Joint Publication 3-34

Joint Engineer Operations

06 January 2016

PREFACE

1. Scope

This publication provides doctrine for the command and control, planning, and execution of joint engineer operations.

2. Purpose

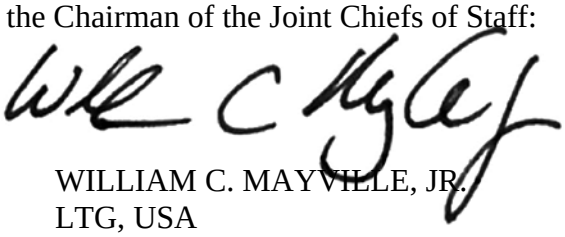
This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff. It sets forth joint doctrine to govern the activities and performance of the Armed Forces of the United States in joint operations, and it provides considerations for military interaction with governmental and nongovernmental agencies, multinational forces, and other interorganizational partners. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders (JFCs), and prescribes joint doctrine for operations and training. It provides military guidance for use by the Armed Forces in preparing and executing their plans and orders. It is not the intent of this publication to restrict the authority of the JFC from organizing the force and executing the mission in a manner the JFC deems most appropriate to ensure unity of effort in the accomplishment of objectives.

3. Application

a. Joint doctrine established in this publication applies to the joint staff, commanders of combatant commands, subunified commands, joint task forces, subordinate components of these commands, the Services, and combat support agencies.

b. The guidance in this publication is authoritative; as such, this doctrine will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence unless the Chairman of the Joint Chiefs of Staff, normally in coordination with the other members of the Joint Chiefs of Staff, has provided more current and specific guidance. Commanders of forces operating as part of a multinational (alliance or coalition) military command should follow multinational doctrine and procedures ratified by the United States. For doctrine and procedures not ratified by the US, commanders should evaluate and follow the multinational command's doctrine and procedures, where applicable and consistent with US law, regulations, and doctrine.

For the Chairman of the Joint Chiefs of Staff:



WILLIAM C. MAYVILLE, JR.
LTG, USA
Director, Joint Staff

Intentionally Blank

SUMMARY OF CHANGES
REVISION OF JOINT PUBLICATION 3-34
DATED 30 JUNE 2011

- **Clarifies understanding of engineer support using the joint phase model by providing task relation by phase.**
- **Clarifies the definition of general engineering.**
- **Clarifies the definition of combat engineering.**
- **Updates the capabilities and functions of the Service engineer forces.**
- **Updates the capabilities and functions of engineer staff.**
- **Updates typical funding and command and control relationships.**
- **Updates the Service engineer capability matrix.**
- **Adds definition of restricted area.**
- **Rescinds definition of advanced base, F-hour, Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer (RED HORSE), and route classification.**
- **Updates references and acronyms.**

Intentionally Blank

TABLE OF CONTENTS

APPENDIX

GLOSSARY

FIGURE

Intentionally Blank

EXECUTIVE SUMMARY
COMMANDER'S OVERVIEW

- **Presents Joint Engineer Fundamentals**
- **Describes Command and Control of Joint Engineer Operations**
- **Discusses Engineer Planning and Planning Considerations**
- **Describes the Engineer Functions of Combat Engineering, General Engineering, and Geospatial Engineering**

Joint Engineer Fundamentals

Engineer Support in Joint Operations

Engineer operations integrate combat, general, and geospatial engineering to meet national and joint force commander (JFC) requirements to facilitate the mobility and survivability of friendly forces; counter the mobility of enemy forces; and provide infrastructure to position, project, protect, and sustain the joint force.

Engineer Functions

Engineer functions fall into three basic groups—combat engineering, general engineering, and geospatial engineering.

Combat engineering consists of those engineer capabilities and activities that directly support the maneuver of land combat forces and requires close and integrated support to those forces.

General engineering consists of those engineer capabilities and activities that provide infrastructure and modify, maintain, or protect the physical environment.

Geospatial engineering consists of those engineer capabilities and activities that portray and refine data pertaining to the geographic location and characteristics of natural and constructed features and boundaries.

Engineer Support Across All Phases of Military Operations

Shape (Phase 0). Effort during shape phase missions, tasks, and actions will focus primarily within the geospatial and general engineering functions. Engineer activities may include

production and distribution of terrain data; real estate acquisition, environmental services, and construction to support the theater campaign plan; and terrain analysis for urban, suburban, and rural area development and management.

Deter (Phase I). In this phase, the engineer effort will focus on geospatial and general engineering functions with activities to include establishing lines of communication (LOCs), continued terrain analysis in support of mobility assessments, and preparing for potential construction and support for basing.

Seize Initiative (Phase II) and Dominate (Phase III). During phases II and III, all engineer functions (general, combat, and geospatial) have a key role. Operations will require engineers who can integrate their activities with the fires and maneuver of land combat forces and the air and naval forces supporting those land combat forces to ensure the mobility of friendly forces, degrade the mobility of adversaries, and enhance the protection of friendly forces.

Stabilize (Phase IV). Engineer effort in stability operations shifts to the general and geospatial engineering functions. Stability operations is a core mission of the US military and requires proficiency equivalent with combat operations to restore or provide essential services and to repair critical infrastructure.

Enable Civil Authority (Phase V). Engineer effort continues to focus on the general and geospatial engineering functions and may include facility development.

Military Engineering Capabilities

Services often use the engineer functions to categorize forces and assets based on their primary function (i.e., combat engineers, general engineers, and geospatial engineers). Forces can sometimes perform some tasks from other functions. Planners and engineer staffs have a responsibility to integrate those capabilities to meet specific operational needs and to support accomplishing a variety of mission requirements in any operational environment.

Engineer Functions

Combat Engineering

There are three core activities associated with combat engineering: mobility, countermobility, and survivability.

Mobility capabilities and activities ensure the ability of land combat forces to maneuver.

Countermobility capabilities and activities reinforce terrain to delay, disrupt, and destroy the enemy with the primary purpose to slow or divert the enemy, to increase time for target acquisition and fires, and to increase weapons' effectiveness.

Survivability capabilities and activities enhance the protection of land combat forces.

General Engineering

General engineering consists of those engineer capabilities and activities, other than combat engineering, that provide infrastructure and modify, maintain, or protect the physical environment. General engineering is a very diverse function often involving horizontal and vertical construction, but also encompassing numerous specialized capabilities. General engineering often is a supporting or sustaining operation; however, the commander's intent may dictate that it be the supported function, for example in recovery, reconstitution, or reconstruction operations.

Geospatial Engineering

Geospatial engineering provides the JFC with terrain analysis and visualization of the operational environment through the utilization and display of accurate terrain and other geospatially referenced information and derived actionable advice that is referenced to precise locations on the earth's surface.

Command and Control

Responsibilities

Geographic Combatant Commander's (GCC's) Engineer Staff. The engineer staff performs a variety of functions to synchronize engineer operations in the area of responsibility (AOR) including:

The engineer staff of a joint force assists the joint force commander by furnishing engineer advice and recommendations to the commander and other staff officers.

- Coordinating with functional combatant commander (FCC) engineer staffs on FCC construction equities within their theaters.
- Coordinating with Department of Defense (DOD) construction agents and other engineer support agencies.
- Planning and coordinating theater engineering support.
- Recommending to the GCC assignment of engineering missions to subordinate commanders; on the tasking of components for theater engineering missions, tasks, or projects; policies and priorities for construction and real estate acquisition, and for Class IV supplies (construction materials).
- Furnishing advice on the impact of joint operations on the environment in accordance with applicable US, international, and host nation (HN) laws and agreements.

FCC Engineer Staff. The engineer staff assists the FCC by performing functions to synchronize engineer operations that support their command's global response commitments. These include many of those listed above and the following:

- Advising the commander on engineering-related doctrine, policy, and issues affecting FCC support of GCCs.
- Providing input to the FCC global campaign plans, theater posture/infrastructure master plans, or other key FCC plans.
- Providing input on the selection, characterization, and nomination of contingency locations, and the establishment of contingency basing criteria, including the common service standard for general engineering support functions (e.g., utility services).

