are available through FFE to focus on applications directly impacting the HN or local populace and infrastructure. Though defined slightly differently for each team, associated subordinate tasks and the provision of technical engineer support are core capabilities for the FEST-M, the FEST-A, the CREST, the EnvST, and the UROC (see Table 4-1, page 4-2). Technical engineering support is a core capability of the UROC. As already discussed, to ensure that the request is being handled by the most qualified subject matter experts, the UROC may extend reachback to the BDTs or other USACE expertise and into OGAs, academia, and industry, as needed. This section provides an overview of technical engineer applications, with a focus primarily supporting operational forces, but these same applications are available when the focus shifts to the HN, the local populace, and the infrastructure. See FM 3-34.400, FM 3-34.170, and FM 5-103 for additional discussion on the general engineering, reconnaissance, and survivability applications described in this chapter. See FM 3-37 for a broader discussion of the protection warfighting function.

a. Both the FEST-M and the FEST-A provide task capabilities to design and manage construction (primarily contract construction). These tasks enable the construction and maintenance of sustainment LOCs, the provision of other construction support, and applications in other engineer requirements. The design and management of construction is considered a general engineering capability and is typically applied to requirements identified for sustainment of the force. However, the design and construction management technical task capabilities may be applied (with UROC support) to support other activities enabling movement and maneuver in the operational area. Both FEST-M and the FEST-A units could design and manage construction as augmentation to an appropriate echelon engineer staff or be task-organized to support an engineer unit. The FEST-M may also conduct tasks while operating as a discrete organization. Considerations for tailoring and task-organizing the FEST units depend on operational and mission variables (as discussed in Chapter 3).

Table 4-1. Associated tasks and FFE elements for technical engineering applications

Associated Tasks	FFE Element
Design and manage construction	FEST-M FEST-A
Provide area engineering support	FEST-M FEST-A CREST EnvST UROC (reachback) BDT (through the UROC)
Conduct engineer operations	FEST-M FEST-A EnvST UROC (reachback) BDT through the UROC)
Provide engineer reachback support	FEST-M FEST-A CREST EnvST UROC (reachback) BDT (through the UROC)
Legend: BDT — base camp development team CREST — contingency real estate support team EnvST — environmental support team FEST-A — forward engineer support team-advance FEST-M — forward engineer support team-main FFE — field force engineering UROC — USACE Reachback Operations Center	

(1) LOCs are routes over land, water, or air that connect an operating military force with a base of operations and provide a means on which supplies and military forces move. There are strategic, operational, and tactical LOCs. Establishing and maintaining LOCs are considered sustainment operations. LOCs may also have an important impact at the operational and tactical levels. The joint force depends on roads and railways for a link to its base of operations, and bridging is often necessary to establish them. Engineers support each of these aspects of LOCs, some of which may require technical support from FFE. FFE support from the deployable FFE teams (FEST-A and FEST-M) and from the non-deployable FFE teams (UROC, BDTs, etc.) will be especially beneficial when contract construction is employed. Design and construction

management tasks applied in support of sustainment LOCs or other key routes may include involvement with any of the aspects listed below:

(a) Seaports and logistics, over-the-shore (LOTS) facilities and construction and rehabilitation operations for ship unloading and cargo handling facilities in the operational area, including special problems encountered in port construction and the construction of supporting structures located in and around the port facility.

(b) Airfields and heliports. Army, USAF, Navy, and USMC engineers all have the capability to design, plan, construct, upgrade, repair, and maintain airfields and heliports. Army engineers are often responsible for initial airfield damage repair as part of a forcible entry operation. This is a type of forward aviation combat engineering performed by combat engineers to enhance mobility. FFE support may be required to assist operational force engineers in any of the various requirements for airfield and heliport design, planning, construction, repair, and maintenance.

(c) Roads and railroads, including the construction, maintenance, and repair of roads and railroads to meet mission and operational requirements for sustainment or movement. Depending on mission variables, the road or railroad may be part of a LOC or required as part of another route. FFE support will be beneficial for more technical design issues (including reconnaissance missions) and will typically be applied if contract construction is employed.

(d) Bridges. Few routes exist without some form of bridge, bypass, or detour. Operational forces and their logistical support depend on four types of bridging: tactical, support, LOC, and existing or permanent bridges. Tactical operations of combined arms forces are primarily focused on the first two of these forms of bridging or the seizure of existing or permanent bridges. Tactical bridging is typically linked to combat engineers and immediate support of combined arms ground maneuver operations. See FM 3-90.12 for a more in-depth discussion of bridging as a component of combined arms gap-crossing operations. A key aspect of LOCs and other routes is the construction, repair, and reinforcement of bridges, including bridge reconnaissance and classification and the construction of bypasses and detour routes. Existing bridges may need to be repaired or reinforced to keep main supply routes (MSRs) and LOCs open. As the tactical situation changes, MSRs are moved or adjusted to support the force. Operations may demand that expedient, standard, and nonstandard structures be emplaced to replace tactical bridging and support bridging. Requirements for engineering capabilities to employ tactical, support, and LOC bridging will continue throughout an operation. For technically complex bridges, FFE can be especially beneficial during reconnaissance. Specialized systems and equipment are available to enable reachback support for this type of reconnaissance (see Appendix G). See FM 3-34.170 for additional discussion on reconnaissance associated with bridging.

(e) Pipelines. In order to supply needed fuels, bulk petroleum is delivered through ports or LOTS. There, it is off-loaded into storage facilities and shipped forward. The modes of shipment in descending order of priority are pipeline, inland waterways, rail, motor carriers, and aircraft. The preferred method of shipment is by pipeline because pipelines save time, money, and

resources for other logistical operations. The engineer mission is to provide general and specialized assistance in constructing and maintaining pipeline systems. The environmental considerations surrounding petroleum and petroleum products are significant and, even in the midst of operations, spills can have an effect that impacts operational commanders simply due to the volume of petroleum potentially involved in spills, fires, or some other negative situation. FFE support is applied in complex design components, environmental considerations, and when contract construction is employed.

(f) Tank farms and critical transportation means for supplying needed fuels where bulk petroleum is delivered through ports or LOTS facilities and shipped to forward destinations. This aspect includes environmental considerations surrounding petroleum products and potential spills, fires, or other hazards. Again, FFE support is applied in complex design components and typically, when contract construction is employed.

(2) The FFE capabilities to support the design and management of construction may be applied to requirements other than LOCs. Typically, the ASCC will determine requirements supporting RSOI and the establishment of the theater sustainment base. Examples include construction of distribution and storage facilities; construction or renovation of fixed facilities; and construction, repair, or maintenance of water facilities. Other construction requirements in support of force bed-down and protection construction requirements are included in the area engineering task group described in the next section.

b. The FEST-M, FEST-A, CREST, EnvST, and prime power elements provide task capabilities for area engineering support. Area engineering is also one of the primary focuses of reachback; UROC's reachback and BDT support is tailored to meet the needs of deployed personnel providing area engineering support. These tasks enable area engineering for base camps, including protection against enemy hazards in the AO, and may have applications in other engineer requirements. Area engineering tasks are typically applied to requirements for sustaining the force. The deployable teams might provide area engineering as augmentation to an appropriate echelon engineer staff or be task-organized in support of an engineer unit. The FEST-M could provide area engineering tasks while operating as discrete organizations.

(1) The FEST-M, the FEST-A, and the CREST provide real estate support that enables the acquisition, management, and disposal of property.

(a) Engineers plan for and support the acquisition of uncontaminated land and facilities and their management and ultimate disposal to support operations, to include—

- Operational facilities (such as CPs, airfields, and ports).

- Logistics facilities (such as maintenance facilities, supply points, warehouses, ammunition supply points, and APODs or SPODs [for sustainment missions]).

- Force bed-down facilities (such as dining halls, billeting, religious support facilities, clinics, and hygiene facilities).

- Common-use facilities (such as access roads, parking areas, and RSOI facilities).

- Protection facilities (such as control points, observation towers, berms, and bunkers).

(b) The commander determines what facilities are needed to satisfy operational requirements. Facilities are grouped into six broad categories that emphasize the use of existing assets over new construction. To the maximum extent possible, facilities or real estate requirements should fall into the following listed categories and in the following priority order:

- U.S.-owned, occupied, or leased facilities (including captured facilities).

- U.S.-owned facility substitutes pre-positioned in theater.

- HN, allied, and coalition support (where an agreement exists) to provide specific types and quantities of facilities, at specified times and in designated locations.

- Facilities available from commercial sources.

- U.S.-owned facility substitutes stored in the United States.

- Construction of facilities that are considered a shortfall after an assessment of the availability of existing assets.

(c) Adequate funding must be available to undertake facility reconnaissance and acquisition missions that meet operational requirements, whether through construction or leasing. Funding constraints are a planning consideration. The commander articulates funding requirements for construction and leasing of facilities by considering the missions supported and the amount of funds required. Funding requirements include facility construction, associated contract administration services, and real estate acquisition and disposal services. Facility construction planning must be accomplished in recurring iterations to ensure that mission-essential facilities are identified in advance of the need and, wherever possible, on-the-shelf designs are completed to expedite facility construction, even as requirements are adjusted to meet operational changes.

(2) The FEST-M, the FEST-A, and the EnvST provide environmental engineering to enable the provision of waste management and actions to control pollution and hazardous materials. The engineer is the staff proponent for the integration of environmental considerations, although environmental issues are significant considerations for the entire staff. Efforts are made to minimize the release of hazardous substances into the environment, protect cultural and natural resources, and prevent pollution. Environmental tasks may be performed by operational force units as general engineering tasks. FFE support will be especially beneficial when complex environmental issues are involved or an area is being considered for other uses or closure.

(3) The FEST-M and the FEST-A, supported by the URCO and the BDTs and others, provide protection engineering against enemy hazards in the AO. See FM 5-103 and FM 3-34.400 for more discussion on survivability and protection construction. In full spectrum

operations, commanders actively protect the force. Tasks and systems related to the protection of the warfighting function preserve the force so that the commander can apply maximum combat power (see FM 3-37). Preserving the force includes protecting personnel (combatant and noncombatant), physical assets, and information on U.S. and multinational partners. Survivability and hardening, integral aspects of protection, often require general engineering support in the form of construction. FFE support is typically required for design but may also be needed for the management of protection-related construction. In addition to C2 facilities, sustainment areas, and a variety of tactical-level facilities, protection engineering is a significant focus area in base camp development, as discussed in the next section.

(4) The FEST-M and FEST-A, supported by to the UROC and the BDTs and others, facilitate and participate in base camp development. FFE base camp development task capabilities enable the planning, construction, management, maintenance, and disposition of bases and installations. Refer to FM 3-34-400 and EP 1105-3-1 for more discussion on base camp development. Base camps are vital in supporting the deployment and operational reach of joint forces. In today's OE, base camp planners will be challenged to determine the magnitude, positioning, and posturing of base camps. Failure to grasp the complexity of base camp development and address the inherent difficulties early in the planning process will present tremendous challenges to the deployed force and supporting units. Effective base camps hinge on proper planning, coordination, and oversight.

(a) CCDRs specify the construction standards for facilities in theater to minimize the engineer effort expended and ensure adequate health and safety conditions and mission accomplishment. Typically, the geographic combatant command will develop specific base camp construction standards using the guidelines provided in JP 3-34. Base camp planners must consider all construction standards and guidebooks established by CCDRs and ASCCs for the AOR, such as USCENTCOM's Sand Book and USEUCOM's Red Book. These standards books typically provide base camp planners with the initial guidance necessary to determine the facilities desired by the command and the associated square footage allowances. CCDRs may also establish construction standards in operations plans, OPORDs, FRAGOs, and directives that may take precedence over guidebooks. Standards may also provide priorities for construction within base camps. Planners must be familiar with the appropriate standards to support construction and maintenance activities effectively.

(b) Effective base camp planning requires a multidisciplined approach and a host of participants from various organizations that can provide necessary expertise in areas such as civil engineering, design, environmental concerns, safety, preventive-medical procedures, antiterrorism, and real estate. The base camp development planning (BCDP) process described in EP 1105-3-1 provides a framework for planning the location, design, construction, and closure or other disposition of base camps. The process is not an absolute, is rarely performed in sequence, and is dependent on both the operational and mission variables that require planners to constantly assess, revise, and coordinate their efforts. When conducting the BCDP process, typical considerations include—

- Integration of protection measures.

- Functional area requirements and their arrangement, based on base camp size and commander's guidance.

- Availability and acceptability of existing facilities and the real estate support required to acquire them.

- Facility construction standards, based on the governing documents.

- Means of facility construction, based on the availability of labor and resources.

- Infrastructure requirements, based on base camp size, location, and life span.

- Environmental considerations.

c. The FEST-M, the FEST-A, and the EnvST provide task capabilities supporting the conduct of engineer operations. These deployable FFE elements conduct operations process activities to integrate FFE support in combined arms operations (as discussed in Chapter 3). FESTs, supported by reachback, also provide engineer reconnaissance task capabilities, enabling assessments, or surveys during route or area reconnaissance and support to geospatial engineering operations and functions. The UROC-developed tools and equipment are designed to assist in the reconnaissance tasks, automating the process and simplifying data collection for mounted and dismounted reconnaissance. The UROC provides training support and technical support prior to, during, and following reconnaissance mission on an as requested basis. Refer to Appendix G for details on the UROC-developed tools. FESTs might conduct engineer operations as augmentation to an appropriate echelon engineer staff or be task-organized in support of an engineer unit. The FEST-M can conduct engineer operations as discrete organizations. Considerations for tailoring and task-organizing FFE teams depend on operational and mission variables.

(1) Key FFE activities in the conduct of engineer operations include providing input for the engineer staff running estimate; providing input to support the MDMP and other planning processes; and participating in engineer-related boards, working groups, and other activities (to control the technical engineer effort). FFE support for engineer reconnaissance is also a critical activity in the conduct of operations.

(2) The FEST-M and the FEST-A, supported by reachback, provide a technical range of engineer reconnaissance capabilities. The EnvST provides a specialized capability for environmental assessments and baseline surveys. FFE support enables assessments and surveys during route or area reconnaissance operations (see FM 3-34.170 for additional discussion of engineer reconnaissance). During reconnaissance, situations may require the collection of a higher degree of technical information. An area with suspected contamination by toxic industrial materials, for example, must be targeted for reconnaissance by assets equipped to determine the type and level of contaminates present and the protection measures needed. Supporting units such as engineer; chemical, biological, radiological, and nuclear (CBRN); EOD; military police; and others have specialized capabilities to collect technical information that complement the

overall reconnaissance effort. Engineer functions provide a menu of reconnaissance capabilities, which vary in the type and degree of tactical or technical expertise applied to the reconnaissance mission. FFE assessments and surveys typically support more technical requirements.

(a) Combat engineers conduct tactical reconnaissance including the five subtasks of—

- Zone reconnaissance.
- Area reconnaissance.
- Reconnaissance-in-force.
- Route reconnaissance.
- Reconnaissance patrols.

These missions are fully integrated within the combined arms tactical reconnaissance operations but, because they are conducted by engineers, will include some degree of focus on technical information, as required by the commander's reconnaissance guidance. These missions may be conducted by engineer reconnaissance teams (ERTs), teamed with other forces, or in a stand-alone fashion. General engineering capabilities are employed in DS of combat engineer ERTs (as required and based on mission variables), providing additional technical capabilities required for the mission. Additionally, FFE reachback support may be employed for technical requirements.

(b) General engineers provide a range of additional and more-technical reconnaissance capabilities. These capabilities enable the combat or general engineer mission support but are focused more on the technical aspects of the reconnaissance target. For example, while an ERT may be tasked to conduct route reconnaissance, general engineers will conduct reconnaissance to identify specific requirements for major construction along the route. FFE provides a broad range of capabilities to apply a higher degree of technical expertise to these general engineering assessment or survey missions. Technical reconnaissance capabilities are typically conducted by an assessment or survey team to gather technical information required for—

- Maintenance and upgrade of ground LOCs.
- Bridge construction or repair.
- General engineering in support of airfields and heliports.
- General engineering in support of seaports.
- General engineering in support of survivability.
- Real estate and real property maintenance activities.
- Procurement or production of construction materials.

- General engineering in support of base camps and support areas.
- Power generation and distribution.
- Petroleum pipeline and storage facilities.
- Water supply and well drilling.
- Underwater and other specialized construction support.
- Infrastructure surveys.
- Environmental baseline assessments.
- Environmental remediation surveys and assessments.

(c) The FEST-M and the FEST-A, when supported by reachback, also provide geospatial engineering capabilities. FFE support enables the conduct of geospatial engineering operations and functions. See Army Tactics, Techniques, and Procedures (ATTP) 3-34.80 for additional discussion on geospatial engineering. The term geospatial intelligence (GEOINT) was created to describe and encompass both the standard and the advanced (integrated) capabilities of imagery, imagery intelligence, and geospatial information. Advances in technology and the use of geospatial data have created the ability to integrate and combine elements of any or all of the areas. The geospatial engineering contribution to GEOINT includes the standards, processes, Soldiers, and equipment required to generate, manage, analyze, and disseminate geospatial information necessary to assemble the best view of the OE for the command. Geospatial engineers manage the enterprise geospatial database (compiled from all sources), to include the National Geospatial Intelligence Agency, the AGC, other Services, OGAs, multinational partners, and new collection and production data from deployed Soldiers and sensors. Geospatial engineers manage the geospatial foundation of the common operational picture—synchronizing all products that are necessary components of source intelligence and C2.

d. The FEST-M and the FEST-A facilitate technical engineer reachback support from the BDT and others through the UROC. As previously discussed, reachback increases the availability of military and civilian engineers, provides the full expertise of the regiment to support full spectrum operations, and enhances the capabilities and expertise of forward deployed forces, while minimizing the required footprint. See Appendix G for additional discussion of the systems and equipment enabling reachback.

4-2. Consequence Management and Civil Support. In an emergency situation, such as in managing the consequences of a terrorist attack or natural disaster, DOD may receive requests for assistance if local, state, and federal resources are overwhelmed. DOD's capability to provide self-deploying, self-sustaining forces with a wide variety of skills and equipment, including engineer forces, can play a major role in support of civil authorities. Although defined differently for each team through associated subordinate tasks, consequence management and the provision

of civil support are core capabilities for the FEST-M, the FEST-A, the LST, and the BDT (see Table 4-2, page 4-10). These core capabilities may also be employed to meet USACE emergency response responsibilities under the NRF.

a. The FEST-M, the FEST-A, and the LST provide task capabilities to conduct consequence management. Consequence management enables the provision of support in response to a terrorist attack.

b. The FEST-M, the FEST-A, and the LST - with reachback to the BDTs and others through the UROC - provide …" task capabilities to conduct civil support. These tasks enable the provision of disaster relief and the restoration of damaged areas. They may also be employed to meet USACE emergency response responsibilities under the NRF. Both the FEST-M and the FEST-A conduct civil support operations as augmentation to an appropriate echelon engineer staff or are task-organized to support an engineer unit. The FEST-M can operate as a discrete organization. The LST would typically operate as augmentation to a FEST. Both the FEST-A and the LST may be employed in lieu of one of the ESF #3 PRTs. Considerations for tailoring and task-organizing FFE teams depend on operational and mission variables (as discussed in Chapter 3).

Table 4-2. Associated tasks and FFE elements for consequence management and civil support applications

Associated Tasks	FFE Element
Conduct consequence management.	FEST-M FEST-A LST
Provide civil support.	FEST-M FEST-A LST BDT(through UROC)
Provide other support, as required.	FEST-M FEST-A LST BDT (through UROC)
Legend: BDT — base camp development team FEST-A — forward engineer support team-advance FEST-M — forward engineer support team-main FFE — field force engineering LST — logistics support team UROC — USACE Reachback Operations Center	

(1) Civil support refers to support provided by military forces, DOD civilians and contractor personnel, and DOD agencies and components in response to requests for assistance

during domestic incidents, to include terrorist threats or attacks, major disasters, and other emergencies. Response to requests for assistance from civil authorities usually occurs during catastrophic emergencies (such as natural or man-made disasters). Emergency response is first managed locally by state government; if the disaster is large enough in scope to overwhelm local and state agencies, the federal government becomes involved. If federal support is required, it is managed under authority of the Secretary of Homeland Security using the NRF. Engineer operations are a key enabler in the provision of disaster relief, the restoration of damaged areas, and the supply of mobile electric power. FFE support may include technical advice and evaluations, engineering services, construction management and inspection, emergency contracting, provision of emergency power, emergency repair of wastewater and solid-waste facilities, and real estate support. FFE capabilities may also be needed to enable military support to other responding agencies. While the military can be called upon to provide support in any civil support category, the common situations that employ engineer forces include—

(a) Natural disasters, such as, but not limited to, severe weather, earthquakes, and land firefighting. Engineers can expect to respond with equipment assets to remove rubble and debris. They may be tasked to maintain or restore essential services and activities, mitigate damage, and take actions to avoid hardship and human suffering. Engineers may be called upon to provide manpower support or general engineering support, such as water purification operations. Other engineer contributions include technical advice, assessments, or surveys; construction planning, management, and inspection; emergency contracting; and emergency repair of wastewater and solid-waste facilities.

(b) Manmade disasters, such as oil spills, terrorist acts, CBRN, or high-yield explosive incidents. These events can produce catastrophic loss of life, destruction of property, and irreparable damage to the environment. Support to domestic CBRN or high-yield explosive consequence management is a major support requirement for military forces and may be an extensive civil support operation for military engineers. Engineers possess mobility and heavy equipment assets and may provide support similar to that provided in response to a natural disaster.

(2) In a typical year, the USACE responds to more than 30 presidential disaster declarations and numerous state and local emergencies. Emergency responses usually involve cooperation with other military elements and federal agencies in support of state and local efforts. USACE conducts its emergency response activities under two basic authorities: the Flood Control and Coastal Emergency Act (Public Law 84-99, as amended) and the Stafford Disaster and Emergency Assistance Act (Public Law 93-288, as amended). USACE has developed an extensive emergency management community to meet these responsibilities. FFE capabilities may be required to augment or act in lieu of one of the ESF #3 PRTs. Some of the activities within the scope of ESF #3 include—

(a) Emergency clearance of debris for reconnaissance of damaged areas and passage of emergency personnel and equipment.

(b) Temporary construction of emergency access routes, including damaged streets, roads, bridges, ports, waterways, airfields, and any other facilities necessary for passage of rescue personnel.

(c) Emergency restoration of critical public services and facilities, including adequate supplies of potable water, temporary restoration of water supply systems, and the provision of water for firefighting operations.

(d) Emergency demolition or stabilization of damaged structures and facilities designated by state or local governments.

(e) Technical assistance and damage assessment, including structure inspections.

4-3. Stability Operations. Many deployable FFE teams are also designed to conduct stability operations. Although defined differently for each team through associated subordinate tasks, the conduct of stability operations is a core capability for the FEST-M, the FEST-A, and the LST (see Table 4-3). Stability operations are also supported through reachback and may be used to apply many of the technical engineer applications to support the HN, the local populace, and infrastructure. Specific focus areas for FFE support in stability operations include the restoration of essential services and support for economic and infrastructure development. Stability operations encompass various military missions, tasks, and activities conducted outside the United States and in coordination with elements of combat to maintain or reestablish a safe and secure environment and provide essential government services, emergency infrastructure reconstruction, and humanitarian relief. Stability operations can be conducted in support of a HN or interim government or as part of an occupation when no government exists. Stability operations involve both coercive and constructive actions by the military force.

Table 4-3. Associated tasks and FFE elements for stability operations applications

Associated Tasks	FFE Element
Provide humanitarian assistance.	FEST-M FEST-A LST BDT
Restore essential services.	FEST-M FEST-A LST
Support economic and infrastructure development.	FEST-M FEST-A
Legend: BDT base camp development team FEST-A forward engineer support team-advance FEST-M forward engineer support team-main FFE field force engineering LST logistics support team	

a. The FEST-M, the FEST-A, and the LST, with reachback through the UROC to the BDT and others, provides task capabilities for humanitarian assistance. These tasks enable the provision of humanitarian relief and the restoration of damaged areas. The FEST-M and the FEST-A provides assistance as augmentation to an appropriate echelon engineer staff or can be task-organized in support of an engineer unit. The FEST-M can operate as a discrete organization. The LST typically operates as augmentation to a FEST. Considerations for tailoring and task-organizing FFE teams are dependent on operational and mission variables, as discussed in Chapter 3. Humanitarian relief focuses on lifesaving measures that alleviate the immediate needs of a population in crisis. It is the application of consequence management outside of the United States.

b. The FEST-M, the FEST-A, and the LST provide task capabilities to restore essential services. These tasks enable the provision of essential civil services and restoration of damaged areas. Both the FEST-M and the FEST-A conduct stability operations as augmentation to an appropriate echelon engineer staff or are task-organized in support of an engineer unit. The FEST-M can operate as a discrete organization. In large-scale stability operations, the FEST-M may provide a foundation on which a USACE contingency district is established. The LST would typically operate as augmentation to a FEST.

c. Both the FEST-M and the FEST-A provide task capabilities to support economic and infrastructure development. These tasks enable private-sector development and support for general infrastructure reconstruction programs. Both the FEST-M and the FEST-A conduct these stability operations as augmentation to an appropriate echelon engineer staff or are task-organized in support of an engineer unit. The FEST-M can operate as a discrete organization. In large-scale stability operations, the FEST-M may provide a foundation on which a USACE contingency district is established.

(1) The infrastructure assessment and the infrastructure survey are two types or levels of reconnaissance used to gather necessary infrastructure information to enable development. The purpose of the assessment is to provide immediate feedback concerning the status of basic services necessary to sustain the local population. A memory aid to describe this assessment is sewage, water, electricity, academics, trash, safety, and other considerations (SWEAT-MSO) (see Figure 4-1, page 4-14). SWEAT-MSO can be adapted for use at the tactical level in either stability or civil support operations. In either type of operation, SWEAT-MSO can be used during COA development to delineate tasks, missions, and effects that support related objectives. FFE also provides reachback support for assessments and surveys in the form of technical engineering expertise and /or tools and equipment support.

(2) The FESTs use contingency engineer management capabilities to support economic and infrastructure development and help HNs develop capability in these areas. Contingency engineer management may involve direct and indirect military assistance to local, regional, and national entities. It requires knowledge of the various engineer capability providers in the operational area, understanding of the funding mechanisms in place, and participation in working groups and cells to determine the commander’s priorities. Infrastructure development complements and reinforces efforts to stabilize an economy. It focuses on a society’s physical

aspects that enable the state's economic viability. These physical aspects of infrastructure include—

(a) Transportation (roads, railways, airports, and ports and waterways).

(b) Telecommunications.

(c) Energy (natural resources, electrical power sectors, and energy production and distribution).

(d) General infrastructure (engineering, construction, and municipal services).

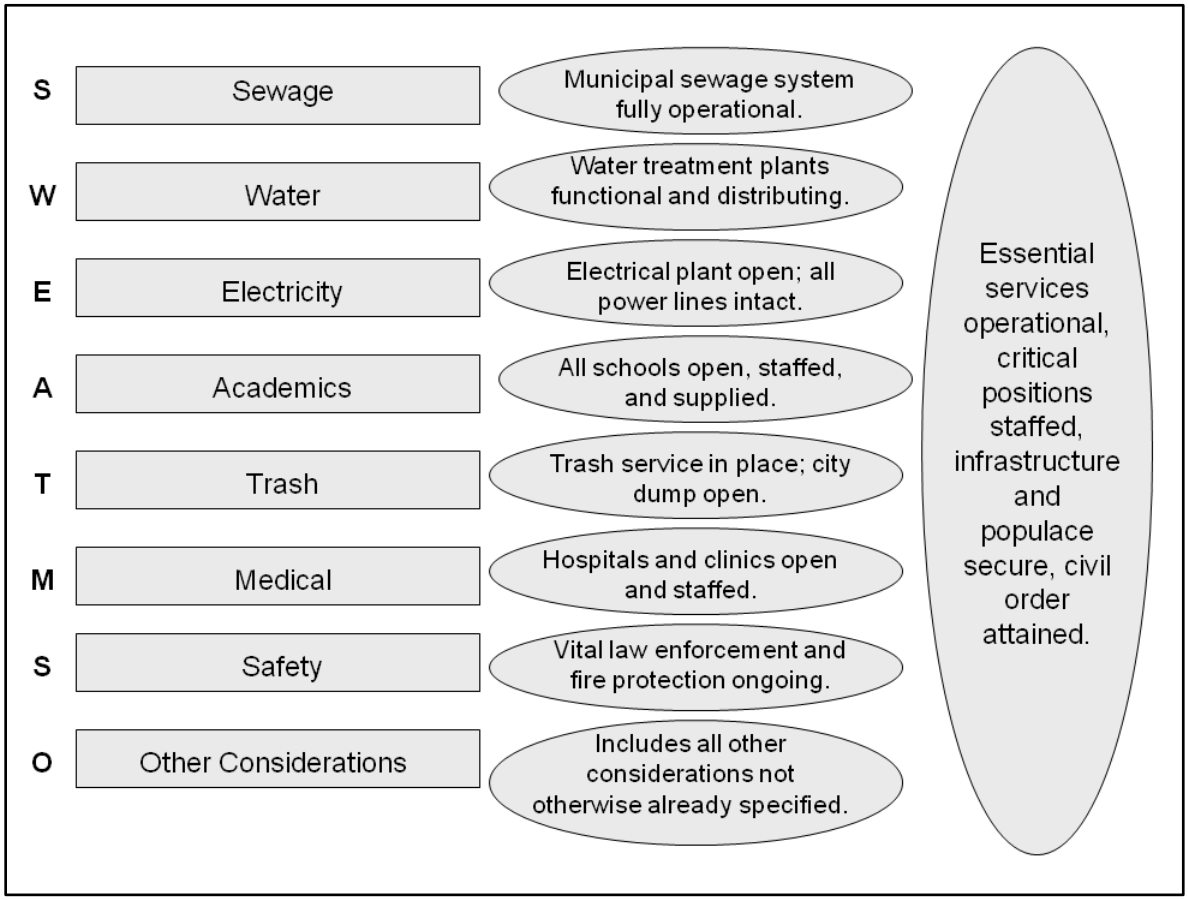

Figure 4-1. Memory aid to describe infrastructure assessment

(3) The FESTs also conduct international capacity development to support economic and infrastructure development and help a HN develop technical capacity in these areas. Economic recovery begins with an actively engaged labor force. Local projects, such as restoring public services, rebuilding schools, or clearing roads, offer additional opportunities for the local labor pool. Drawing on local goods, services, and labor presents the force with the first opportunity to infuse cash into the local economy, which in turn stimulates market activity. Developing the

private sector typically begins with employing large portions of the labor force. In addition to acquiring goods and services from the local economy, the tasks that support private-sector and technical capacity development infuse cash into local markets and initiate additional public investment and development. The FESTs will typically coordinate efforts with provincial reconstruction teams when they are established in the operational area.