Subordinate Joint Force Engineer Staff. The joint force engineer serves as the principal advisor to the JFC for matters pertaining to the planning and execution of joint engineering support operations. The joint force engineer responsibilities include:

- Planning for and coordinating the conduct of operational mobility, countermobility, survivability, and construction tasks.
- Providing recommendations to the JFC on the assignment of engineering missions to subordinate commanders.
- Construction and maintenance of required facilities and LOCs.
- Coordination of materiel requirements.
- Furnishing advice, with legal assistance, on the impact of JFC operations on the environment.
- Geospatial engineering in conjunction with the geospatial information and services officer.
- Real estate acquisition and management.
- Emergency repair of war damage to facilities and infrastructure.
- Coordinating with DOD construction agents and other engineer support agencies.

Command and Control Options

Engineering forces are extremely adaptable and can be tailored to any joint force organizational structure.

Simplicity and clarity of command relationships are paramount to the effective and efficient use of engineer forces due to the varied nature of engineer tasks, units, and capabilities. Types of command and control options include:

Service Component Command. Service component commanders maintain operational control (OPCON) over their Service engineer forces under this organizational option. This structure maintains traditional command relationships and is best used when the JFC chooses to conduct operations through Service component commanders and when engineer forces are used in direct support of Service component missions.

Functional Component Command. The JFC may also organize using one or more functional component commands. Under this organizational option, the JFC establishes command relationships for engineer forces based on the requirement for engineer missions.

Subordinate Joint Task Force (JTF). The JFC may opt to establish a subordinate JTF to control extensive engineer operations and missions. The JFC designates the military engineer capabilities that will be made available for tasking and the appropriate command relationships. Engineer forces could be placed under OPCON, tactical control, or in a supporting role, depending on the degree of control that the JFC desires to delegate to the subordinate JTF.

Engineer Organization Considerations

When a functional component command employs forces from more than one Service, the staff should reflect each Service represented. A notional engineer staff may include the following.

Plans. The engineer staff participates in the planning process through representation on the joint planning group. The engineer staff addresses all potential engineer requirements during the planning process.

Operations. The engineer staff monitors the deployment, employment, mission, and redeployment status of major subordinate Service component engineer forces.

Facilities. The facilities section has oversight of base establishment and development, real estate contracting and management, facility construction, and operation and maintenance.

Environmental. Key tasks include coordinating with the staff judge advocate to provide advice on applicable requirements and actions.

Logistics. Key tasks of the section include monitoring Class IV materials and Class V ammunition and the coordination of service support.

Reconstruction. This section is responsible for the coordination and integration of outside the wire construction projects.

Separate Engineer Staff. When the engineer effort is a significant focus or a key element of the joint operation, or where the engineer effort is primarily combat support and combat service

support operations, the JFC should consider establishing a separate engineer staff element that reports directly to the JFC.

Separate Engineer Command. When the engineer effort is a significant focus or a key element of the joint operation, and there are a significant number of theater-level engineer requirements that can only be accomplished with high-demand engineer assets, the JFC may establish a separate engineer command that reports directly to the JFC. Establishment of this command will require GCC approval based on the command relationship the JFC has with the other Service forces.

Engineer Boards, Centers, Cells, and Working Groups

A JFC may establish engineer-specific boards or cells to manage engineer-intensive activities and to ensure an effective use of resources to meet mission requirements. The joint force engineer is responsible for the following boards:

The Joint Civil-Military Engineering Board provides overall direction for civil-military construction and engineering requirements in the theater or joint operations area (JOA). It is a temporary board activated by the GCC or subordinate JFC and staffed by personnel from the components and agencies or activities and recommends policies, procedures, priorities, and overall direction for civil-military construction and engineering requirements in the theater or JOA.

The Joint Facilities Utilization Board (JFUB) assists in managing Service component use of real estate and existing facilities. The JFUB is a temporary board chaired by the combatant command or subordinate joint force engineer, with members from the joint force staff, components, and any other required special activities.

The Joint Environmental Management Board is established and chaired by the combatant commander (CCDR) or subordinate JFC to assist in managing environmental requirements.

The Explosive Hazards Coordination Cell is established to predict, track, distribute information

on, and mitigate explosive hazards within the theater that affect force application, focused logistics, protection, and awareness of the operational environment.

Other Boards, Centers, Cells, and Working Groups. Joint force engineers may also participate in planning groups, joint operations center, joint targeting coordination board, information operations cell, civil-military operations center, Joint Logistics Operations Center, and others.

Interorganizational Coordination

Several organizations, including the United States Agency for International Development and United States Army Corps of Engineers, work together to establish civil security and civil control, restore essential services, repair critical infrastructure, and provide humanitarian relief. Two methods for facilitating such coordination are the civil-military operations center and the joint interagency coordination group.

Engineer Planning

Strategic, Operational, and Tactical Planning

The challenges of planning successful engineer operations within diverse theaters are vast and varied.

Strategic Planning. Engineer planning activities at the strategic level include force planning and the execution of campaigns and operations, focusing primarily on the means and capabilities to generate, sustain, and recover forces.

Operational Planning. The GCC's engineer planning concepts for the AOR focus on the impact of geography and force-projection infrastructure on the concept of operations (CONOPS). Engineer planners must determine the basic yet broad mobilization, deployment, employment, and sustaining requirements of the CCDR's CONOPS. Engineers conduct operational area/environment assessments and work with intelligence officers to analyze the threat during the joint intelligence preparation of the operational environment (JIPOE) process.

Tactical Planning. Tactical planning focus is on combat engineering tasks and planning done within tactical organizations.

General Planning Considerations

In tailoring the engineer support to operations, the joint force engineer should address a number of general considerations for engineer planning, including speed, economy, flexibility, decentralization of authority, and establishment of priorities. Planning considerations include assured mobility, geospatial planning information, assessment, engineer reconnaissance, infrastructure survey, logistics, information intelligence requirements, and JIPOE.

Functional Planning Considerations

Each engineer function has unique planning considerations. Some of those that are most significant to the joint force engineer's planning activities include:

Combat Engineering. Emplacing barriers and obstacles and countering their use by adversaries are often significant requirements for engineers. Collectively these roles are covered primarily by the functional categories mobility and countermobility. Under combat engineering, these are focused on support to combat maneuver forces conducting operations on land and as a part of amphibious operations. Survivability is also performed as a part of combat engineering.

General Engineering. The joint engineer plans for general engineering requirements in support of base camps and facilities. The requirements should reflect the general engineering support necessary for the expected duration and intensity of operations, be limited to the forces employed (to include multinational, HN, and contractors), and be time-phased.

Geospatial Engineering. Geospatial data provides the foundation for analysis and visualization of the operational environment, is required for many military functions such as navigation, mission planning, mission rehearsal, targeting, obstacle and minefield reconnaissance, and terrain analysis.

Detailed Planning Considerations

Transitions. Engineers, together with logisticians, must anticipate the JFC's phase transition decisive points in order to ensure adequate resources are available for the next phase of the campaign.

Force Protection. Engineers construct protective facilities, bunkers, emplacements, vehicle barriers, fences, and other structures. Combat engineering tasks like the development of fighting and protective positions (survivability) are also a part of force protection. Engineer support to force protection also includes the support of camouflage, concealment, and deception.

Explosive Ordnance Disposal (EOD). This capability must be requested through their higher EOD headquarters, and units may be placed in a direct support or general support role.

Real Estate Requirements. Joint force engineers must plan for the acquisition of land and facilities and their management and ultimate disposal to support joint operations, including operational facilities, logistics facilities, force beddown facilities, common-use facilities, and force protection planning considerations.

Construction Planning. The joint force engineer and Service component engineers must ensure that facilities are available to support the joint force. This will often require new construction, but where possible, it is important to maximize the use of existing facilities.

CONCLUSION

This publication provides doctrine for the command and control, planning, and execution of joint engineer operations.

CHAPTER I
JOINT ENGINEER FUNDAMENTALS

1. Engineer Support in Joint Operations

Engineer capabilities enable joint operations by facilitating freedom of action necessary for the joint force commander (JFC) to meet mission objectives. Engineer operations integrate combat, general, and geospatial engineering to meet national and JFC requirements. Joint engineer operations facilitate the mobility and survivability of friendly forces; counter the mobility of enemy forces; provide infrastructure to position, project, protect, and sustain the joint force; contribute to a clear understanding of the physical environment; and provide support to civilian authorities and other nations.

2. Engineer Operations and the Principles of Joint Operations

Joint doctrine for engineer operations is built upon, and consistent with, the principles of joint operations described in Joint Publication (JP) 1, *Doctrine for the Armed Forces of the United States*, and JP 3-0, *Joint Operations.* Engineer operations enhance the JFC's ability to successfully apply these principles to joint operations.