4-4. General Mission Capabilities. All deployable FFE teams are designed with general mission capabilities. Mobilization and demobilization and protecting the force are general capabilities for each of the teams. The FEST-M, the FEST-A, and the LST has general capabilities for providing sustainment. Only the FEST-M includes the general capabilities to conduct C2 (see Table 4-4). The FFE teams available through reachback are not designed with general mission capabilities.

Table 4-4. Associated tasks and FFE elements for general mission capabilities

Associated Tasks	FFE Element
Conduct mobilization and demobilization.	FEST-M FEST-A CREST EnvST LST
Conduct C2.	FEST-M
Provide sustainment.	FEST-M FEST-A LST
Protect the force.	FEST-M FEST-A CREST EnvST LST

Legend:

C2	command and control
CREST	contingency real estate support team
EnvST	environmental support team
FEST-A	forward engineer support team-advance
FEST-M	forward engineer support team-main
LST	logistics support team

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APPENDIX A

References

REQUIRED
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EP 1105-3-1. *Base Camp Development in the Theater of Operations.*
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FM 3-0. *Operations.*
FM 3-07. *Stability Operations.*
FM 3-34. *Engineer Operations.*
FM 3-34.170. *Engineer Reconnaissance.*
FM 3-34.400. *General Engineering.*
FM 3-37. *Protection.*
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APPENDIX B

Engineer View of the Operational Environment

B-1. Challenges and Opportunities in the Operational Environment. U.S. military forces conduct operations in all regions of the globe and covering a spectrum of conflict—from stable peace, through unstable peace, to insurgency, and in general war conditions (see Figure B-1 and FM 3-0). Army forces operate anywhere on the spectrum of conflict. Some situations require applying massive force in MCO to eliminate a threat; other situations involve applying military power to reduce an insurgency to a size the HN government can defeat. Military forces often conduct nonlethal and constructive actions to restore security and normalcy to a local populace. Military forces participate in actions to restore essential services or mitigate problems resulting from disasters and catastrophes. Engineering applications support operations covering the spectrum of conflict.

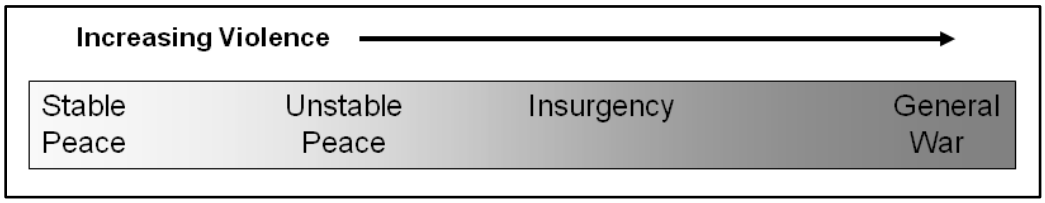


Figure B-1. The spectrum of conflict

a. Political and military leaders conduct operations in a complex, interconnected, and increasingly global OE. Soldiers operate in the midst of populations, not adjacent to or above them. Winning battles and engagements is important; however, this victory alone is not sufficient. Shaping the civil situation is just as important to success. In addition to military forces and noncombatants, there may be a large number of OGAs (U.S. agencies), IGOs, NGOs, and regional organizations in the joint operational area. Further complicating the OE are nonmilitary threats such as pandemics and natural disasters. JP 3-0 describes the *OE* as a composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. Understanding the OE and how Army forces conduct operations within it as part of an interdependent joint force underpins mission success.

b. Army forces use operational variables to understand and analyze the broad environment in which they conduct operations and mission variables to focus analyses on specific elements of the environment that apply to their mission. Army doctrine describes an OE in terms of eight operational variables: political, military, economic, social, information, infrastructure, physical environment, and time (PMESII-PT). Upon receipt of a warning order or mission, Army leaders narrow their focus to the mission variables of mission, enemy, terrain, and weather, troops and support available, time available, civil considerations (METT-TC). Mission variables are the aspects of the OE that directly affect a mission.

c. Engineers also use operational variables to understand and analyze the broad environment and mission variables that apply to their mission. An engineer view of the OE is in addition to a shared understanding gained in terms of the variables. The engineer view shares common understanding while adding a degree of focus on those aspects within the purview of an engineering background (see Figure B-2).

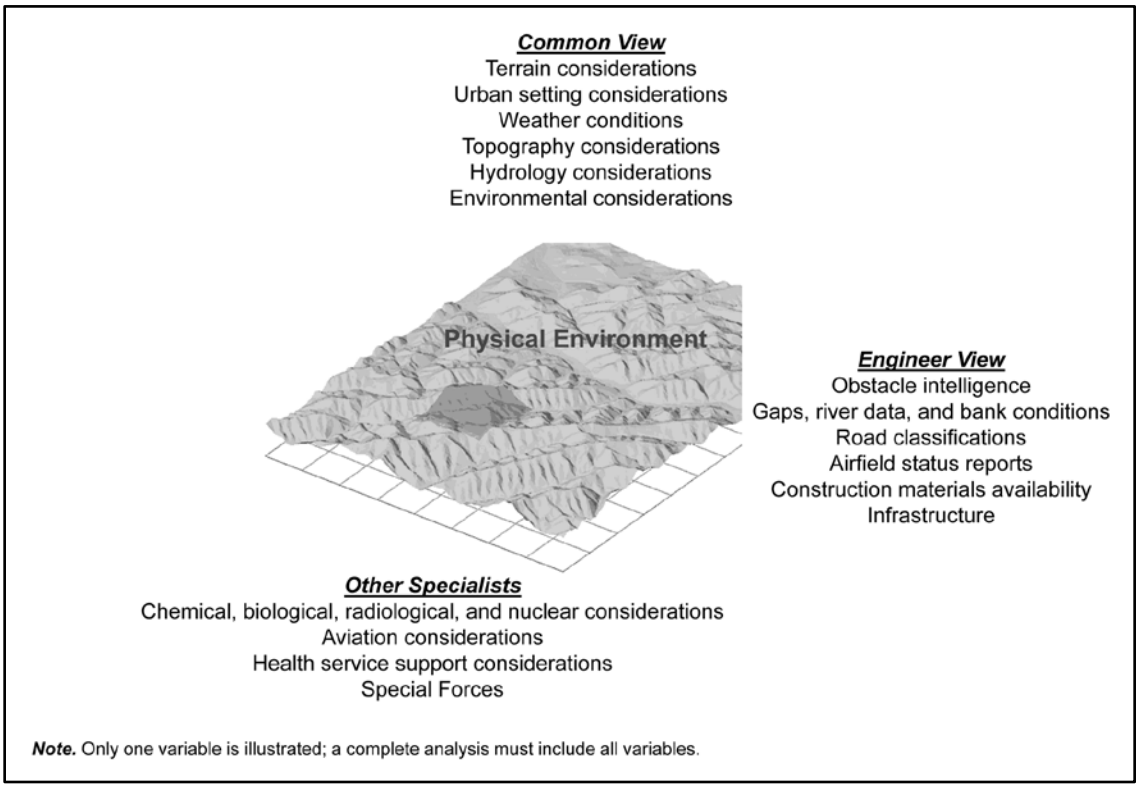


Figure B-2. Illustration of an engineer view of the OE

d. Guided by common understanding, the engineer analysis adds a degree of focus on engineering considerations and identifies potential challenges and opportunities associated with the variables analyzed in the OE. The engineer view must be consistent with the shared framework and variables employed to analyze the OE. For illustration purposes, example engineer considerations for operational variables are described in Table B-1; engineer considerations for mission variables are described in Table B-2, pages B-4 through B-6.

Table B-1. Example engineer assessment using operational variables

Operational Variables	Engineer Considerations
Political	• Political circumstances permitting or denying access to key ports of entry or critical sustainment facilities. • Alternative access routes. • The effect of laws, agreements, or positions of partners that might prevent the shipment of construction, hazardous, or other materials across borders. • Political considerations that might affect real estate acquisition or engineer planning and operations.
Military	• An adversary's capability to employ explosive hazards or other obstacles and the capability to challenge traditional survivability standards. • Existing military installations and other infrastructure. • An understanding of engineer capabilities in a joint, interagency, and multinational context.
Economic	• Production or availability of key materials and construction resources. • Potential for new or improved production facilities that might be added.
Social	• Specific cultural or religious buildings or installations. • Potential impact of language barriers or unique local dialects on the availability of labor and engineer resources. • Ability to provide culturally related building requirements.
Information	• Physical deficiencies in the supporting architecture (including electrical power) or nodes. • Provisions for humanitarian projects or services.
Infrastructure	• Deficiencies in basic infrastructure (see FM 3-34.170 for a discussion on the assessment of infrastructure using SWEAT-MSO). • Access to existing infrastructure and the ability to build, deconstruct, or transfer infrastructure for base camps. • Opportunities for improvements to existing infrastructure and specific new projects
Physical environment	• Defining factors, such as urban settings (super-surface, surface, and subsurface features), other types of complex terrain, weather, topography, hydrology, and environmental conditions. • Natural and man-made obstacles. • Existing routes, installations, and resources.

Table B-1. Example engineer assessment using operational variables

Operational Variables	Engineer Considerations
Time	• Challenges associated with completing required construction projects in the time allotted. • Potential to accelerate priority projects.
Legend: SWEAT-MSO	sewage, water, electricity, academics, trash, medical, safety, and other considerations

Table B-2. Example engineer assessment using mission variables

Mission Variables	Engineer Considerations
Mission	• An understanding of the friendly mission, commander's intent, and concept of the operation (two levels up the command); understand how engineer capabilities contribute to the mission. • The status of engineer missions (planned, prepared, and executed) and the ability of personnel to analyze and monitor those missions.
Enemy	• Enemy disposition (organization, strength, and location). • Obstacle intelligence (results ISR); engineer reconnaissance; and mine strike reporting). • Enemy engineer capabilities. • Enemy vulnerabilities. • Probable enemy COAs.
Terrain and weather	• Updated terrain information to reflect the effects of combat and nature. • Environmental considerations.

Table B-2. Example engineer assessment using mission variables

Mission Variables	Engineer Considerations
Troops and support available	• Current task organization. • Engineer combat power. ▪ Unit readiness (normally two command levels down), to include— - Personnel strength (critical specialties). - Maintenance status. - Supply status. ▪ Mobility/countermobility/survivability (M/CM/S) and other engineer capabilities. • Resources and support available from— ▪ Joint, multinational, and interagency forces. ▪ DOD or other government civilians. ▪ Contractors.
Time available	• Information related to how much time is available to plan, prepare, and execute operations. • Critical milestones that have been identified or need to be identified.
Civil considerations	• Influences having an immediate impact on engineer operations in the AO, to include— ▪ Areas (such as district boundaries, economic centers, and religious or tribal enclaves). ▪ Structures (such as bridges, dams, power plants, and cultural sites). ▪ Capabilities (such as the status of essential services, HN resources, and services that can support military operations). ▪ Organizations (nonmilitary groups or institutions that can influence the population). ▪ People (attitudes and activities of civil leaders and populations), to include the criminal dimension and its effect on engineer operations ▪ Events (such as holidays, elections, and natural or man-made disasters).

Table B-2. Example engineer assessment using mission variables

Mission Variables	Engineer Considerations
Legend:	
AO	area of operation
COR	course of action
DOD	Department of Defense
HN	host nation
ISR	intelligence, surveillance, and reconnaissance
M/CM/S	mobility/countermobility/survivability

APPENDIX C

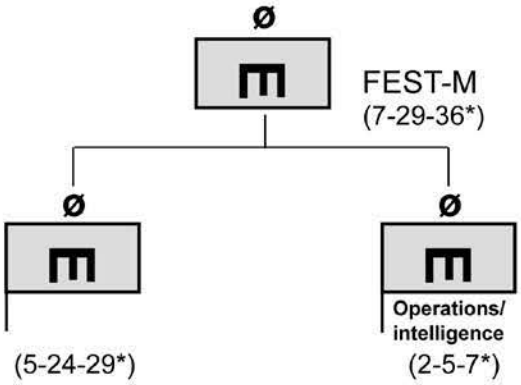
Field Force Engineering Organizations

C-1. USACE Organizations. Table C-1 provides a quick reference index for the USACE organizations described in this appendix (pages C-2 through C-7).

Table C-1. USACE FFE organizations

Unit	Figure Number and Page
Forward Engineer Support Team–Main	Figure C-1, page C-2
Forward Engineer Support Team–Advance	Figure C-2, page C-3
Contingency Real Estate Support Team	Figure C-3, page C-4
Environmental Support Team	Figure C-4, page C-5
Logistics Support Team	Figure C-5, page C-6
USACE Reachback Operations center (UROC)	Figure C-6, page C-7
Base Camp Development Team	Figure C-7, page C-8

Forward Engineer Support Team-Main
05567GA00



* Personnel numbers in parenthesis show (military strength-civilian strength-total strength).

Mission

A deployable team that provides construction management, real estate, environmental, geospatial, and other engineering support (typically at the theater echelon level) and provides command and control for deployed field force engineering teams.

Capabilities

- Technical engineering support, including—
  - Construction design and management (typically contract construction).
  - Area engineering support (real estate, environmental, protection, and base camp development planning).
  - Support to engineer operations (integration, reconnaissance, and geospatial).
  - Support to facilitate reachback.
- Disaster response, including consequence management or civil support operations.
- Support to stability operations, including—
  - Humanitarian assistance.
  - Essential services restoration.
  - Economic and infrastructure development support.

Dependencies

Gaining or supported organizations must provide basic life support and security.

Support

- Force-tailored to support a joint task force or joint force land component headquarters.
- Typically task-organized to the joint task force (corps) or joint force land component (theater Army or corps) headquarters.
- May be task-organized to the supporting engineer headquarters or operate as a discrete headquarters.
- May provide the base on which a contingency district is established.

Figure C-1. FEST-M organizational reference

Forward Engineer Support Team-Advance
05567GB00

* Personnel numbers in parenthesis show (military strength-civilian strength-total strength).

Mission

A deployable team that provides infrastructure assessment, engineer planning and design, environmental, geospatial, and other engineering support from theater to brigade echelon and augments the staff at those echelons.

Capabilities

- Technical engineering support, including—
  - Construction design and management (typically contract construction).
  - Area engineering support (real estate, environmental, protection, and base camp development planning).
  - Support to engineer operations (integration, reconnaissance, and geospatial).
  - Support to facilitate reachback operations.
- Disaster response, including consequence management or civil support operations.
- Stability operations support, including—
  - Humanitarian assistance.
  - Essential services restoration.
  - Economic and infrastructure development support.

Dependencies

Gaining or supported organizations must provide basic life support and security.

Supports

- Typically a force-tailored unit used to support a joint task force (in smaller-scale contingencies) or a corps, division, or brigade as a tactical headquarters.
- Typically task-organized to support force headquarters or to augment the engineer staff.
- May be task-organized to support an engineer headquarters.
- May operate as a subordinate to a forward engineer support team–main configured as a discrete headquarters.

Figure C-2. FEST-A organizational reference

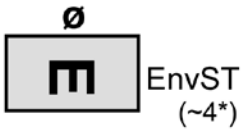
Contingency Real Estate Support Team

* Strength varies and may include up to four civilian personnel.

Mission A deployable team—typically task-organized as part of a forward engineer support team—which can acquire, manage, and dispose of real property on behalf of the United States government.
Capabilities Technical engineering support, including area engineering (real estate and base camp development planning) and reachback operations.
Dependencies Gaining or supported organizations must provide basic life support and security.
Supports • Typically force-tailored to support an Army component headquarters with real estate requirements. • Typically task-organized to support force headquarters and augment engineer staff. • May be task-organized to support an engineer unit headquarters or forward engineer support team.

Figure C-3. CREST organizational reference

Environmental Support Team



* Strength varies and may include up to four civilian personnel.

Mission

A deployable team—typically task-organized as part of a forward engineer support team—which conducts environmental assessments, surveys, and studies.

Capabilities

Technical engineering support that includes area engineering (environmental), engineer operations (environmental reconnaissance), and reachback operations.

Dependencies

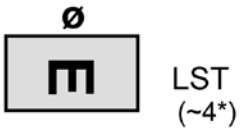
Gaining or supported organizations must provide basic life support and security.

Supports

- Typically force-tailored to support an Army component headquarters with base camp development planning and other environmental requirements.
- Typically task-organized to support the force headquarters and augment engineer staff.
- May be task-organized to support an engineer unit headquarters or forward engineer support team.

Figure C-4. EnvST organizational reference

Logistics Support Team



* Strength varies and may include up to four civilian personnel.

Mission

A deployable team that coordinates sustainment support for deployed field force engineering or emergency management elements when support requirements are exceed or are not provided by the operational force logistics system.

Capabilities

- Disaster response includes consequence management or civil support operations.
- Stability operations support, including—
  - Humanitarian assistance.
  - Restoration of essential services.

Dependencies

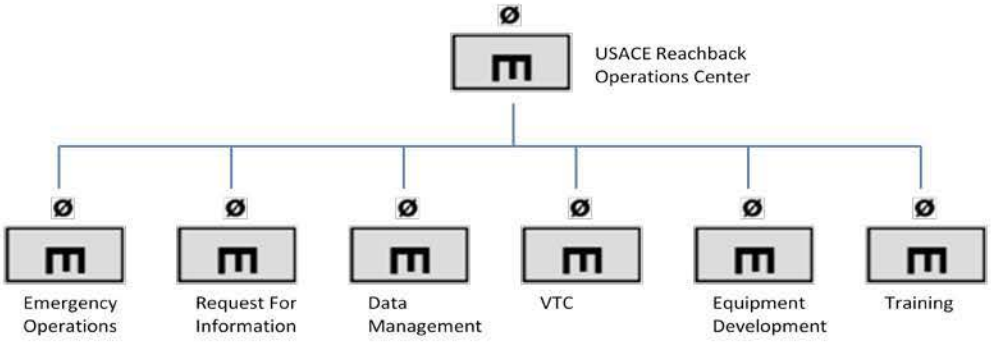
Gaining or supported organizations must provide basic life support and security.

Supports

- Typically tailored to support a forward engineer support team-main when the unit is operating as a discrete headquarters.
- Routinely tailored for emergency response operations as a planning and response team under Emergency Support Function #3.
- May be task-organized to support an engineer unit headquarters or forward engineer support team.

Figure C-5. LST organizational reference

USACE Reachback Operations Center (UROC)



Mission

Provide rapid, relevant, and reliable solutions to Soldiers and Civilians across the full operational and natural disaster spectrum in support of the Armed Forces and the Nation.

Capabilities

The UROC provides a "reachback" engineering capability enabling Department of Defense (DoD) personnel deployed worldwide to talk directly with experts in the United States when a problem in the field needs quick resolution. Deployed troops are linked to subject matter experts (SMEs) within the government, private industry, and academia to obtain solutions to complex field problems.

UROC staff responds to incoming information requests such as:

- Flooding potential due to dam breaches;
- Load carrying capacities of roads and bridges
- Field fortifications and force protection
- Design and repair of airports, port facilities, bridges, dams, railroads and roadways
- Evaluation of transportation networks.

The UROC provides comprehensive training and support to deployed units and maintains a data repository for collected engineering data used for infrastructure analysis.

Dependencies

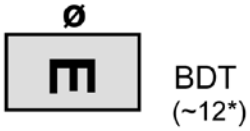
None

Support

- Headquarters USACE provides Field Force Engineering Support to UROC.

Figure C-6. UROC organizational reference

Base Camp Development Team



* Strength varies and may include up to 12 civilian personnel.

Mission

A nondeployable working group within a selected United States Corps of Engineers district that can quickly provide base development engineering and master planning, and facilitate design in support of field force engineering and other reachback requests for information.

Capabilities

- Technical engineering support, to include—
  - Area engineering support (protection and base camp development planning).
  - Reachback support.
- Disaster response in civil support operations.
- Stability operations support in the provision of humanitarian assistance.

Dependencies

Designated United States Corps of Engineers districts train and sustain teams based on a rotational readiness model.

Supports

Reachback support is coordinated through the United States Army Corps of Engineers Reachback Center.

Figure C-7. BDT organizational reference

APPENDIX D

Field Force Engineering in Tailored Configurations

D-1. Force-Tailored Organizations. Table D-1 provides a quick reference index for typical force-tailored FFE support, illustrated in the notional force packages in Figures D-1 through D-7, page D-3 through D-10.

Table D-1. Force-tailored organizations

Unit	Figure Number and Page
Theater Army Service component command configuration	Figure D-1, page D-3
Theater Army joint force land component configuration	Figure D-2, page D-4
Theater Army joint force command configuration	Figure D-3, page D-5
Corps joint task force configuration	Figure D-4, page D-6
Corps intermediate tactical headquarters configuration	Figure D-5, page D-7
Division joint task force configuration	Figure D-6, page D-9
Division tactical headquarters configuration	Figure D-7, page D-10

a. Theater Army echelon configurations. Figures D-1, D-2, and D-3 illustrate notional FFE support tailored at theater army echelon. The theater army headquarters performs theater-wide functions in addition to other operational responsibilities. These functions include RSOI, LOTS operations, and security coordination. The ASCC engineer staff identifies and addresses theater-wide support requirements for construction and engineering support. As the ASCC, the theater army exercises ADCON over all Army forces in the AOR. This includes Army forces assigned, attached, or OPCON to the combatant command. These forces provide a critical linkage for Army support to deployed engineer forces throughout the AOR. When the CCDR acts as the JFC during MCO, the theater army may provide the land component commander and headquarters. In that case, the theater army exercises OPCON over land forces deployed to a joint operations area. Although not organized primarily to act as a JTF headquarters, the theater army, with augmentation from other Services, can provide a headquarters able to C2 a JTF for crisis response or limited contingency operations.

(1) USACE routinely supports each theater army with commercial contract construction acquisition and management, project and program management, real estate and environmental services, technical services, and access to the full suite of USACE (and other agency) capabilities through reachback. Each geographic combatant command and theater army headquarters coordinates for routine support through an aligned USACE LNO and USACE division. The theater army engineer staff collaborates with the USACE LNO for access to FFE and other USACE resources to support engagement strategies and operations. The supporting LNO will also typically assist the theater army in coordinating with the DOD designated contract construction agent. The designated construction agent may have assets already operating under

contract in theater. For MCO and contingencies, deployable FFE support will typically be provided for the theater army in its ASCC configuration in the form of a FEST augmented, as required, by the CREST and the EnvST. A FEST-M may be required due to the scale of the operation if the theater army is also serving as land component command headquarters. In either case, the FEST may be task-organized to a supporting engineer headquarters, augment the theater army engineer staff, or function as a discrete operational headquarters. Separate FFE elements will likely be required to support a theater army-configured JTF as that headquarters focuses on the limited contingency and relies on a split ASCC headquarters to conduct necessary theater-wide operations. In all cases, whether teams are available to deploy, reachback support provided by the UROC is available and can be coordinated by the LNO.

(2) To meet its support responsibilities, the theater army receives attachments in the form of brigades and commands requisite for the campaign or missions in the AOR. These forces are in addition to an assigned mix of regionally focused, supporting commands and brigades. The additional forces are not regionally focused but, rather, are drawn from the pool of available forces maintained in the continental United States and around the world. The situation in each theater dictates the size of these formations, commands, brigades, or groups. The tailored FFE support for the formations considers operational and mission variables in balancing responsive support with available capabilities. As a general rule, there will not be enough deployable FFE teams to task-organize with every engineer staff and unit at each echelon; however, technical engineer reachback support from the UROC is available.

(a) In MCO, the theater army is normally supported by the TEC. The TEC DCP provides C2 and an organizational framework for the operational-level engineer effort within the AOR. The DCP focuses on reinforcing and augmenting tactical-level engineer efforts and developing the theater sustainment base. This focus involves conducting engineer operations supporting the operational design and coordinating engineer operations supporting the subordinate tactical echelons. The DCP supervises geospatial support, construction, real-property maintenance activities, LOC sustainment, engineer logistics management, and base development. The TEC has primary responsibility for theater infrastructure repair or development, as needed.

(b) Because the theater army headquarters continues to perform AOR-wide functions in addition to its operational responsibilities, the theater army formed JFLCC or JTF may require discrete engineer forces, staff, and FFE support. For major operations, theater engineer planners will typically consider timing and level for deployment of additional FFE capabilities, including appropriately tailored FESTs for support of the theater army and subordinate echelon headquarters. Planners review operational and mission variables, taking into consideration the availability of local engineer resources, including HN military and civilian sources. Joint, multinational, and interagency capabilities are also considered. Even when considering contract and other resources available, engineer planners will typically identify a number of requirements for which the most effective engineer capability must be tailored from operational forces with appropriate FFE support.