3. Engineer Functions

a. **Engineer functions** are categories of related engineer activities grouped together to help JFCs integrate, synchronize, and direct engineer operations. These functions fall into three basic groups—combat engineering, general engineering, and geospatial engineering (see Figure I-1). The operation plan (OPLAN) or operation order (OPORD) describes the way that the engineer functions are used in the operation.

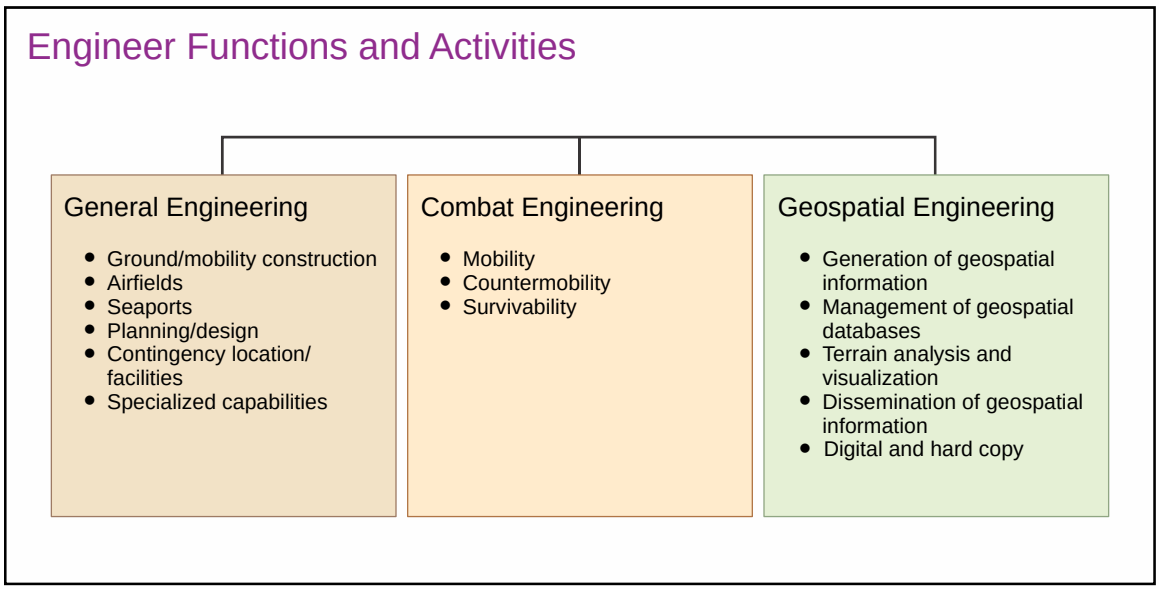


Figure I-1. Engineer Functions and Activities

(1) **Combat engineering** consists of those engineer activities that directly support the maneuver of land combat forces and require close and integrated support to those forces. Combat engineering consists of three types of activities: mobility, countermobility, and survivability. Examples include combined arms breaching operations, assault gap crossing operations, and constructing and maintaining combat roads and trails; emplacing barriers and obstacles; and construction of fighting and protective positions. Combat engineering requires forces able to integrate their activities with the maneuver of land combat forces. Usually this requires combat engineers organic to most land combat forces at the brigade or regimental level or its equivalent. Only combat engineers are organized, trained, and equipped to perform the range of combat engineering tasks required by land combat forces; to integrate their activities with the fires and maneuver of those forces; and to operate as part of a combined arms team in close combat. Due to this consideration, JFCs do not routinely assign combat engineering tasks to units trained and equipped to execute general engineering tasks. Instead, the JFC ensures that engineering tasks are synchronized to maximize the effectiveness of combat engineering. For example, tactical bridges are programmed for replacement by more permanent, higher capacity line of communications (LOC) bridges.

(2) **General engineering** consists of those engineer capabilities and activities that provide infrastructure and modify, maintain, or protect the physical environment. Examples include the planning, construction, repair, and maintenance of infrastructure, storage area requirements, LOCs and bases, protection of natural and cultural resources, terrain modification and repair, disaster preparedness, and selected explosive hazard (EH) activities. The general engineering requirements for an operation will often exceed the capabilities of available military engineers, so JFCs may need to employ a combination of military engineers, civilians, contractors, and multinational and host nation (HN) capabilities to fulfill these requirements, based on the operational environment. Combat engineers are able to perform some general engineering tasks, but their capabilities to do so are often limited by their training and equipment. JFCs should be cautious about using combat engineers to perform general engineering tasks without appropriate augmentation and training. Even with such augmentation and training, the use of combat engineers to perform general engineering tasks can create significant risk if it reduces the combat engineering capabilities and capacities available to the joint force.

(3) **Geospatial engineering** consists of those engineer capabilities and activities that portray and refine data pertaining to the geographic location and characteristics of natural and constructed features and boundaries in order to provide engineering services to commanders and staffs. Examples include terrain analysis, terrain visualization, digitized terrain products, nonstandard tailored map products, precision survey, geospatial data management, baseline survey data, identification of significant cultural sites and natural resources, facility support, and force beddown analysis. Geospatial engineering tasks require highly technical and specialized capabilities. These may include processing data from disparate sources such as remote sensed imagery, field reconnaissance, digital data, intelligence data, existing topographic products, and other collateral data. Geospatial engineers also perform digital manipulation of topographic, hydrographic, and aeronautical information by querying, viewing, evaluating, and downloading digital data. They support operational needs such as the production of tactical decision aids or time and spatial analysis to support the JFC's decision cycle. They can assist in predictive analysis of the impact that

terrain and weather may have on transportation, communications, and intelligence systems. Geospatial engineers and intelligence personnel leverage data accessibility, exploitation, visualization, and distribution to create fused products.

b. **Distinction Between Combat and General Engineering**

(1) The primary difference between combat engineering and general engineering is combat engineering's requirement for close support to ground combat forces. Inherent in close support is a requirement for detailed integration or coordination with the fires, movement, or other actions of those forces. This requirement:

(a) Results in significantly different types of tasks; shorter time requirements to accomplish those tasks; and a much higher probability that those tasks will have to be performed in close combat conditions. However, combat engineering must not be confused with engineering under combat conditions, which could apply to general and geospatial engineering activities. Only activities requiring close support to land combat forces are combat engineering activities.

(b) Results in different performance measures for tasks that may seem to be the same. Thus, a task to reduce an obstacle as part of a combined arms breaching operation has different performance measures than a similar task to reduce the same obstacle where the requirement for detailed integration does not exist (for example, such a situation might occur as part of a road construction effort). The former is a combat engineering task while the latter is a general engineering task.

(c) Is established by the commander responsible for the operational area (OA) in which engineering activities are conducted.

(2) Although general engineering activities may not require the detailed integration inherent in close support that combat engineering activities require, they still must be coordinated with the supported unit and the unit responsible for the OA in which the activities are conducted.

(3) Combat engineering is almost always conducted in support of military forces. General engineering is conducted in support of military forces, but is also frequently employed in support of others (e.g., civilians, other nations, civilian authorities, civilian agencies) as a critical element of civil-military operations (CMO). Likewise, geospatial engineering is often employed in support of military forces and in support of others. For additional CMO information, see JP 3-57, *Civil-Military Operations*.

(4) Combat engineering and general engineering often require significant logistic support with long lead times to obtain and deliver equipment and supplies. Combat engineering typically requires large quantities of barrier materials and explosives. General engineering often requires very large amounts and many varieties of construction materials. These materials may not be readily available in the OA. As a result, they must be requisitioned, procured, and transported from sources that are positioned outside the OA and distributed to supply depots or job sites inside the OA.

c. **Engineer Reconnaissance.** Timely and effective engineer reconnaissance is essential to effective planning and execution of engineer tasks, and can often provide information that allows the JFC to avoid or reduce the need for engineer activities. Engineer reconnaissance is an activity that occurs across the three engineer functions.

d. **Levels of Warfare and the Engineer Functions.** The engineer functions are not categorized according to the levels of warfare because all three functions can contribute directly to the achievement of tactical, operational, and strategic objectives. However, the nature of the activities within each engineer function causes some functions to be more closely associated with certain levels of warfare than with others. Since combat engineering is conducted in close support of land combat forces, its focus is on the tactical level. Some tasks within general engineering are tactical and directly support combat air forces, such as airfield damage repair (ADR) and base recovery. However, most are closely associated with the operational and strategic levels. Geospatial engineering is equally associated with all three levels of warfare.

e. **Joint Functions and Engineer Activities.** There is not a one-to-one relationship between engineer activities and the joint functions. Each engineer activity is associated with multiple joint functions, but is more closely associated with some than with others. Figure I-2 illustrates the association between some typical engineer activities and their corresponding joint function.