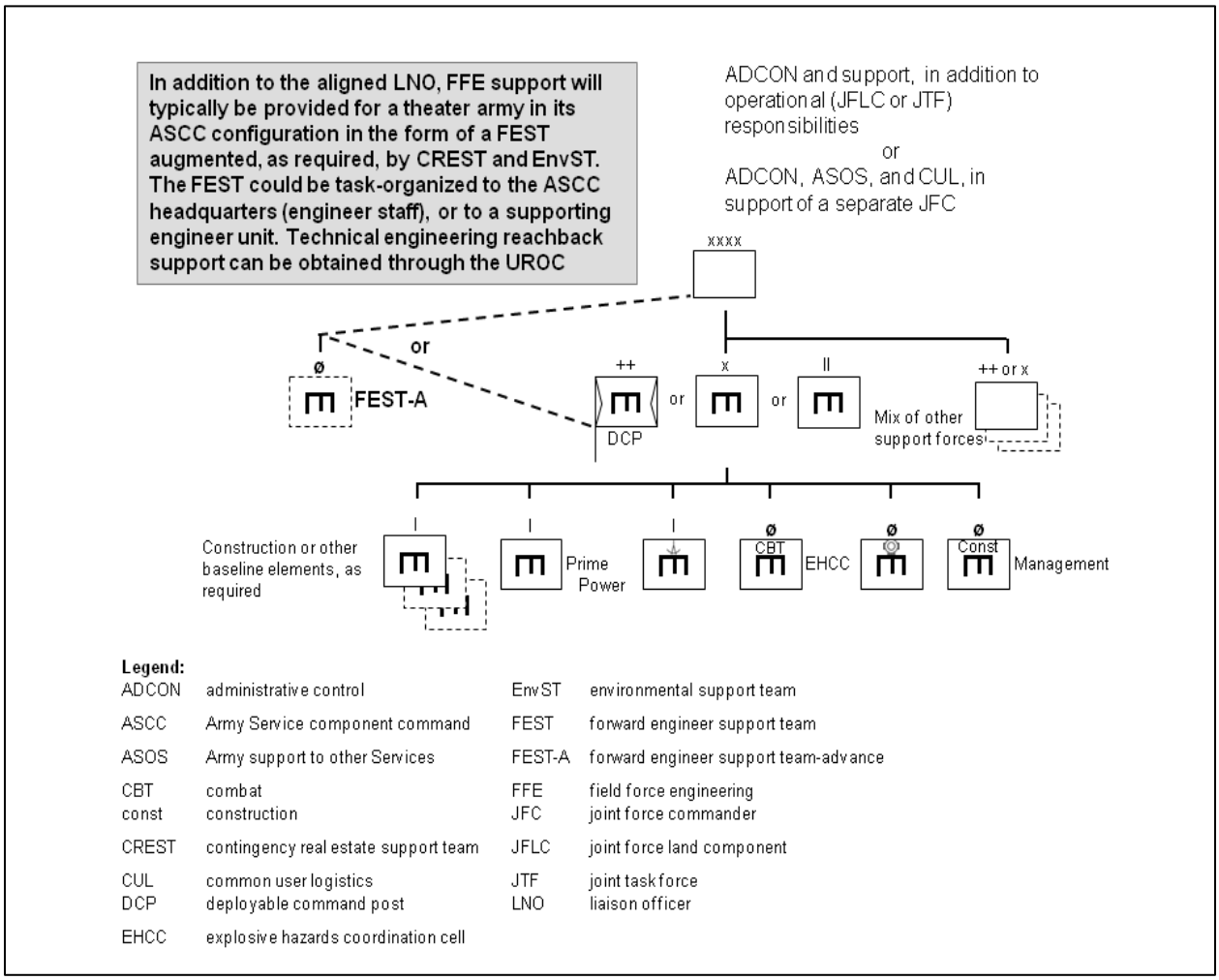


Figure D-1. Theater ASCC configuration

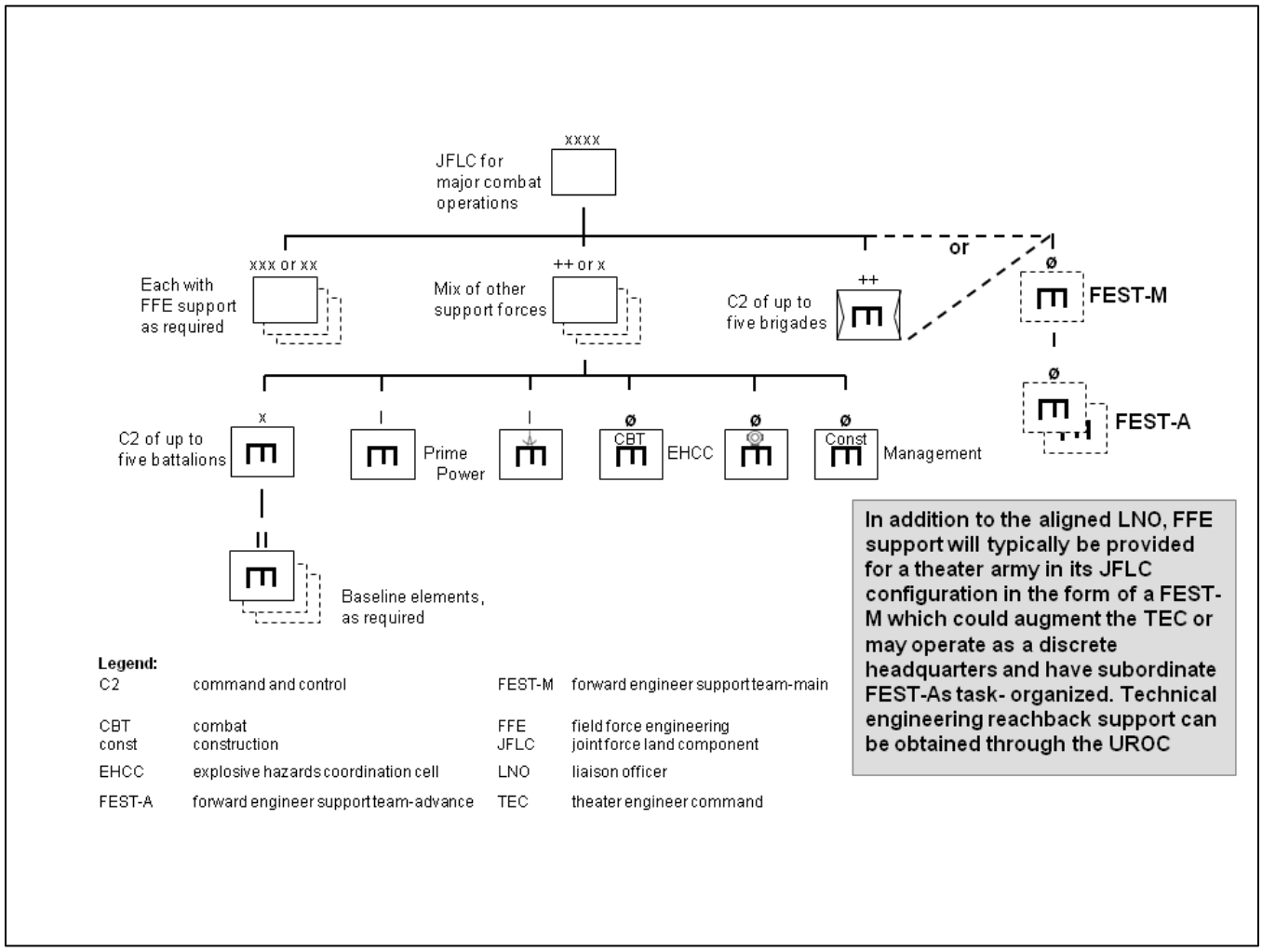


Figure D-2. Theater Army JFLC configuration

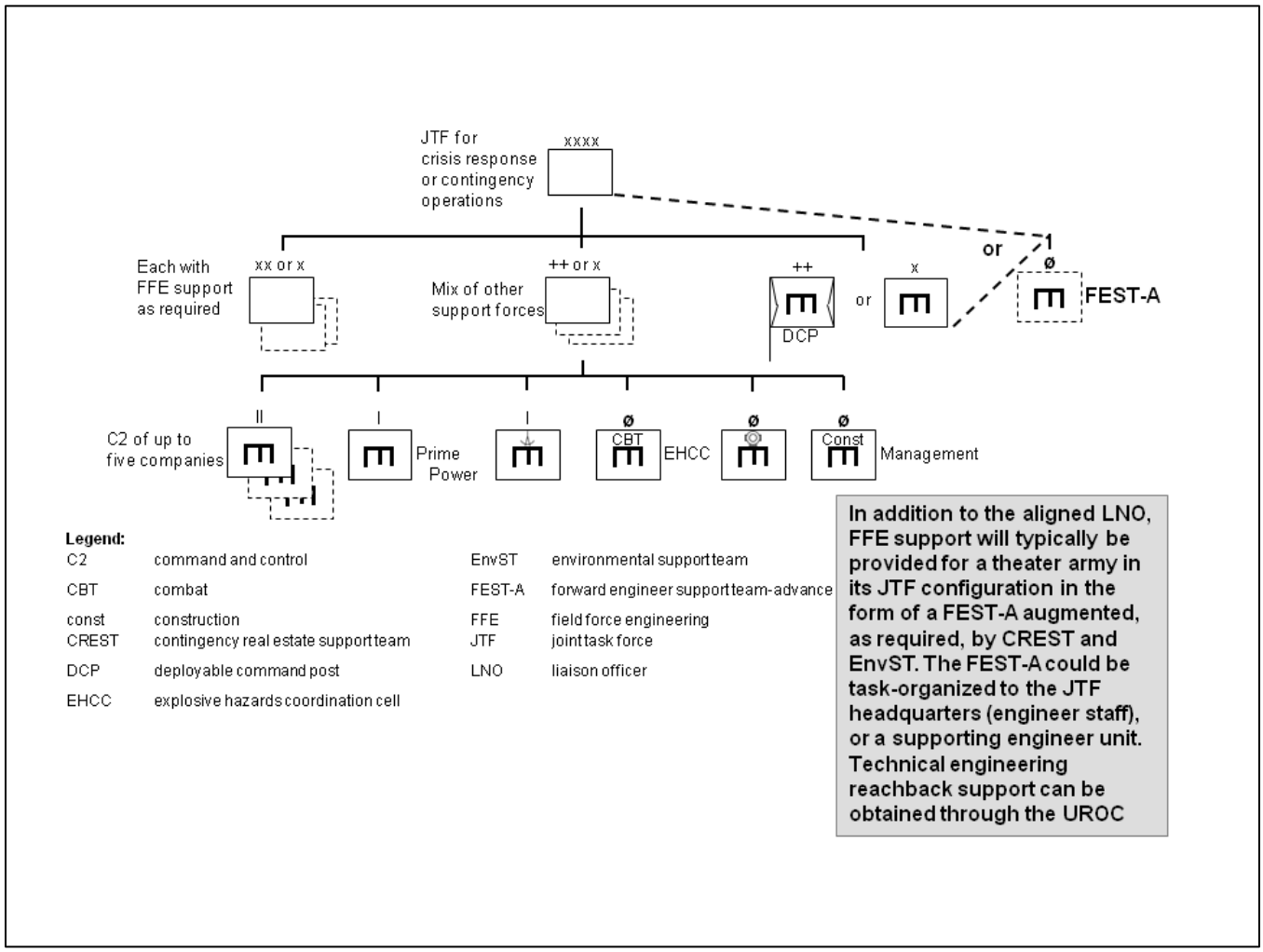


Figure D-3. Theater Army joint force command configuration

b. Corps echelon configurations. Figures D-4 and D-5 illustrate notional FFE support tailored at corps echelon. In MCO, the corps may be tasked to be an intermediate land tactical headquarters under the command of a theater army configured JFLCC. A corps headquarters may provide the base structure on which a JTF headquarters can be built for a smaller-scale contingency without initial Army augmentation. The corps configured as a JTF does not provide ADCON for Army forces because the theater army continues its ASCC functions. The corps headquarters is also designed to provide the headquarters on which a JFLCC or combined force land component headquarters can be built. This headquarters can exercise OPCON over land forces in a campaign or major operation. This mission may include controlling multiple Army, USMC, and multinational division- and brigade-sized formations. While acting as a JFLCC headquarters, the corps headquarters will also perform the duties of an Army Service component headquarters.

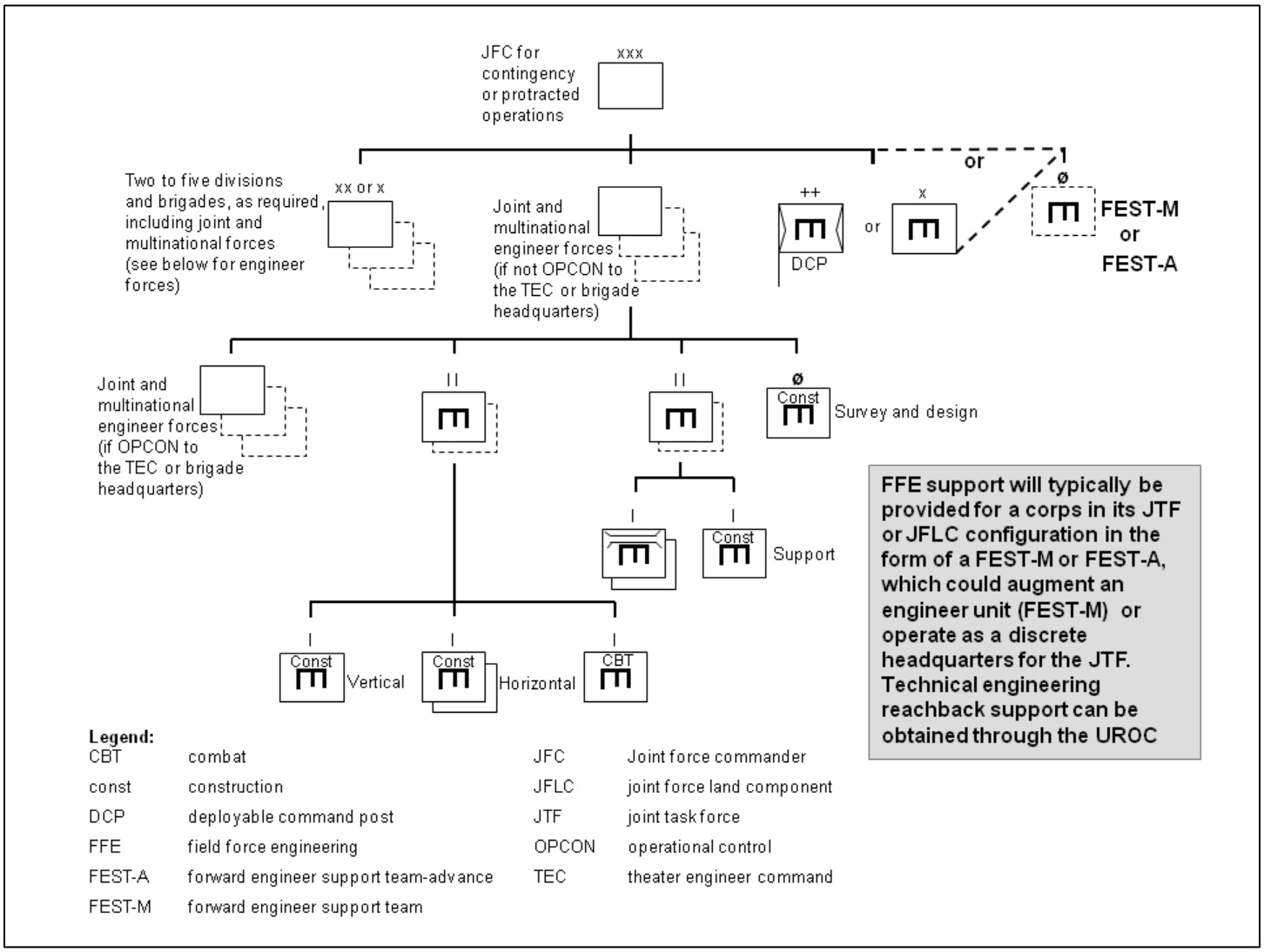


Figure D-4. Corps JTF configuration

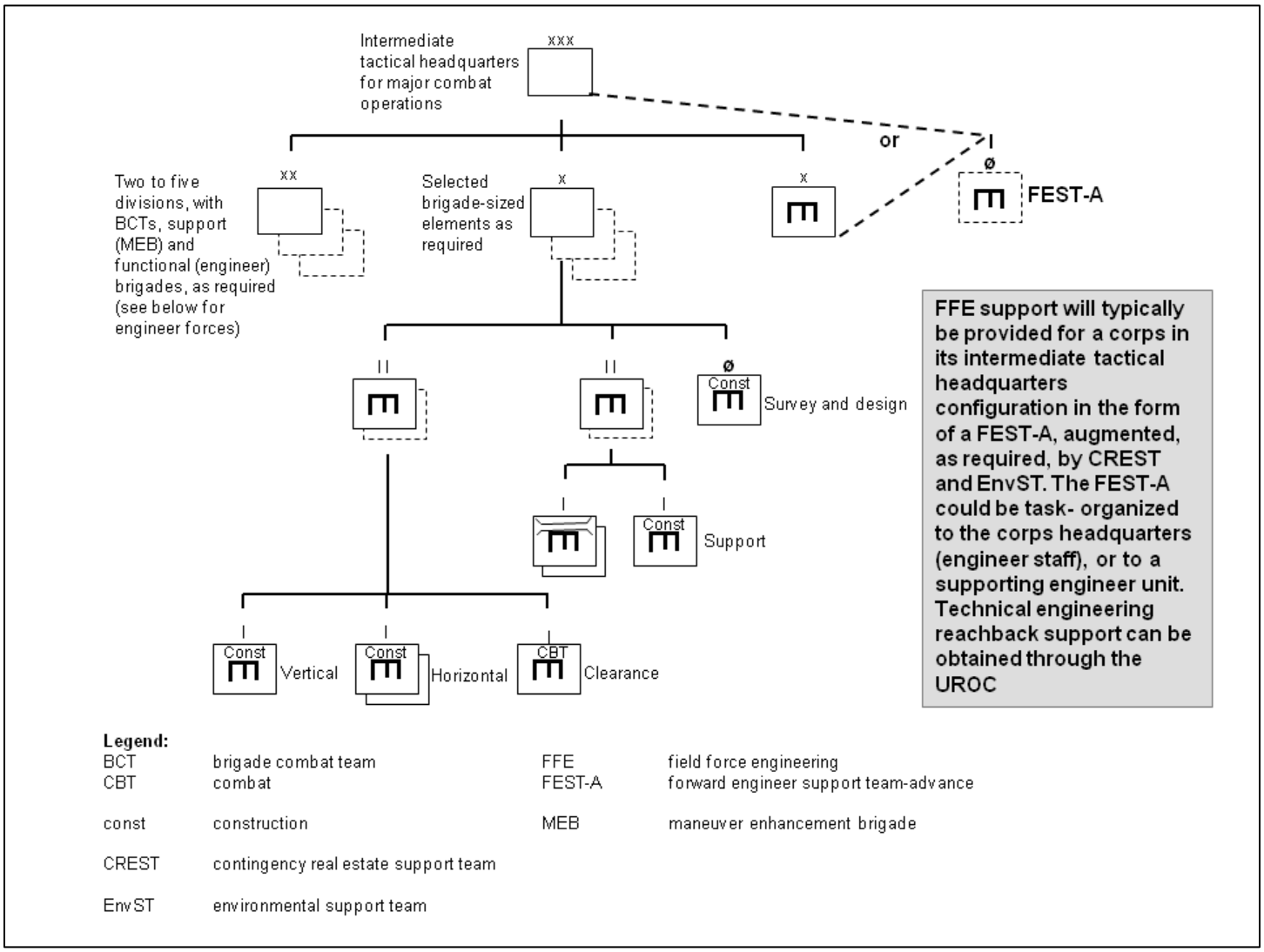


Figure D-5. Corps intermediate tactical headquarters configuration

(1) A corps headquarters will receive USACE reachback support through its tailored operational force engineer headquarters. The corps engineer staff may also collaborate with the theater army, the theater USACE LNO, and the supporting TEC to determine the appropriate level of deployable support. Based on analyses of operational and mission variables, including what FFE teams might be tailored for theater echelon support, deployable FFE support will typically augment corps forces as FESTs augmented, as required, by CREST and EnvST. A FEST-M or FEST-A may be required if the corps is configured as a JTF or a land component command headquarters; a FEST-A is a more likely option when the corps is configured as an intermediate tactical headquarters. In all cases, the FEST may be task-organized to support an engineer brigade (or TEC), augment the corps engineer staff, or (for a FEST-M) function as a discrete headquarters.

(2) While battalion or brigade echelons of engineer or multifunctional headquarters may be allocated as a corps engineer headquarters, the functional engineer brigade headquarters is more typical for most operations. Unlike the theater army-formed JTF, the corps configured as a JTF will not require a separate engineer staff and supporting headquarters. The corps engineer staff transitions to become the JTF engineer staff and will not have additional responsibilities associated with theater support.

c. Division echelon configurations. Figure D-6 and Figure D-7 (page D-10) illustrate notional FFE support tailored at division echelon. The division will likely be configured as a tactical warfighting headquarters in MCO. In this configuration, the division may be task-organized in a command relationship to a corps configured as intermediate tactical headquarters or as the JFLCC. The engineer perspective in a tactical warfighting configuration focuses on the needs of BCTs without losing sight of operational requirements. The division may be configured as a JTF or JFLCC for smaller-scale operations. A JTF configuration is most likely in civil support or foreign humanitarian assistance operations. In either configuration, the division will require augmentation. The engineer perspective in a JFC configuration focuses more on the requirements for the restoration of essential services and infrastructure development, without losing sight of the support required for the movement and maneuver, protection, and sustainment of the BCTs. In its Army Service component headquarters role, the division headquarters coordinates ADCON support for Army forces within its operational area and provides support to other Services, OGAs, and multinational forces, as required by the JFC. When a significant level of engineer effort is required by the division Army Service component headquarters role, appropriate additional engineer units may be tailored with the division or other engineer capabilities made available.

d. Brigade echelon configurations. The BCT is the Army's basic instrument of tactical execution when implementing combat and stability operations. The BCT also has applicability in civil support operations. Five types of modular support brigades complement the BCTs and provide multifunctional capabilities to deployed forces. Support brigades are organized around C2 headquarters and are tailored by adding or subtracting functional battalions. Finally, a variety of functional brigades may be tailored to support a division, corps, or theater army. The engineer brigade is an example of a functional brigade.

(1) FFE support within a brigade will likely be provided in the form of reachback support or from a deployed FFE team task-organized at the division or higher echelon. A FEST-A would likely be provided to a brigade configured as a JTF (as in, for example, a civil support situation). In the case of a brigade configured as a JTF, the FEST may be task-organized with a supporting engineer battalion or as augmentation to the brigade engineer staff (if not an engineer brigade).

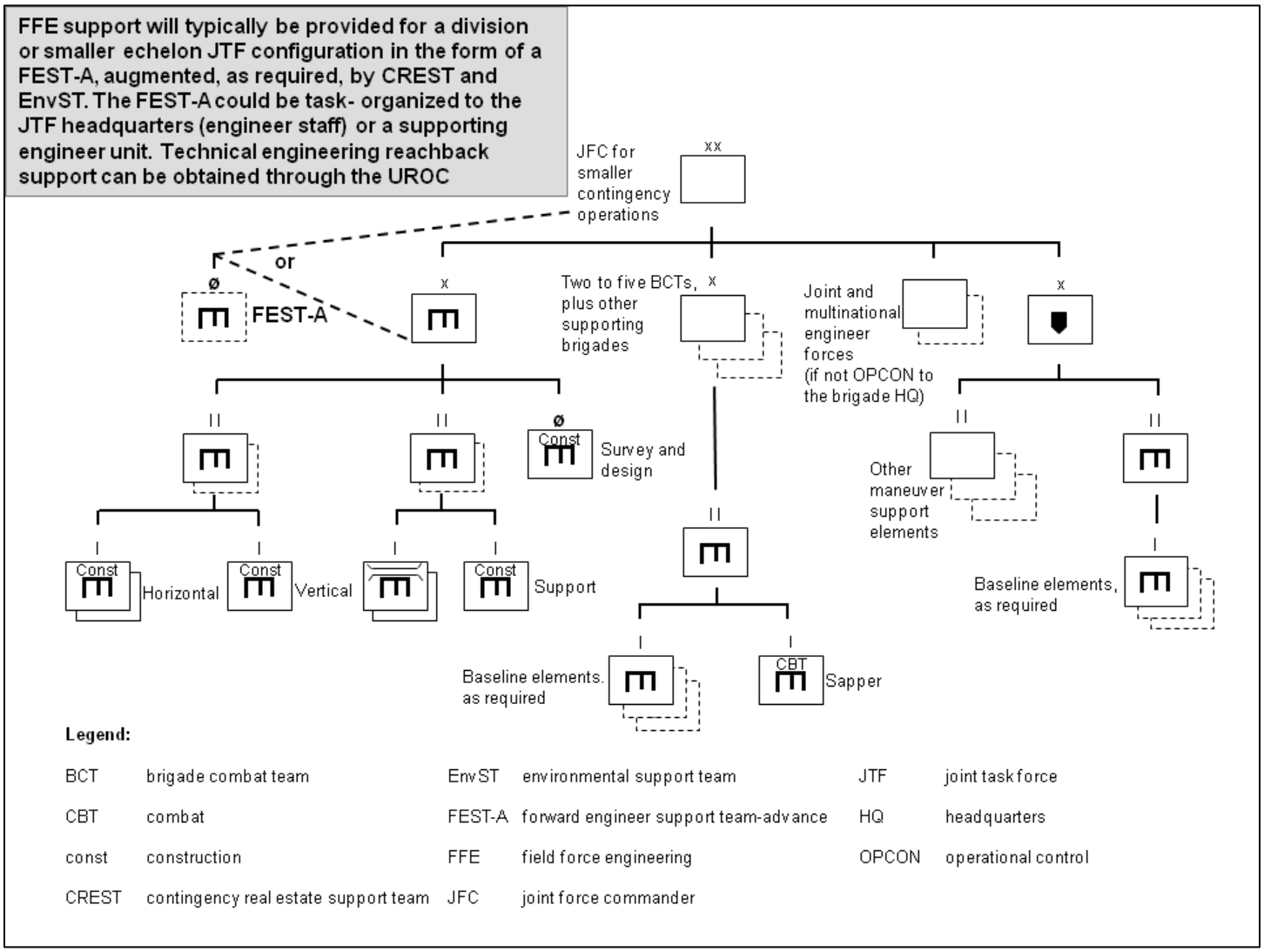


Figure D-6. Division JTF configuration

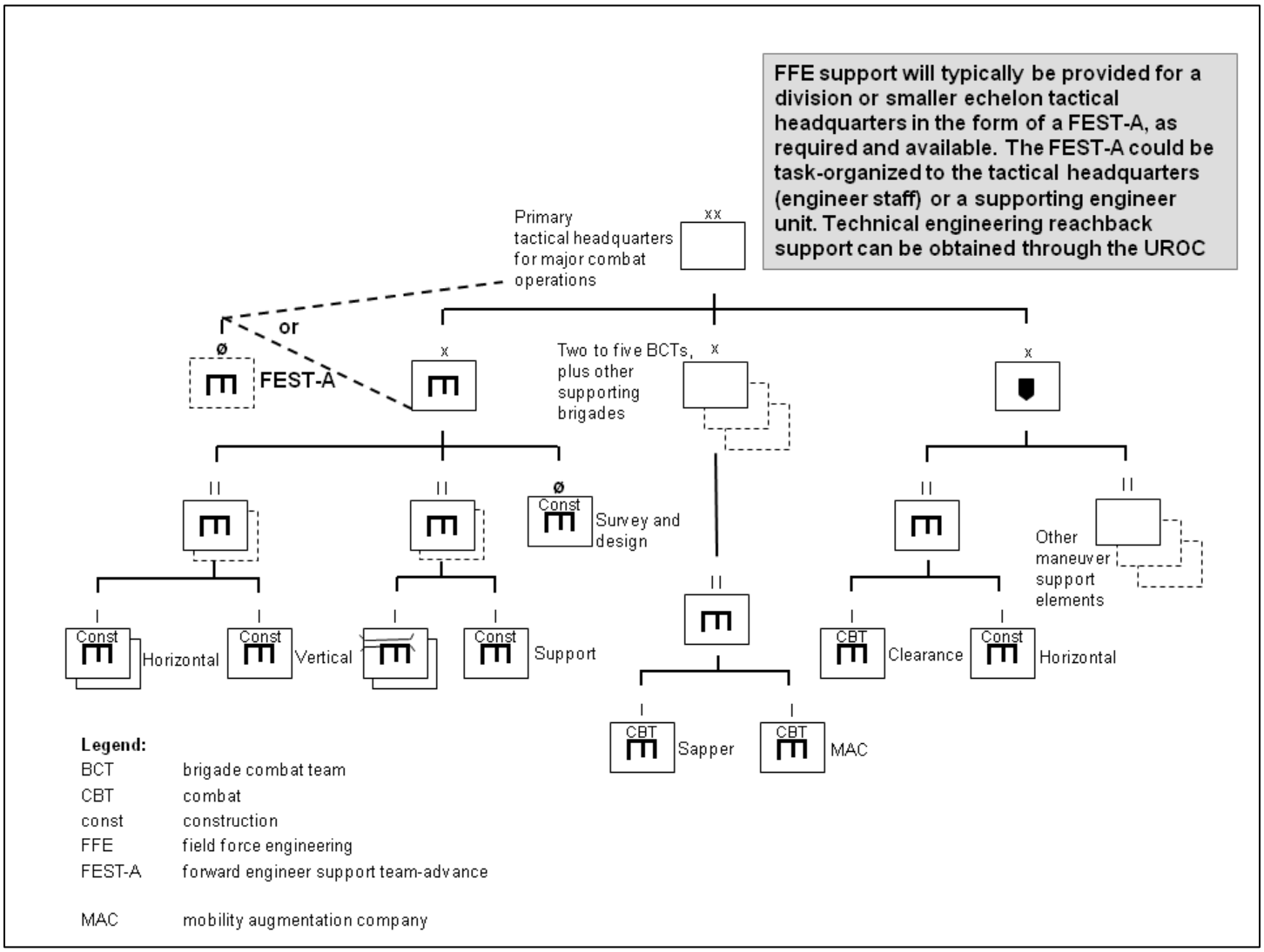


Figure D-7. Division tactical headquarters configuration

(2) Each of the three types of BCTs (and the armored cavalry regiment) has an organic engineer company. The engineer companies concentrate their efforts on maintaining the BCT freedom of movement and lessening the enemy's ability to mass and maneuver in the operational area. The organic engineer companies are optimized to perform combat engineering tasks (primarily mobility with limited capabilities in countermobility and survivability), along with geospatial engineering support provided by the organic terrain teams. Additional engineering support (combat and general engineering) comes from modular engineer organizations task-organized to the BCT or providing support from echelons-above-brigade organizations.

APPENDIX E

Integrating Functions

E-1. The Engineer Regiment is organized and equipped to support full spectrum operations. Engineer staff elements at each echelon represent and integrate engineer capabilities to support the operation. The engineer staff uses engineer functions to categorize capabilities and work with combined arms staff counterparts to understand requirements through the warfighting functions.

a. Three categories of related engineer capabilities and activities—engineer functions—are designed and used to relate specific capabilities to actual requirements. Military forces use engineer functions to categorize forces and assets based on their primary function (combat, general, and geospatial engineering). Forces can sometimes perform tasks from other functions, but engineer forces and assets are not interchangeable. Engineer reconnaissance; though not a separate engineer function, is a critical task (see FM 3-34.170 for additional discussion of engineer reconnaissance). FFE is typically considered general engineering in nature, although it enables generating force engineer support to capabilities and activities in all three engineer functions. Figure E-1, page E-2, describes engineer activities,—categorized by function—, which assist commanders and their engineer staff in identifying appropriate capabilities for various requirements. In all three categories of engineer capabilities and activities, UROC-developed equipment and technical reachback support are available to enhance and simplify the engineer's tasks.

(1) Combat engineering includes those capabilities organic to and augmenting the BCTs. Combat engineering provides tactical-level engineer support to combat (offense and defense), stability, or civil support operations. In this situation, combat engineering is typically focused on the support of close combat. FFE applications supporting combat engineering include support for reconnaissance, especially the more technically focused assessments and surveys. FFE support is typically applied to address significant technical challenges during mobility operations, including bridge repair or design problems and rapid airfield repair problems. FFE support is especially relevant for protection engineering design issues in survivability operations. Because combat engineering is typically focused on the support of close combat, FFE applications supporting combat engineering will most likely be provided by reachback.

Figure E-1. The engineer functions

Combat Engineering

- Conduct reconnaissance.
- Employ demolitions.
- Provide engineer advice.
- Fight as engineers or infantry.

Mobility

- Breach obstacles.
- Construct combat roads.
- Construct assault bridges.
- Clear environmental hazards.
- Forward aviation combat engineering.

Countermobility

- Place mines or munitions.
- Construct obstacles.

Survivability

- Construct field forts.
- Construct positions.

General Engineering

- Perform engineer assessments.
- Provide engineer advice.
- Harden facilities.
- Perform horizontal construction.
- Perform hauling.
- Provide port construction.
- Perform underwater construction.
- Perform pipeline construction.
- Produce asphalt.
- Perform prime power operations.
- Perform survey and design operations.
- Perform environmental protection operations.
- Support mobility, countermobility, and/or survivability operations.
- Fight as engineers.
- Perform vertical construction.
- Erect bridges.
- Provide utilities.
- Perform firefighting functions.
- Dig wells.
- Perform quarry aggregate operations.
- Produce concrete.
- Perform construction management.
- Perform facilities management.
- Perform real estate operations.

Geospatial Engineering

- Perform geospatial operations.
- Plan.
- Perform data generation operations.
- Perform analyses.
- Perform dissemination operations.

Note. The capabilities listed here are illustrative and should not be considered all-inclusive.

(2) General engineering capabilities may be performed in support of combat engineering and combat operations but are not typically associated with close combat. General engineering capabilities are applied to establish and maintain the infrastructure necessary for sustaining military operations in theater. At times, the military operation may extend general engineering support to restore or develop facilities, power, and life-support systems within the infrastructure of the operational area or build technical capacity of the HN. General engineering is the most diverse of the three engineer functions and is typically the largest percentage of all engineer support provided to an operation. FFE applications supporting general engineering include technical engineering and specialized support for the entire range of general engineering tasks, especially when those tasks include a contract construction or contract management component. While FFE applications supporting combat engineering will typically be provided through reachback, the applications supporting general engineering will be provided through deployed FFE teams on the ground and through reachback and through nondeployable teams including the UROC.

(3) Geospatial engineering is generating, managing, analyzing, and disseminating positionally accurate terrain information that is tied to some portion of the earth's surface. These actions provide mission-tailored data, tactical decision aids, and visualization products that define the character of the zone for the maneuver commander. Key aspects of the geospatial engineering mission are databases, analyses, digital products, visualization, and printed maps. Specialized FFE applications are available, typically through reachback, to support geospatial engineering data management and products.

b. Engineer functions generally align in support of specific warfighting functions (see FM 3-34), although they have impact in and across the other functions (for example, survivability support may be provided with linkages to the fires and protection warfighting function). FFE support is considered primarily general engineering in nature and shares its primary alignment from general engineering to sustainment, protection, and reinforcement of combat engineering outside of close combat. However, FFE enables technical engineer support to capabilities and activities in all three engineer functions and, therefore, may be integrated through any or multiple warfighting functions. Engineer reconnaissance, while not a separate engineer function, is critical to each function and may require reachback or other FFE support for more technical or detailed assessments or surveys. For FFE to contribute effectively to the total means of force which a military formation applies in its operations, appropriate technical or specialized engineer requirements are identified through applicable warfighting functions (see Table E-1, pages E-4 through E-6) UROC-developed equipment (see Appendix G) and UROC-provided technical reachback support are available to personnel performing any of the engineer functions.