For additional information on joint functions, refer to JP 3-0, Joint Operations.

4. Engineer Support Across All Phases of Military Operations

Engineer operations occur across the range of military operations and phases of operations. JP 3-0, *Joint Operations,* provides the figure communicating the operational planning phases for a given operation and the respective level of military effort associated with these phases. In the same manner, Figure I-3 illustrates the level of engineer functional effort across the notional phases of a joint operation.

a. **Shape (Phase 0).** Effort during shape phase missions, tasks, and actions will focus primarily within the geospatial and general engineering functions. Major operations and campaigns frequently require large numbers of forces in theater, as do crisis response and contingency operations. Military engagement, security cooperation, and deterrence activities may require large numbers of forces. These forces will need infrastructure, LOCs, and bases to support their sustainment. Even in areas with well-developed existing infrastructure, significant engineer effort will often be required to plan, design, construct, acquire, operate, maintain, integrate with, or repair infrastructure in order to support operations in theater. Engineer activities may include production and distribution of terrain data; real estate acquisition, environmental services, and construction to support the theater campaign plan; and terrain analysis for urban, suburban, and rural area development and management.

b. **Deter (Phase I).** In this phase, the engineer effort will focus on geospatial and general engineering functions with activities to include establishing LOCs, continued terrain analysis in support of mobility assessments, and preparing for potential construction and support for basing. In addition, planning for the integration of engineer reconnaissance and

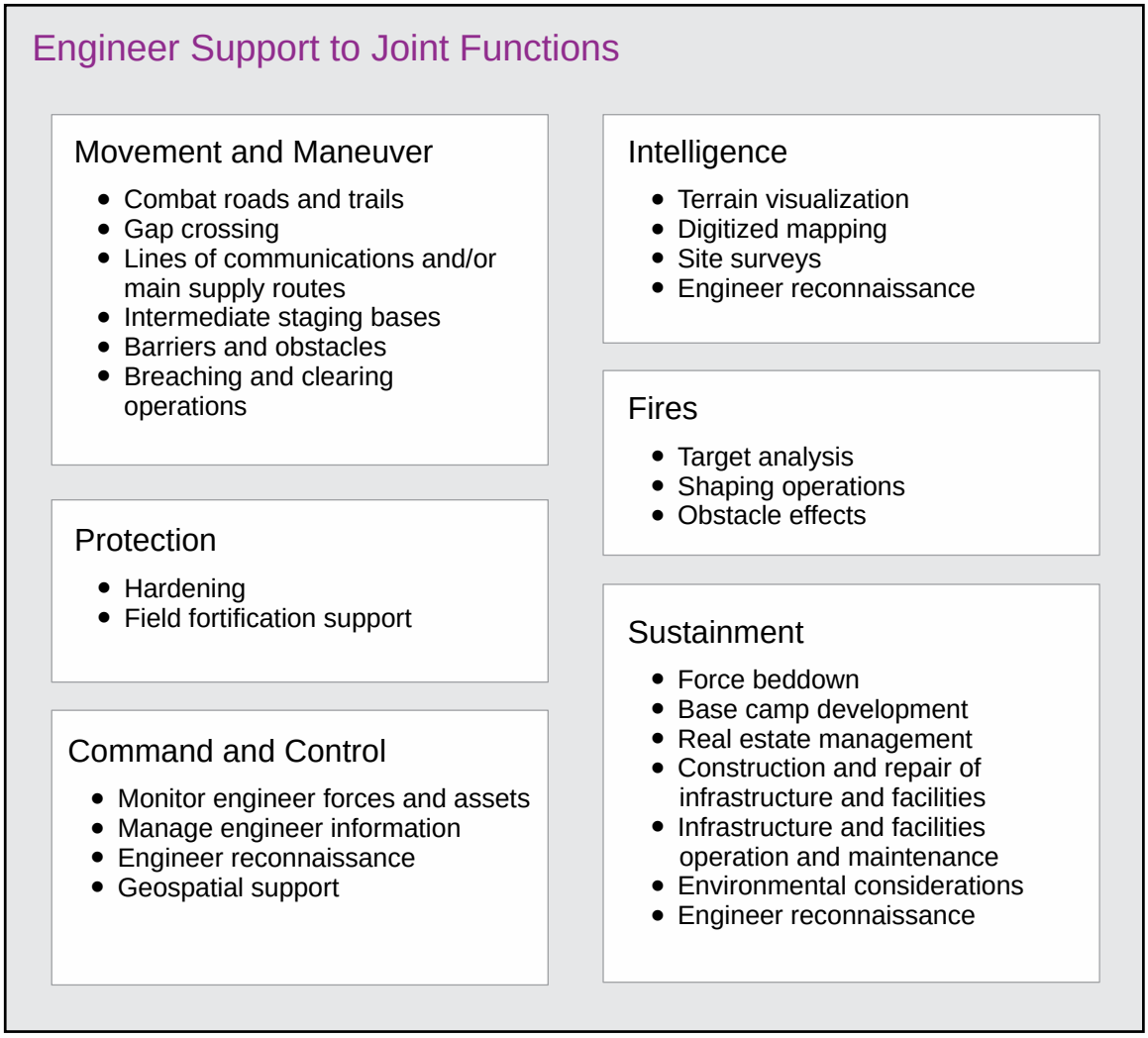


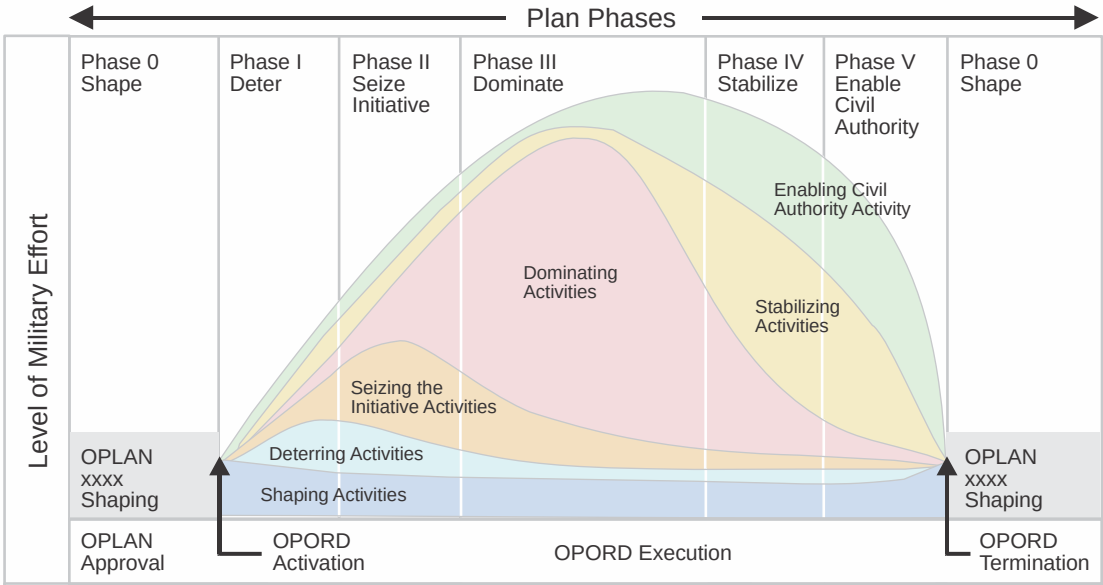
Figure I-2. Engineer Support to Joint Functions

counter EH capabilities is critical during this stage to promote synergy and integration of campaign planning.

c. **Seize Initiative (Phase II) and Dominate (Phase III).** During phase II and III, all engineer functions (general, combat, and geospatial) have a key role. Major operations and campaigns frequently require ground combat and the projection of airpower as do crisis response and contingency operations. Such operations will require engineers who can integrate their activities with the fires and maneuver of land combat forces and the air and naval forces supporting those land combat forces to assure the mobility of friendly forces, degrade the mobility of adversaries, and enhance the protection of friendly forces. Additional activities to include constructing and maintaining combat roads and LOCs, terrain surveys to identify landing zones (LZs) and conduct assaults, and infrastructure assessments allow for the JFC to seize initiative. Transitioning to phase III, engineers continue to support with capabilities to include enhancing mobility (including gap crossing), countering EHs, and denying movement and maneuver to the enemy.

Engineer Support by Joint Phase

Notional Operation Plan Phases versus Engineer Functions and Effort



	Phase 0 Shape	Phase I Deter	Phase II Seize Initiative	Phase III Dominate	Phase IV Stabilize	Phase V Enable Civil Authority	Phase 0 Shape
Primary Engineer Functions	GEO GEN	GEN GEO	CBT GEN GEO	CBT GEN GEO	GEN CBT GEO	GEN GEO	GEO GEN
Examples of Engineer Activities	Produce, distribute, and store terrain data essential to the preparation of the OE. Formulate plans for the development and management of urban and suburban terrain. Analyze land use and compatibility as well as infrastructure and environmental conditions. Provide design, real estate acquisition, construction, and environmental services to support theater campaign plan and theater posture plan objectives. Conduct exercise and SME exchange to build interagency and partnership capacity.	Assess suitability and provide initial repair, installation, and hardening of expeditionary infrastructure. Technical survey and reconnaissance. Utilize geospatial data for terrain analysis and mobility assessments. Plan, site, construct, and provide utilities (including hardening) for contingency locations using both expeditionary and semi-permanent construction. Open APODs and SPODs.	Assess, locate, neutralize, and clear hazards. Emplace and reduce barriers and obstacles. Construct tactical and LOC bridging. Construct and maintain LOCs. Technical survey and reconnaissance. Inspect, repair, maintain, improve, and harden APODs/SPODs and infrastructure. Provide SME and conduct targeting. Provide rescue and firefighting. Construct and maintain bases, medical, and support facilities.	Construct and maintain trails, roads, and LOCs. Survey and reconnaissance terrain and routes. Repair, maintain, improve, and harden APODs and SPODs. Provide SME to targeting and damage assessments. Provide rescue and firefighting. Emplace and reduce obstacles and barriers. Construct and maintain outposts, bases, medical facilities, and logistical support areas. Inspect Infrastructure and perform expedient repair and hardening. Assess, locate, neutralize, and clear explosive hazards. Construct assault, tactical, and LOC bridging.	Restore life sustaining infrastructure (water, sewer, power). Rehabilitate hospitals, schools, and key government facilities. Provide protection for personnel, infrastructure, and expeditionary locations. Clear and mark explosive remnants of war. Conduct exercise and SME exchange to build interagency and partnership capacity.	Expand capacity of utility production and distribution systems. Develop new facilities to enable effective governance. Rebuild infrastructure and transportation networks. Clear and mark explosive remnants of war.	Produce and distribute terrain data essential to the preparation of the new OE. Formulate plans for the development and management of urban and suburban terrain in the new OE. Analyze land use and compatibility as well as infrastructure and environmental conditions. Provide design, real estate acquisition, construction, and environmental services in the new OE. Conduct exercise and SME exchange to build interagency and partnership capacity.

Legend

APOD	aerial port of debarkation	LOC	line of communications	SME	subject matter expert
CBT	combat engineering	OE	operational environment	SPOD	seaport of debarkation
GEN	general engineering	OPORD	operation order		
GEO	geospatial engineering	OPLAN	operation plan		

Figure I-3. Engineer Support by Joint Phase

d. **Stabilize (Phase IV).** With a significant shift in focus from sustained combat operations to stability operations, engineer effort shifts to the general and geospatial engineering functions. Department of Defense Instruction (DODI) 3000.05, *Stability Operations,* establishes stability operations as a core mission of the US military and requires proficiency equivalent with combat operations. Engineer support is inherent in the tasks of stability operations to restore or provide essential services and to repair critical infrastructure. Although the Department of Defense (DOD) provides this initial capability, transition planning in stability operations is a key engineer task requiring coordination with other United States Government (USG) departments and agencies to achieve unity of effort.

e. **Enable Civil Authority (Phase V).** Engineer effort continues to focus on the general and geospatial engineering functions. In an effort to support the established civilian governance, the activities may include facility development.

For further details, refer to JP 3-06, Joint Urban Operations, *and JP 3-07,* Stability Operations.

5. Military Engineering Capabilities

a. Services often use the engineer functions to categorize forces and assets based on their primary function (i.e., combat engineers, general engineers, and geospatial engineers). Forces can sometimes perform tasks that result in effects associated with other functions. Planners must be careful to accurately identify the capabilities required for an operation and the forces that have those capabilities. As engineering capabilities and capacities are determined by phase of operations, Service components potentially execute tasks as depicted in Figure I-3.

b. Each Service has core engineering units and capabilities shaped by their traditional roles. Planners and engineer staffs have a responsibility to integrate those capabilities to meet specific operational needs and to support accomplishing a variety of mission requirements in any operational environment. An understanding of the Services' combat, general, and geospatial engineering capabilities allows the JFC and the joint force engineer to tailor the engineer force to effectively and efficiently accomplish the mission. The JFC should understand multinational, interagency, nongovernmental organization (NGO), and intergovernmental organization (IGO) engineer capabilities to better coordinate adjacent activity, develop viable courses of action (COAs) and, as conditions dictate, integrate them into the joint operation. The joint force engineer provides comprehensive recommendations to the JFC on the effective employment of all engineer capabilities in support of joint operations. The JFC, with the assistance of the joint force engineer, analyzes mission requirements to tailor optimal engineer force packages. The engineering capabilities of each Service component may provide engineering support to the other components to meet joint force requirements.

c. **Army Engineers.** The US Army maintains engineer forces that have the capability to perform all combat, general, and geospatial engineer operations. They provide the JFC with significant engineering capabilities at each echelon within the command. The brigade engineer battalion is organic to the brigade combat team (BCT), and is focused on brigade

level and below combat engineering, and enabling friendly forces mobility, countermobility, and survivability. Engineers at levels above the BCT reinforce the engineering capability within the BCT and possess various combat and general engineering capabilities. Army engineer command and control (C2) units are designed to provide C2 for additional engineer capabilities under the operational control (OPCON) or tactical control (TACON) at the brigade and echelons above brigade levels. The size and scope of the engineer requirement will drive the selection of the appropriate C2 capability (i.e., engineer battalion, brigade, theater engineer command [TEC]). Geospatial engineering capabilities exist at brigade level and higher staffs. Some capabilities that are categorized as engineering by other Services reside in other branches of the Army (e.g., explosive ordnance disposal [EOD] and chemical, biological, radiological, and nuclear [CBRN] capabilities). The United States Army Corps of Engineers (USACE) is the Army's direct reporting unit assigned responsibility to execute Army and DOD military construction (MILCON), real estate acquisition, environmental management, and development of the nation's infrastructure through the civil works program. Unique USACE assets that are available to support the field forces include forward engineer support teams and the 249th Engineer Battalion (Prime Power), as well as wetlands and waterway management, and disaster relief support. USACE is the primary agency for providing Emergency Support Function #3 (Public Works and Engineering) technical assistance, engineering, and construction management resources and support during response activities and assists the Department of Homeland Security/Federal Emergency Management Agency (FEMA). USACE also provides technical assistance and contract support to joint forces deployed worldwide.

d. **Navy Engineers.** Navy construction engineers (Seabees), organized under naval construction groups (NCGs) or the naval beach groups (NBGs), comprise the naval construction force (NCF). They have rapidly deployable units of various sizes and configurations tailored to provide responsiveness and flexibility. NCFs provide advanced general engineering to include airfields, LOCs, upgrade and maintenance, battle damage repair, underwater and amphibious construction, and logistic facilities construction. Seabees also provide engineering support to the Marines at various levels to include, depending on the scope and level of support provided, functioning as a major subordinate command to a Marine air-ground task force (MAGTF). The Naval Facilities Engineering Command (NAVFAC) also provides engineering planning, design engineering, project management, environmental engineering support, construction contracting, and operations and maintenance for shore-based and ocean facilities. NAVFAC also maintains a reachback capability for forward engineer units.