Table E-1. Requirements identified by warfighting function

Warfighting Function	**Engineer Requirements** (Likely focus areas for FFE are italicized)
<u>Movement and maneuver</u> • Deploy. • Move. • Maneuver. • Conduct direct fires. • Occupy an area. • Conduct mobility and countermobility operations. • Conduct battlefield obscuration.	• *Analyze infrastructure to support operational deployment and movement.* • Evaluate mobility and countermobility required to preserve operational freedom of maneuver, including clearance, crossing, and terrain reinforcement considerations. • Develop engineer force and capabilities estimates. • *Consider infrastructure improvements, reconstruction, capacity development, and other nonlethal applications for stability or civil support operations.*
<u>Intelligence</u> • Support force generation. • Support situational understanding. • Conduct ISR . • Provide intelligence support to targeting and information operations capabilities.	• *Coordinate for geospatial information and products to enhance visualization of the operational area, achieve situational understanding, and enable decision making.* • Estimate threat engineer capabilities. • Gather and coordinate for obstacle intelligence. • Disseminate specific explosive hazards, hazardous material, or other recognition and warning information. • *Coordinate for engineer assessments and surveys for technical information requirements.* •
<u>Fires</u> • Decide surface targets. • Detect and locate surface targets. • Provide fire support. • Assess effectiveness. • Integrate C2 warfare.	• Participate in the targeting process. • Coordinate for command guidance on employment of scatterable mines and other munitions.

Table E-1. Requirements identified by warfighting function

Warfighting Function	**Engineer Requirements** (Likely focus areas for FFE are italicized)
<u>Sustainment</u> • Provide logistics. • Provide personnel services. • Provide health services support. • Conduct internment and resettlement operations.	• *Estimate sustainment base and base development requirements.* • *Estimate real estate and other facilities engineering support.* • *Identify LOCs and other key routes, and determine support requirements for establishing and maintaining a distribution system.* • *Estimate area damage control and other construction support.* • *Determine specialized engineer requirements, such as power, water, and firefighting.* • *Prepare construction and barrier material estimates.* • Prepare munitions estimates. • Determine authorities, funding types, and levels of support.
<u>Command and control</u> • Execute the operations process. • Conduct CP operations. • Integrate the information superiority contributors. • Conduct information engagement. • Conduct civil affairs operations. • Integrate airspace C2. • Execute command programs.	• *Coordinate for geospatial products to enhance visualization of the operational area, achieve situational understanding, and enable decision making.* • Establish and participate on boards, working groups, and cells. • Recommend command and support relationships. • Recommend control measures, priorities, standards, and reports. • *Establish and maintain liaison relationships.*

Table E-1. Requirements identified by warfighting function

Warfighting Function	**Engineer Requirements** (Likely focus areas for FFE are italicized)
<u>Protection</u> • Provide air and missile defense. • Provide personnel recovery. • Provide information protection. • Provide fratricide avoidance. • Provide operational area security. • Prepare antiterrorism operations. • Develop survivability measures. • Provide force health protection. • Defend against CBRN operations. • Provide safety measures. • Provide operations security. • Prepare for EOD.	• *Evaluate base camp and other survivability requirements.* • *Evaluate survivability of key assets.* • *Consider facilities hardening.* • Consider the use of networked munitions as part of base defense. • Plan for area damage control. • *Investigate environmental impacts.* • Conduct explosive hazards threat assessments and support.

Legend:

C2	command and control
CBRN	chemical biological, radiological, and nuclear
CP	command post
EOD	explosive ordnance disposal
FFE	field force engineering
ISR	intelligence, surveillance, and reconnaissance
LOC	line of communications

APPENDIX F

Field Force Engineering Training

F-1. Training Model. USACE leverages the engineering and other professional competencies throughout its organization to develop and maintain the technical expertise required to provide FFE. The FFE training model is similar to the Professional Filler System used by the military medical community to provide highly qualified medical professionals that are also proficient in designated mission-essential tasks. FEST-Ms are division based and routinely coordinate for team members to train within the appropriate business enterprise throughout the division. FEST-As are based at districts to leverage the planning and design, construction management, and other engineer expertise resident within the host district to develop and maintain team member technical skills. The CREST, the EnvST, the LST, and the BDT are similar to the FEST in that they also rely on their host USACE organizations for development of technical competencies. A significant difference is that these teams are not TOE based. The CREST, EnvST, LST, and BDT team members have job assignments within their host organizations and are assembled into their respective FFE teams based on the TDA. These team members sustain technical competencies as part of their routine job performance within their host organizations. FFE provides technically competent engineering teams for support to operational forces. Individuals and teams must not only maintain their engineering or related technical skill competencies but must additionally train to be proficient in the mission-essential tasks that enable operational support. USACE has developed its FFE training model to balance individual and team training considering proficiency in technical competencies and in mission-essential tasks.

a. USACE employs a force generation cycle to develop FEST teams through a process that builds team readiness over time and yields predictable periods of availability (see Figure F-1, page F-2). The force generation cycle allows FESTs to progress through a structured operational readiness cycle consisting of four force pools: *reset, train, ready*, and *available.* The FEST-Ms cycle through the first three force pools in a 12 month period and are then considered available for 12 months. Cycle time for the FEST-A is 24 months in the first three pools followed by 12 months available. The force pools within the cycle indicate a unit's level and focus for training which concentrates on developing mission-essential capabilities. Mission-essential task training is balanced throughout the cycle with necessary training to sustain team member engineering and other technical competencies. USACE also uses the cycle to prioritize resources for training and to synchronize unit manning, equipping, and resourcing. Each FFE team transitions from one force pool to the next based on an assessment of its proficiency in the critical tasks that are the focus of training within that pool.

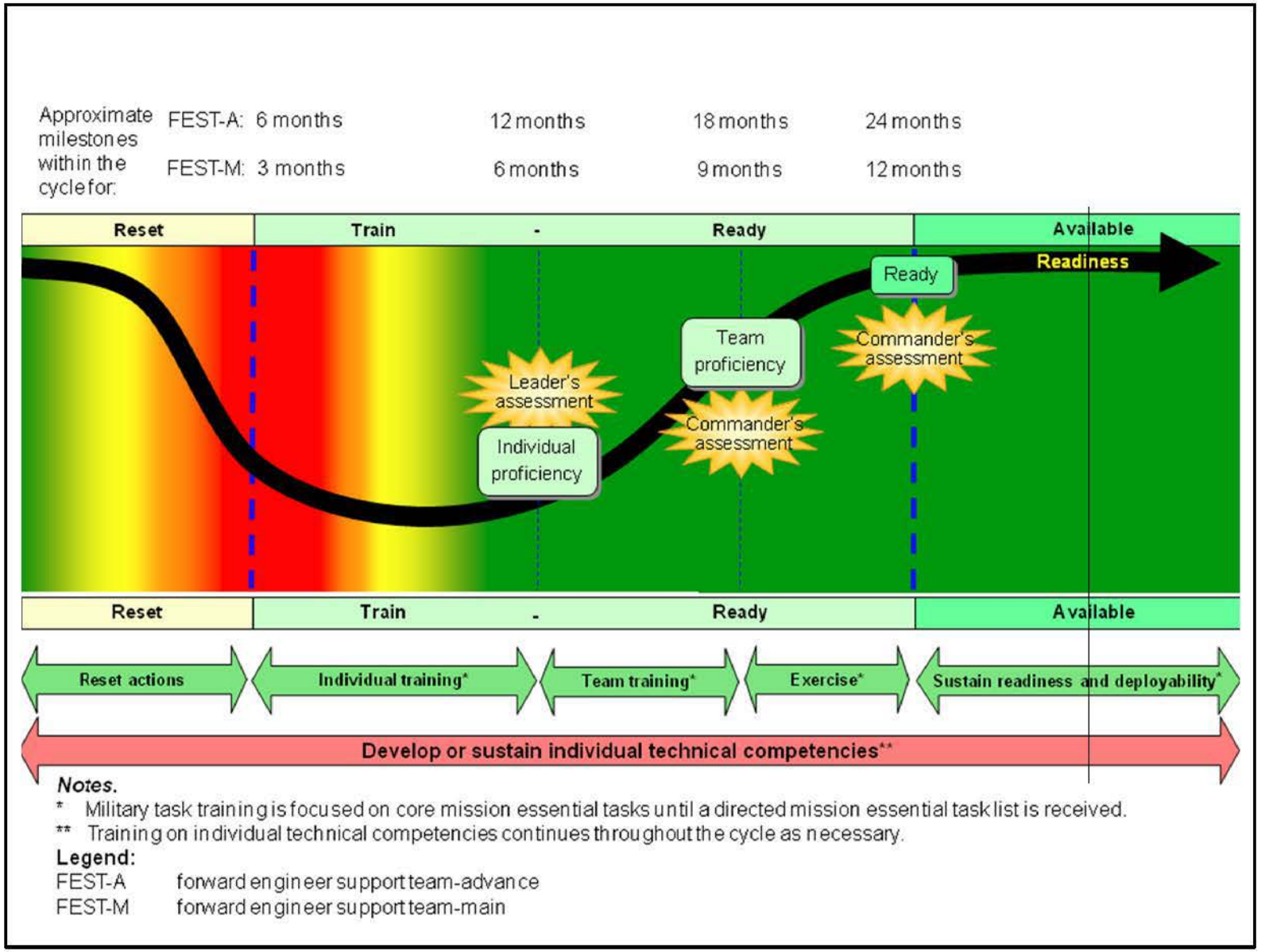


Figure F-1. FFE team force generation model

b. The force generation cycle is designed to provide combatant commanders and civil authorities with technically competent FESTs trained for the capabilities described in Chapter 4. The cycle contributes to effective training by defining the training level and critical task focus within each pool. The cycle and associated focus for training can be adjusted in consideration of specific operational requirements when those requirements are identified. Mission-essential task training shifts focus to the directed mission and associated essential tasks when a mission is received. Table F-1 relates the training focus for each force generation pool.

Table F-1. Training focus related to force generation

Force Pool	Training Level and Focus
Reset	• Reset actions necessary for manning and equipping the team. • Primary emphasis on establishing individual technical competencies. • Initial individual training on selected individual tasks supporting mission-essential capabilities.
Train	• Balance provided to maintain technical competencies. • Individual training focused on critical essential tasks. • Team training on essential collective tasks.
Ready	• Balance provided to maintain technical competencies. • Team training on essential collective tasks. • Team participation in training exercises.
Available	• Individual- and team-level review of perishable tasks. • Teams may be employed for reachback support, as needed.

c. The CREST, the EnvST, the LST, and the BDT all follow a training cycle that, although not tied directly to defined time periods, mirror the force generation process to also yield available FFE teams. The CREST and EnvST cycles provide 18 months for the *reset*, *train*, and *ready* pools followed by 12 months availability. The LST cycle provides 12 months for the first three pools followed by 12 months availability. Because the BDT does not deploy, it is managed by the UROC on a rotational basis (altered as necessary) that allows time for training and preparation to respond to requests for support. Additional available weeks can be added as required. For all of the FFE teams, balance is maintained between sustaining technical competencies while conducting individual and collective training on essential tasks.

F-2. Responsibilities. USACE has assigned responsibilities to major subordinate commands for the collective and individual training of FFE teams. These responsibilities are adjusted throughout the force generation model and vary to meet the needs of each FFE team. The Assistant Chief of Staff, Operations and Plans (G-3), HQUSACE coordinates development of training products based on analysis of the critical tasks required to support FFE mission-essential tasks. When a mission or deployment is identified, the gaining or supported command must provide guidance for the specific deployment-related critical tasks so that training can be

adjusted accordingly. HQUSACE also retains responsibilities for managing team participation in training at the Readiness Support Center (RSC) in Mobile, Alabama, as well as deployments to combat training centers and other major training exercises.

a. FFE team members are selected for their duty positions based on extensive education, training, and in many cases certification required by the technical nature of each position. Individual technical training and professional development is considered a base line requirement for assignment as an FFE team member and must be developed individually and with support from the host district. Training cycles for FFE teams consider a balance of maintaining technical competencies and training on essential tasks.

b. During the reset pool, individual team members are responsible for identifying and conducting the individual training specific to their duty position. Much of this training is conducted at home station. This training includes a variety of on-line, distance learning, and other training venues that support critical individual tasks that may be unique to each duty position. Team leaders also coordinate classes and other training during this pool on selected common individual tasks. Team leaders are responsible for coordinating an individual development plan for each team member and then monitoring and assessing individual training progress.

c. During the train pool, team members continue conducting individual training specific to their duty position. Team leaders coordinate for common individual training. Training is conducted at the home station with host districts and other organizations providing support for the teams. Team leaders continue monitoring and assessing individual training progress. Team leaders are also responsible for the team's participation in critical collective training. This training is conducted at home stations in preparation for participation in collective training events during the ready pool. Team leaders coordinate the scheduling and support for this training through their host district or organization. District commanders, except for the FEST-M, are responsible for monitoring the progress of collective training and reviewing training assessments provided by the team leader. In the FEST-M, division commanders monitor the progress of collective training and review training assessments provided by the FEST-M commander.

d. During the ready pool, individual and collective training continues at home station while HQUSACE manages team rotations to and participation in collective training events at the RSC. This training includes a variety of scenario driven training programs that focus on critical collective tasks and may reinforce selected individual tasks. HQUSACE also manages FFE team deployments and participation in major training exercises including rotations to the combat training centers. Training exercise opportunities are identified annually by military planners at each division in coordination with HQUSACE. The training opportunities must provide a focus on FFE critical collective tasks and are selected based on resources and training priorities established in annual training guidance. District commanders are responsible for monitoring participation in training at centers and in exercises and for reviewing training assessments for the FEST-As. Division commanders are responsible for monitoring participation in training at centers and in exercises and for reviewing training assessments for the FEST-Ms.

e. During the available pool, responsibilities for the conduct of training are shared depending on the level of training. Team leaders retain responsibility for monitoring individual training proficiencies; district commanders (division commanders for the FEST-M) assess team proficiency and monitor collective training. Teams that are not deployed may be employed for reachback support. In some cases HQUSACE may coordinate support for a selected exercise if that event directly contributes to sustaining the training readiness of the FFE team.

F-3. Training Focus. USACE has analyzed the FFE mission and organization to develop mission-essential tasks which support full spectrum operations. These tasks make up the FFE teams' mission-essential task list (METL). The METL provides focus for training until a team is notified for deployment or given a specified mission. When a team is notified of a deployment or given a specified mission, it shifts focus to those tasks that are specific to the deployment or mission. Mission-essential tasks are comprised of subordinate collective and individual tasks. FFE individual and team training, through the force generation cycles, focuses on the critical METL supporting collective and individual tasks. Figures F-2 through F-7, pages F-6 through F-8, describes the METLs for each FFE team.

F-4. UROC Training Program. The U.S. Army Corps of Engineers Reachback Operations Center (UROC) provides training and support for the Automated Route Reconnaissance Kit (ARRK), IKEwGATER (Geospatial Assessment Tool for Engineering Reachback), and TeleEngineering Communications Equipment (TCE) systems. The following provides a general outline of the various levels of training available, up to and including train-the-trainer level training on each system. Detailed training support packages and related training materials are available for each system, but the outline below is intended to provide an overview of the different levels of training and the time that should be allocated to conduct or attend the training.

a. Certified FEST Train-the-Trainers. Home station training must be conducted regularly to practice set-up, operation, and processing of the data, as these are perishable skills. Once the trainees have become certified as a Train-the-Trainer, they will only be authorized to train the FEST Team they are a member of. If a certified trainer is asked to train anyone outside their team, UROC's approval must be obtained. Certified trainers are encouraged to "educate" other USACE and Non-USACE personnel and organizations on the equipment capabilities.

b. Training Program Overview

(1) Automated Route Reconnaissance Kit Training

(a) Level I.A Training – ARRK Operator

Purpose: Provides the student with basic knowledge to install and operate the ARRK system to collect route reconnaissance data and to verify that the data are properly recorded and saved using the TeleEngineering Toolkit software.

(b) Level I.B Training – ARRK Data Processor

Purpose: This training is focused on using the TeleEngineering Toolkit software for processing data collected by the ARRK, including editing recon data, generating standard reconnaissance forms, etc.