e. **Marine Corps Engineers.** The United States Marine Corps (USMC) task organizes its engineer forces to primarily support the internal engineering requirements of the MAGTF. MAGTF engineer units have the capability to perform a variety of combat and limited general engineering tasks. These same units can employ reconnaissance teams to collect geospatial information. However, the ability to produce and disseminate geospatial intelligence (GEOINT) resides in the topographic platoon of the intelligence battalion of each Marine expeditionary force (MEF). Each Marine division possesses an organic combat engineer battalion (CEB) that provides mobility, countermobility, and survivability support to the ground combat element (GCE) of the MEF. Each Marine logistic group possesses an organic engineer support battalion (ESB) that provides general support general engineering

support to the entire MEF. 1st Marine Aircraft Wing (MAW) has three organic Marine wing support squadrons (MWSSs) and one Marine wing support detachment (MWSD). 2d MAW has three MWSSs and one MWSD, 3d MAW has two MWSSs and one MWSD. The MWSS provides aviation ground support (AGS) to the aviation combat element (ACE) of the MEF. The MWSS can perform limited general engineering, limited combat engineering and aviation-related tasks including base recovery after attack, aircraft rescue and firefighting, EOD, and ADR. In certain cases, the MEF may be augmented by NCF units. Other MAGTFs that possess engineer units include the Marine expeditionary brigade (MEB) and the Marine expeditionary unit (MEU). A notional MEB can consist of task-organized engineer detachments drawn from the CEB, ESB, and MAW of a MEF. It may also include NCF augmentation. The size and composition of the MEB is based upon the assigned mission. The MEU is a standard MAGTF with an established table of organization. It includes a reinforced combat engineer platoon in the GCE, a reinforced engineer platoon in the logistics combat element (LCE) and an MWSS detachment in the ACE.

f. **Air Force Engineers.** Air Force engineers provide engineering units to the JFC with a rapidly deployable and skilled engineering capability. The Air Force embeds military engineer manpower within the garrison work force. Therefore, the Air Force does not maintain a separate combat service support (CSS) force structure to support expeditionary missions, while also resourcing an in-garrison work force. By mixing the two force structures, the Air Force gains the benefit of peacetime base support from the CSS forces-in-waiting. Deployed Air Force engineers are organized as Prime Base Engineer Emergency Force (Prime BEEF) and Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer (RED HORSE) units to provide a broad array of general and geospatial engineering capabilities with limited combat engineering capabilities. Both train as organic units performing comparable functions in peacetime and during contingencies and remain fully prepared to rapidly deploy as full unit type codes (UTCs) or tailored force packages. The primary tasking for Air Force engineers is to enable rapid global mobility for airlift, bombers, fighters, and to support other manned and unmanned systems. However, they also provide general engineering support for other Service facility requirements. Air Force engineers are trained and equipped with organic capabilities to support all aspects of airfield operations. The Air Force has the capability to rapidly deploy general engineer units organized as part of an air expeditionary task force (AETF) to open, establish, and maintain air base power projection platforms. The Air Force does not have forces permanently assigned to AETFs, but an air expeditionary force (AEF) teaming approach has been developed to populate the structure in groups. AEF teaming aims to aggregate UTCs from the same installation in order to deploy more individuals from their own unit. Prime BEEF engineers are organized under the agile combat support group and RED HORSE and EOD engineers are organized under demand force groups. These same units can deploy as detached units operating in support of emergency-specific missions and operational tasks such as airfield pavement evaluations (APEs); crash rescue and fire suppression; EOD; emergency management (EM) response; CBRN response; ADR; facility construction and maintenance; utility systems construction and maintenance; aircraft arresting system installation and maintenance; and airfield lighting, marking, and installation of navigation aids. The Air Force Civil Engineer Center (AFCEC) provides environmental engineering support, construction contracting, and project management, and maintains a reachback capability for forward engineer units.

A more extensive description of Service engineer capabilities is provided in Appendix A, "Service Engineer Organizations and Capabilities."

g. **Other Engineering Capabilities.** In addition to US military engineer forces, multinational partner military engineers can provide valuable capabilities. HN, multinational, and USG departments and agencies, and civilian contractors, in addition to providing labor, material, infrastructure, and services, may possess certain engineering capabilities specifically adapted to the local environment. The benefits to the use of multinational, HN, and US contractors 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.

h. **DOD Construction Agents.** The Secretary of Defense (SecDef) has designated the USACE, NAVFAC, or other approved DOD activity as construction agents for the design and construction of US military facilities in designated regions. Combatant commanders (CCDRs) use the designated construction agent to design and award construction contracts to civilian companies in support of military operations.

Specific information on the responsibilities of DOD construction agents is contained in Appendix D, "Contract Construction Agents," and in Department of Defense Directive (DODD) 4270.5, Military Construction.

i. **Standing Contingency Contracts.** Civil augmentation programs, such as the Army's logistics civil augmentation program (LOGCAP), the Navy's Global Contingency Construction Multiple Award Contract (GCCMAC) and Global Contingency Services Multiple Award Contract (GCSMAC), and the Air Force's 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.

For further guidance on service civil augmentation programs, refer to JP 4-10, Operational Contract Support.

CHAPTER II
ENGINEER FUNCTIONS

1. Combat Engineering

a. **Overview.** Combat engineering consists of those engineering capabilities and activities that support the maneuver of land combat forces, which require close support to those forces. Therefore, combat engineering activities are focused on the tactical level of warfare and predominantly in phases II through IV of operations, though they can also contribute directly to the achievement of strategic and operational objectives. Most combat engineering activities are **planned and executed by a joint force's Service or functional components.** Even so, the joint force engineer must understand how combat engineering requirements are affected by the operational environment and the joint force's concept of operations (CONOPS) and how combat engineering capabilities can affect a joint force's ability to execute the CONOPS.

b. **Combat Engineer Activities.** There are three core activities associated with combat engineering: mobility, countermobility, and survivability. These activities also have broader meanings that encompass competencies that are outside the combat engineering function. This section describes combat engineering.

(1) **Mobility.** Mobility capabilities and activities assure the ability of land combat forces to maneuver. They only include tasks that meet the definition of combat engineering, and they typically include tasks associated with conducting **combined arms breaching operations**, **clearing operations**, and **assault gap crossing operations**; constructing and maintaining **combat roads and trails;** and performing **forward aviation combat engineering.** Joint forces should be prepared to encounter obstacles (including improvised explosive devices [IEDs], mines, and other EHs) across the range of military operations.

For additional information, see JP 3-15, Barriers, Obstacles, and Mine Warfare for Joint Operations.

(2) **Countermobility.** Countermobility capabilities and activities reinforce terrain to delay, disrupt, and destroy the enemy. Their primary purpose is to slow or divert the enemy, to increase time for target acquisition and fires, and to increase weapons' effectiveness. They only include tasks that meet the definition of combat engineering, and they typically include tasks associated with the development of **barriers and obstacles** and their integration with fires and maneuver forces. Countermobility supports the JFC's CONOPS by adding depth in space and time, attacking the enemy's ability to execute its plan.

For additional information about barriers, obstacles, and mines, see JP 3-15, Barriers, Obstacles, and Mine Warfare for Joint Operations.

(3) **Survivability.** Survivability capabilities and activities enhance the protection of land combat forces. They only include tasks that meet the definition of combat engineering, and they typically include tasks associated with the construction of fighting and

protective positions, and tactical camouflage, concealment, and deception (CCD). In most cases, survivability support is designed to reduce vulnerability to enemy fires and is a means to enhance force protection.

(4) While combat engineering mobility, countermobility, and survivability tasks are **primarily performed by combat engineers** organic to land combat forces, general engineers can sometimes assist them.

For additional information about combat engineering, see Chapter I, "Joint Engineer Fundamentals."

c. **Other Considerations**

(1) **Offensive and Defensive Operations.** The requirements for combat engineering capabilities are highest during offensive and defensive land operations. When land forces conduct sustained offensive and defensive operations, combat engineering requirements often exceed organic combat engineering capabilities, requiring augmentation by additional combat engineers and severely limiting the availability of combat engineers for general engineering tasks. When offensive and defensive operations diminish, combat engineering requirements diminish also, often making combat engineers available to perform selected general engineering tasks.

(2) **Forcible Entry Operations.** In forcible entry operations, the joint force will be faced with natural and man-made obstacles intended to restrict or halt movement and allow the enemy to mass its forces and repulse the assault. The role of combat engineering in forcible entry operations is to support maneuver and protect the force. Combat engineers focus on support to the combined arms force and its conduct of close combat as the assault forces are inserted. Initially, mobility is the primary focus to support the needs of the maneuver commander and ensure the seizure and control of the entry site. Special consideration will be given to techniques for breaching obstacles and clearing beaches, ports, roads, and airfields of obstacles (including mines, unexploded ordnance [UXO], and IEDs), to assault gap crossing, for repairing airfields for friendly use, and for hasty airfield construction to enhance the mobility of assault and follow-on forces. The enemy will contest the insertions and counterattack to recover them. This will require combat engineers to perform countermobility and survivability tasks early in the insertion. Combat engineers facilitate insertion of assault forces and prepare for onward movement to the objective.

For additional information on forcible entry, refer to JP 3-18, Joint Forcible Entry Operations.

(3) **Amphibious Operations.** During the planning for amphibious operations, planners will gather and analyze geospatial products to examine the suitability of landing beaches and seaward approaches. In some cases these products will require confirmation for accuracy. This can be achieved by using naval or other geospatial information collection assets. The same confirmed geospatial information can be used for planning the ship-to-shore movement of task-organized combat engineer units and the application of their specialized breaching and gap crossing equipment. During amphibious operations, the

commander, amphibious task force conducts assault breaching operations up to the line of demarcation (on the beach). The commander, landing force conducts mine and obstacle breaching and clearing operations landward from the line of demarcation and for follow-on clearance operations on the beach. Engineers develop and maintain critical beach support areas and beach throughput and enhancing unit reception, staging, onward movement, and integration (RSOI). Engineers continue supporting force projection from the sea by sustaining the logistic operations ashore. As the lodgment expands, general engineers are brought in to free combat engineer units to move forward in support of combat maneuver forces.

For additional information, refer to JP 3-02, Amphibious Operations.

(4) **Engineer and EOD Considerations.** During the conduct of operations, the joint force will face the danger presented by explosive ordnance, IEDs, and UXO. Explosive ordnance is all munitions containing explosives, nuclear fission or fusion materials, and biological and chemical agents. An IED is a weapon that is fabricated or emplaced in an unconventional manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals designed to kill, destroy, incapacitate, harass, deny mobility, or distract. UXO is explosive ordnance which has been primed, fused, armed or otherwise prepared for action, and which has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material and remains unexploded either by malfunction or design or for any other cause. Combat engineer and EOD units conduct tactical activities to address these dangers so that the joint force retains the ability to maneuver and move wherever necessary to accomplish the mission. Combat engineer unit activities include the detection, reporting, breaching and clearing of minefields, and the detection, reporting, and destruction of IEDs. EOD unit activities include the application of EOD procedures by qualified EOD personnel against explosive ordnance, UXO, or IEDs. EOD units responding to these dangers can employ render safe procedures. Render safe procedures involve the application of special EOD methods and tools to provide for the interruption of functions or separation of essential components of UXO to prevent an unacceptable detonation.

(a) **Assisting EOD Units.** UXO and other hazardous devices (e.g., IEDs) in a theater will often threaten military forces and operations. UXO and IEDs threaten not only military forces, but also civilians, who are unfamiliar with military ordnance. While Service components usually deploy with, and are supported by, their own EOD assets, the number of these assets is very limited and in high demand. In many situations, the geographic combatant commander (GCC) can achieve economy of effort by organizing EOD forces using common servicing. Common servicing may allow the JFC to provide more efficient and effective EOD support to the joint force, depending upon the situation. The joint EOD force could also include integration of multinational EOD forces in a joint/multinational EOD task force. However, planner's analysis must consider the limitations of interoperability of multinational equipment. EOD forces are the only personnel authorized to render safe UXO, to include IEDs and explosive booby traps.

(b) **Coordination.** Operational and tactical considerations for engineers and EOD units should include liaison officers (LNOs) working together in the planning process;

engineers exchanging reporting and tracking information on mines, UXO, IEDs, and booby traps; establishing a training scenario to teach mine awareness and the most current procedures; and using combat engineers to detect, mark, and record UXO in concert with the tracking system for other similar obstacles.

(5) **Humanitarian Demining (HDM).** Because of the threat to peace and safety, HDM has become a significant disarmament and peace operations activity. Demining is ultimately an HN responsibility; however, the US promotes its foreign policy interests by assisting other nations in protecting their populations from land mines through mine awareness education and training of HN personnel in the surveying, marking, and clearing of mines. Engineers do not remove mines, but will assist and train others in demining techniques and procedures. Title 10, United States Code (USC), Section 407, specifically states that no member of the US armed forces, while providing HDM assistance or stockpiled conventional munitions assistance, may engage in the physical detection, lifting, or destroying of land mines or other explosive remnants of war, or stockpiled conventional munitions, as applicable (unless the member does so for the concurrent purpose of supporting a US military operation).

For additional information on barriers, obstacles, and mines, refer to JP 3-15, Barriers, Obstacles, and Mine Warfare for Joint Operations. *For additional information on counter-IED operations, refer to JP 3-15.1,* Counter-Improvised Explosive Device Operations.

2. General Engineering

a. Overview

(1) General engineering consists of those engineer capabilities and activities, other than combat engineering, that provide infrastructure and modify, maintain, or protect the physical environment. General engineering is a very diverse function often involving horizontal and vertical construction, but also encompassing numerous specialized capabilities. General engineering often is a supporting or sustaining operation; however, the commander's intent may dictate that it be the supported function, for example in recovery, reconstitution, or reconstruction operations. General engineer operations can encompass large-scale tasks requiring detailed construction and logistic support as well as expedient operations in environments across the range of military operations. General engineering tasks are usually resource and time-sensitive, demanding a high degree of preplanning and control to effectively manage the limited general engineering resources.

(2) **Strategic and Operational Roles.** General engineering support is closely linked to the strategic and operational levels of warfare and is vital to the achievement of national security objectives.

(a) **Strategic Role.** General engineer operations are conducted to prepare an OA for future joint operations. Engineer operations are planned and conducted in support of a CCDR's theater campaign plan, as well as in support of crisis response and limited contingency operations. Support includes the improvement of infrastructure, operational and tactical environmental and energy considerations, construction of bases, and activities to

support joint and multinational operations. General engineering facilitates strategic deployment of the joint force to reception, staging, and marshalling areas and supports pre-positioning through various contracting methods, facility construction to store material, and real estate management. Exercise-related construction and humanitarian and civic assistance (HCA) projects and engineer assessments often provide significant strategic leverage in many countries. General engineering projects enhance the ability to project and sustain combat power. Due to their large scope, these projects are typically programmed and constructed during peacetime.

(b) **Operational Role.** General engineer operations support the JFC's CONOPS and enhance logistic support in the OA. General engineering support addresses major facilities, construction policies, environmental considerations, and allocation of general engineering resources in support of mobilization, deployment, employment, sustainment, redeployment, and demobilization of the joint force during military operations. CCDRs should ensure the effective use and interoperability of limited general engineering resources, to include the reallocation of these resources between Service components to achieve strategic and operational goals.

For further guidance on Service capabilities, refer to Appendix A, "Service Engineer Organizations and Capabilities."

b. **General Engineering Throughout the Range of Military Operations.** General engineer operations will vary by type and level of effort depending on the type of operation conducted. Multiple joint operations occurring simultaneously within an area of responsibility (AOR) may have different general engineer requirements. Major combat operations may occur or be initiated while transitioning to stability operations. General engineer units must be flexible and be prepared to transition from activities supporting combat operations to activities supporting stability operations or from stability operations back to combat operations. General engineers may be required to perform selected combat engineering tasks.

(1) **Major Operations and Campaigns.** General engineer activities during major operations and campaigns ensure theater access, sustain operations, protect the force, facilitate maneuver of forces, and include construction and upgrade of ports, airfields, and joint reception, staging, onward movement, and integration (JRSOI) facilities; construction and repair of interconnecting routes; repair of ports, railroads, pipelines, and other assets; construction of bridging; construction of enemy prisoner of war facilities; construction of hardened facilities; construction of decontamination facilities; and tent and base camp construction. General engineering activities vary by phase, as follows:

(a) **Shape.** General engineering activities during the shape phase, such as improving HN infrastructure and preparing of overseas bases and facilities to support force deployment, help prepare the potential OA, shape perceptions, and influence the behavior of both adversaries and allies.

(b) **Deter.** General engineer operations during the deter phase prepare the OA. Successful accomplishment of general engineering support is essential to maintain the

schedule for force deployment and employment, as contained in the OPLAN and/or OPORD and time-phased force and deployment data (TPFDD) documents. One of the principal general engineering tasks during this phase is to establish infrastructure and bases that support the reception, beddown, and employment of personnel, equipment, and logistics. Engineers may also be tasked to establish intermediate staging bases (ISBs). While these bases may be identified in OPLANs and OPORDs, final placement of bases will depend on an evaluation of mission requirements, threat level, supporting infrastructure, expected duration of the deployment, and specific weapon system requirements. Support could be required from geospatial engineering, ground maneuver forces, naval vessels, aircraft, space support, or information systems.