(c) Level II Training – ARRK Train-the-Trainer

Purpose: This includes the final steps to become an ARRK trainer. Review of ARRK and TeleEngineering Toolkit skills, overview of the instructional materials and logistics for conducting an ARRK training class, and experience instructing classes are included. Prior to completing this level of training, students must have successfully completed the Level I and Level II training courses, and it is highly recommended that the student also have some hands-on experience with the system. At the successful completion of this Level II training, the student is certified by the UROC as a trainer to conduct Level I.A and Level I.B ARRK training.

(2) IKE w GATER Training

(a) Level I Training – Basic IKE w GATER Operation

Purpose: Covers basic operation of the IKE with GATER system for data collection and the associated business process for data management. The goal is to enable the student to deploy and effectively collect GATER data, analyze data and sync data to the centralized GATER geodatabase. This training covers all three tiers of the GATER operating environments; online, desktop and mobile (the IKE).

(b) Level II Training – IKE w GATER Train-the-Trainer

Purpose: Prepares the student to become an IKEwGATER trainer. Prior to entering this level of training, the student is required to have successfully completed the Level I IKEwGATER training class outlined above, and it is highly desired that the student also have experience with the system. Upon successful completion of this level of training, the student is certified by the UROC as a trainer to conduct Level I IKEwGATER training classes. This training provides one-on-one detailed instruction on all three tiers of the GATER operating environments. In addition, program administration, system business rules and policies, troubleshooting and technical support are also covered.

(3) TeleEngineering Communications Equipment Training

(a) Level I Training – TCE and BGAN Operator

Purpose: Covers the TeleEngineering Communications Equipment (TCE) and Broadband Global Area Network (BGAN) equipment and provides the student with the basic knowledge to assemble and operate the equipment to conduct secure and non-secure video teleconferencing,

secure and non-secure data transfer, non-secure telephone, and non-secure internet access via satellite-based systems.

(b) Level II Training – TCE and BGAN Train-the-Trainer

Purpose: This course equips the student as a trainer for UROC communications equipment, including the TCE-D / TCE-SL and BGAN. The student must successfully complete the Level I TCE and BGAN training outlined above prior to entering this training course and it is highly desirable that the student have experience with the equipment prior to participating in this course. At the successful completion of this Level II training, the student is certified by the UROC as a trainer to conduct Level I TCE and BGAN training.

Forward Engineer Support Team-Main Mission-Essential Tasks

Provide Technical Engineer Support
- Design and manage construction.
- Provide area engineering support.
- Conduct engineer operations.
- Provide engineer reachback support.

Conduct Consequence Management
- Provide support in response to a terrorist attack.
- Provide other support, as required.

Conduct Stability Operations
- Provide humanitarian assistance.
- Restore essential services.
- Support economic and infrastructure development.

Conduct Civil Support Operations
- Provide support in response to a natural disaster.
- Provide other support, as required.

Conduct Command and Control
- Plan an operation.
- Prepare for an operation.
- Execute an operation.
- Assess an operation.

Figure F-2. METL for FEST-M

Forward Engineer Support Team-Advance Mission-Essential Tasks

Provide Technical Engineer Support
- Design and manage construction.
- Provide area engineering support.
- Conduct engineer operations.
- Provide engineer reachback support.

Conduct Consequence Management
- Provide support in response to a terrorist attack.
- Provide other support, as required.

Conduct Stability Operations
- Provide humanitarian assistance.
- Restore essential services.
- Support economic and infrastructure development.

Conduct Civil Support Operations
- Provide support in response to a natural disaster.
- Provide other support, as required.

Figure F-3. METL for FEST-A

Contingency Real Estate Support Team Mission-Essential Tasks

Provide Technical Engineer Support
- Provide area engineering support-real estate.
- Provide engineer reachback support.

Figure F-4. METL for CREST

Environmental Support Team Mission-Essential Tasks

Provide Technical Engineer Support
- Provide area engineering support-environmental.
- Conduct engineer operations-reconnaissance.
- Provide engineer reachback support.

Figure F-5. METL for the EnvST

Logistics Support Team
Mission-Essential Tasks

Conduct Consequence Management
- Provide support in response to a terrorist attack.
- Provide other support, as required.

Conduct Stability Operations
- Provide humanitarian assistance.
- Restore essential services.

Conduct Civil Support Operations
- Provide support in response to a natural disaster.
- Provide other support, as required.

Provide Sustainment Operations
- Conduct logistics support.
- Conduct maintenance.
- Conduct human resource support.
- Provide health service support.

Figure F-6. METL for LST

USACE Reachback Operations Center

Provide Technical Engineering Support to Forward Deployed Elements

- Provide Reachback utilizing Subject Matter Experts
- Sustaining a data repository
- Provide equipment support
  - o TeleEngineering Communications Equipment
  - o Automated Router Reconnaissance Kit
  - o Handheld data collection devices
- Provide Equipment Training
  - o FEST
  - o ENVEST
  - o CREST
  - o Other Deploying personnel

Provide Support to Civil Operations

- Provide Reachback support for man-made and/or natural disasters
- Provide equipment support

Provide Support to Stability Operations and Reconstruction

- Provide access to Base Camp Development Teams
- Provide reachback support to deployed elements
- Support reachback for essential services

Provide Support for Sustainment and Redeployment

- Provide engineering reachback to deployed elements
- Provide equipment training

Figure F-7 METL for UROC

Base Camp Development Team
Mission-Essential Tasks

Provide Technical Engineer Support

- Provide area engineering support, to include—
  - Protection.
  - Base camp development planning.
- Support engineer operations, to include—
  - Estimates.
  - Assessments and surveys.
- Provide engineer reachback support.

Conduct Stability Operations, to include humanitarian assistance.

Conduct Civil Support Operations

- Provide support in response to a natural disaster.
- Provide other support, as required.

Figure F-8. METL for BDT

APPENDIX G

Specialized Systems and Equipment

G-1. Systems. The USACE organization for FFE includes teams with a variety of critical specialties and skills as previously described and summarized in Appendix B. Additionally, the physical infrastructure enabling FFE includes some specialized systems and software applications necessary to deliver FFE support.

a. FFE is the application of USACE and other capabilities to support full spectrum operations through forward presence and reachback. Reachback is the process that provides access to the expertise, applications, and other capabilities that are not deployed. Reachback is enabled by TeleEngineering, but includes the entire process that delivers necessary support from nondeployed assets to the user conducting full spectrum operations. Accessing reachback support is simple. Deployed personnel from all military services or OGAs can submit a request for support to the UROC, in the form of a RFI. Once a request is submitted, trained personnel address the RFI and provide a response, these teams include the UROC, trained response teams, centers of expertise, laboratories, USACE Districts and Division, other OGAs, among others. The UROC acts as a hub for technical reachback support, providing one-stop reachback engineering capability. RFIs can be submitted to the UROC by DoD personnel, US Government personnel, FFE deployable team members, and others. UROC coordinates closely with the USACE LNO responsible for the AOR. Table G-1 provides contact information for the UROC.

Table G-1. Reachback contact information for UROC

Nonsecure Web Site	Secure Web Site	Phone
https://uroc.usace.army.mil	http://uroc.usace.army.smil.mil	(877) ARMY-ENG (877) 276-9364 (601) 643-2439 DSN 312-446-2439

b. TeleEngineering Tool Kit software aids the engineer Soldier or FFE team using reachback by:

(1) Providing a platform for viewing and analyzing geospatial data.

(2) Collecting and displaying data required for engineering analyses by SMEs.

(3) Tracking previously conducted analyses.

(4) Organizing RFIs.

(5) Efficiently displaying analyses by the SMEs.

c. TCMS is a personal computer-based automated construction planning, design, management, and reporting system used by military engineers for overseas construction activities. It combines commercial, off-the-shelf computer hardware and software with Army Facilities Components System designs and databases to enhance engineer performance of overseas construction missions.

G-2. Equipment. Specialized equipment enables FFE support by providing reliable communications linkages and efficient collection and management of the information and data supporting reachback. More information is available on the UROC website (see Table G-1 for the URL).

a. The TeleEngineering Communications Equipment – Deployable (TCE-D) is used across the engineer regiment. The systems are used not only by USACE FEST teams, but by Regular, Reserve, and National Guard Army engineer units. The capability has also been extended to other engineer service components. These kits allow Type 1 encrypted secure links for reachback to address engineering challenges, worldwide. The system is a major component when existing infrastructure is damaged, unavailable, or nonexistent. The TCE-D is a satellite-based system that enables the user to send and receive data and conduct video teleconferences in a classified or non-classified manner. It can also be used to place phone calls, access the internet, and send and receive e-mail traffic. The TCE-D has been ruggedized for field use and consists of a video conferencing codec capable of (Integrated Services Digital Network (ISD) and internet protocol (IP) based conferencing, laptop computer, encryption device, external handheld camera, and other miscellaneous components. The TCE-D connects through a satellite terminal and uses auto -switching power supplies to operate on 110- and 220-volt alternating currents. The system can also be operated solely using vehicle battery power. The TeleEngineering Communications Equipment – Fixed (TCE-F) is the office or conference room variant and uses terrestrial circuits to obtain connectivity. The USACE Reachback Operations Center (UROC) acts as a telecommunications hub for the users of the TCE-D and TCE-F. The UROC maintains both classified and unclassified multipoint video bridges. The bridges maintained by the UROC can host multiple conferences at one time with participants connecting through a variety of connection methods. The UROC maintains certification with the Defense Information Systems Agency (DISA), Defense Information System Network (DISN) Video Services- Global (DVS-G). DVS-G allows the UROC to accommodate connections from its participants to this larger audience, which may be operating at various rates or using dissimilar cryptographic networks. Data transfer rates and the video connections are typically adequate for reachback requirements but can be increased by increasing satellite bandwidth or by adding dedicated lines.

b. For satellite linkage, the TCE-D is typically complemented with the Broadband Global Area Network (BGAN). BGAN is a highly portable and robust satellite terminal that provides voice and broadband data simultaneously. It is accessible via a range of small, lightweight satellite terminals.

c. The IKE is a handheld data collection device with a customized interface called Geospatial Assessment Tool for Engineering Reachback (GATER), which provides a platform for collecting critical infrastructure condition assessments and other elements of interest through

the use of modules. The IKE unit integrates a Global Positioning System (GPS), digital camera, laser range finder, inclinometer, and a mobile GIS interface to support the customized GATER software. Collected data is synced to a PC, and then synced to the UROC spatial data server. Data can be viewed, edited, and disseminated to others using the GATER On-line portal.

d. The Automated Route Reconnaissance Kit (ARRK) is a ruggedized laptop computer running custom software coupled with various sensors to continuously collect route reconnaissance information without stopping or leaving the vehicle for routine calculations. The ARRK collects pictures, voice recordings, Global Positioning System (GPS) location, accelerometer, and 3-D gyroscope data streams. The ARRK provides a chronological picture replay of the route and a geo-referenced display of major features that effect the classification and usage of the route for vehicle mounted applications, and when used in its airborne configuration, provides an overview of damage in impacted areas due to a natural disasters. The stored-data types can be scrolled thru to instantly locate specific features along the route. The system also provides for automated determination of slope and radius of curvature. The reconnaissance data collected from the ARRK is converted by the operator to pre-formatted reconnaissance reports that are in accordance with the requirements of FM 3-34.170 (formerly FM 5-170), “Engineer Reconnaissance”. Additional outputs are available in the form of JPEG snapshots and movie clips. The ability to export KMZ files has been useful when sharing data with host nation and non-governmental organizations (NGOs).

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GLOSSARY

Acronyms and Terms

Section I
Acronyms:

ADCON	administrative control
AFCAP	Air Force Contract Augmentation Program
AGC	Army Geospatial Center
AO	area of operations
AOR	area of responsibility
APOD	aerial port of debarkation
ARRK	automated route reconnaissance kit
ASCC	Army Service component command
ATTP	Army tactics, techniques, and procedures
BCDP	base camp development planning
BCT	brigade combat team
BDT	base camp development team
BGAN	Broadband Global Area Network
C2	command and control
CBRN	chemical, biological, radiological, and nuclear
CCDR	combatant commander
COA	course of action
CP	command post
CREST	contingency real estate support team
DA	Department of the Army
DCP	deployable command post
DHS	Department of Homeland Security
DOD	Department of Defense
DS	direct support
EFD	engineer facilities detachment
EnvST	environmental support team
EOD	explosive ordnance disposal.
EP	engineer pamphlet
ERDC	Engineer Research and Development Center
ERT	engineer reconnaissance team
ESF	emergency support function
FEMA	Federal Emergency Management Agency
FEST	forward engineer support team
FEST-A	forward engineer support team-advance
FEST-M	forward engineer support team-main
FFE	field force engineering
FM	field manual
FRAGO	fragmentary order
G-3	Assistant Chief of Staff, Operations and Plans

GATER	Geospatial Assessment Tool for Engineering Reachback
GEOINT	geospatial intelligence
GPS	Global Positioning System
GS	general support
HN	host nation
HQUSACE	Headquarters, United States Army Corps of Engineers
IGO	intergovernmental organization
IKE	it knows everything
ISR	intelligence, surveillance, and reconnaissance
JFC	joint force commander
JFLCC	joint force land component command
JP	joint publication
JTF	joint task force
LNO	liaison officer
LOC	line of communications
LOGCAP	Logistics Civil Augmentation Program
LOTS	logistics, over-the-shore
LST	logistics support team
M/CM/S	mobility/countermobility/survivability
MCO	major combat operations
MDMP	military decision making process
MEB	maneuver enhancement brigade
METL	mission essential task list
METT-TC	mission, enemy, terrain and weather, troops and support available, time available and civil considerations
MSR	main supply route
NAVFAC	Naval Facilities Engineering Command
NCF	Naval Construction Force
NGO	nongovernmental agency
NRF	National Response Framework
OE	operational environment
OGA	other government agency
OPCON	operational control
OPORD	operation order
PDF	portable document format
PM	project management
PMESII-PT	political, military, economic, social, information, infrastructure, physical environment and time
PRT	planning and response team
Prime BEEF	Prime Base Emergency Engineer Force
RED HORSE	Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineer
RFI	request for information
RSOI	reception, staging, onward movement, and integration
RSC	Readiness Support Center
SME	subject matter expert

SPOD	seaport of debarkation
SWEAT-MSO	sewage, water, electricity, academics, trash, medical, safety, and other considerations
TCE-D	tele-engineering communications equipment-deployable
TCMS	Theater Construction Management System
TDA	table of distribution and allowances
TEC	theater engineer command
TM	technical manual
TOE	table of organization and equipment
UROC	United States Army Corps of Engineers Reachback Operations Center
U.S.	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USCENTCOM	United States Central Command
USEUCOM	United States European Command
USMC	United States Marine Corps

Section II
Terms:

Civil Support
(DOD) Department of Defense support to U.S. civil authorities for domestic emergencies and for designated law enforcement and other activities. (see JP 3-28)

Field Force Engineering
The application of the Engineer Regiment's capabilities across the range of engineer battlespace functions (although primarily general engineering intensive) and to support full spectrum operations through both reach and forward presence. (FM 3-34)

Force Tailoring
The process of determining the right mix of forces and the sequence of their deployment in support of a joint force commander. (FM 3-0)

Operational Environment
A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. (JP 3-0)

Stability Operations
(DOD) An overarching term encompassing various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment and provide essential government services, emergency infrastructure reconstruction, and humanitarian relief. (JP 3-0)