1. **Resources.** Infrastructure and base development relies on the resources made available from pre-positioned sources, HN agreements, local contracting for existing facilities and infrastructure, multinational assistance, and deployed specialized teams and equipment. These resources can include billeting sets, vehicles, power generation systems, and consumable supplies.

2. **General Engineering and Service Capabilities.** General engineering supports infrastructure and base development by the following means: constructing, repairing, and maintaining facilities for staging and force beddown facilities; providing systems improvements in support of JRSOI and joint logistics over-the-shore (JLOTS); providing potable water and utility support; erecting bridges; installing bulk fuel and distribution systems; erecting prefab shelters, to include collective protection systems; analyzing existing force protection capabilities and recommending areas requiring improvement to ensure protection of the force; and repairing and maintaining airfield pavements. Base development includes construction of facilities in support of rest and refit sites, airfield operations, and base camps for the joint force in the conduct of crisis response and limited contingency operations such as foreign humanitarian assistance (FHA) and peace operations. General engineers enhance the survivability of the joint force by recommending to the JFC essential construction in support of force protection measures (e.g., hardening of essential facilities and utilities).

(c) **Seize Initiative**

1. General engineering activities during the “seize initiative” phase focus on providing the facilities and infrastructure systems necessary to move, receive, and bed down deploying forces. These support operations include JRSOI, JLOTS, and real property support, not only in the OA, but also at locations within the US and at en route support sites. In noncombat operations, such as humanitarian relief operations, engineers can provide immediate assistance to help resolve the crisis.

2. **Engineer Support to Expeditionary Theater Opening.** Early arrival of engineering assessment and repair capabilities may be critical to mitigate antiaccess effects to ports of debarkation (PODs) including clearing debris or repairing infrastructure following attack. In some cases, early arrival sequencing of assessment forces and repair forces with appropriate engineering equipment can foster the GCCs ability to repair and restore infrastructure, increase the throughput through strategic PODs, expand the lodgment

in a contingency operation, and potentially deter an enemy's use of antiaccess/area denial means. CCDRs should consider the level of engineer support required to enable successful expeditionary theater opening.

For further guidance on expeditionary theater opening, refer to JP 4-09, Distribution Operations.

3. **JRSOI.** General engineering supports JRSOI through a variety of means, including improving or constructing advance bases, aerial ports of debarkation (APODs), seaports of debarkation (SPODs), highways, railroads, bridges, tunnels, and communications infrastructure. Transportation and support infrastructure strongly influence the ability to rapidly execute JRSOI. An engineering survey of the transportation infrastructure will be needed to evaluate roads, bridge limitations and/or restrictions, rail lines, airfields, and tunnels. A robust infrastructure of modern air and sea ports, highways, railroads, and inland waterways will expedite the flow of forces, equipment, and logistic support. A lesser-developed or austere infrastructure can impede JRSOI, thereby slowing the deployment of the forces, and may require an early deployment of support capabilities such as port opening teams and engineering units.

For additional information on JRSOI, refer to JP 3-35, Deployment and Redeployment Operations.

4. **Battle Damage Repair.** Engineer support to battle damage repair is one of the focal points of recovery operations. General engineers are responsible for battle damage repair of the various systems and support facilities required to sustain, maintain, and restore infrastructure and base operations. Engineers assess and repair those facilities deemed mission-essential by the JFC for continuing force projection. The joint force engineer, in concert with the logistics directorate of a joint staff (J-4) and operations directorate of a joint staff (J-3), develops and prioritizes the list of requirements and monitors repairs. The major engineer tasks of battle damage repair include rubble clearance, fire protection services, limited EOD capabilities, electrical power production and restoration, and infrastructure repair, particularly to airfields, port facilities, fueling and electrical systems, main supply routes (MSRs), defense emplacements, and key C2 facilities. General engineering tasks may also include emergency repair of damaged property or structures that may be used by the HN. More permanent repairs can be planned and executed as mission requirements warrant. Battle damage repair occurs most often during the seize initiative, dominate, and stabilize phases of an operation.

(d) **Dominate**

1. General engineering support to sustainment is essential during this phase. General engineer operations can also support base defense, force protection, and battle damage repair.

2. In a linear, contiguous joint operation, general engineering tasks are typically performed at rear boundaries by theater-level engineer units. As the OA becomes less contiguous and more nonlinear, general engineering tasks are required in forward areas

near front-line units. The impacts of noncontiguous, nonlinear operations on general engineering tasks include:

a. Need for increased protection and security.

b. Increased number and length of LOCs and MSRs.

c. Increase in the facilities construction effort.

d. Augmentation of combat engineer units to conduct selected general engineering tasks.

e. Task-organization of general engineering assets in either a command or support relationship to a much lower level.

(e) **Stabilize.** General engineer operations in this phase help to sustain the force, operate bases, assist in coordination with the civil affairs (CA) staff for infrastructure repair, and support force protection. Engineer and joint forces conduct these activities in support of the other USG departments and agencies, NGOs, IGOs, and the HN. This support must be planned as part of combat operations as there is no clear break from combat operations to stability operations. Environmental support operations will often be required during stability operations. US interests and objectives in the stabilization of the region determine the magnitude of engineer support to foreign governments.

(f) **Enable Civil Authority.** General engineer operations established during the stabilize phase continue in this phase. During redeployment of the force, engineers undertake preparation of facilities for retrograde, including close out of construction projects, refurbishment and turnover of property and real estate to the HN, construction of wash racks and other redeployment facilities, and preparation of collection points and coordination with the Defense Logistics Agency (DLA) and other appropriate activities for the safe disposition of hazmat.

(2) **Crisis Response and Limited Contingency Operations.** Engineers often have a significant role in crisis response and limited contingency operations. The general engineering level of effort may be very high at the onset and decrease as the operation continues. Preparing for crisis response and limited contingency operations requires examining a broad range of potential missions. Early engineer assessments are critical to tailoring initial engineer assets and to supporting follow-on engineer operations. Sending only those engineer capabilities that are actually required reduces the burden on the deployment system and reduces unnecessary sustainment demand in theater. As the operation continues, the general engineering effort may transfer to civilian contractors.

(a) **Defense Support of Civil Authorities (DSCA).** Engineer support may be garnered from federal, state, tribal, and local resources. Close coordination between these engineer forces is required to assure unified action. Typical general engineering missions in DSCA operations are listed in Figure II-1. In many cases, active component forces may execute missions with National Guard engineers operating under the C2 of the state

Engineering Support to Defense Support of Civil Authorities

Typical engineering support missions include:

- Clearing debris
- Reestablishing utilities
- Restoring public facilities
- Restoring infrastructure
- Emergency power and lighting
- Sanitation
- Potable water production and distribution
- Support to urban search and rescue
- Construction of temporary facilities
- Construction and operation of camps and temporary shelters
- Wildfire response and support operations
- Environmental assistance (e.g., oil spill and hazardous material response)
- Utility isolation

US Army Corps of Engineers immediate response missions under the National Response Framework include:

- Conduct power assessments and install emergency generators to provide emergency power
- Clear debris, build temporary shelters, and conduct emergency repairs to public facilities using contractors

Joint task force engineers may conduct the following immediate response missions:

- Emergency debris clearance from critical transportation facilities
- Emergency repairs to public facilities
- Emergency power for critical public facilities

Major infrastructure recovery missions for engineers include:

- Perform emergency debris removal from roads and transportation facilities
- Clear, reduce, and dispose of debris
- Provide temporary housing
- Provide temporary roofing for housing

Figure II-1. Engineering Support to Defense Support of Civil Authorities

governor. This will require close coordination with the dual-status commander to assure coordinated action.

For additional information on homeland security, homeland defense, and DSCA, refer to Appendix B, "Defense Support of Civil Authorities;" JP 3-27, Homeland Defense; *and JP 3-28,* Defense Support of Civil Authorities.

(b) **FHA.** Typical engineer missions for FHA are listed in Figure II-2. The level of assistance can vary from limited, highly specialized teams to complete engineer units. Limited teams are used to assess damage or estimate engineering repairs and can assist in specialized support such as power supply and distribution, utilities repair work, water purification, and well drilling operations. The joint force engineer and staff may

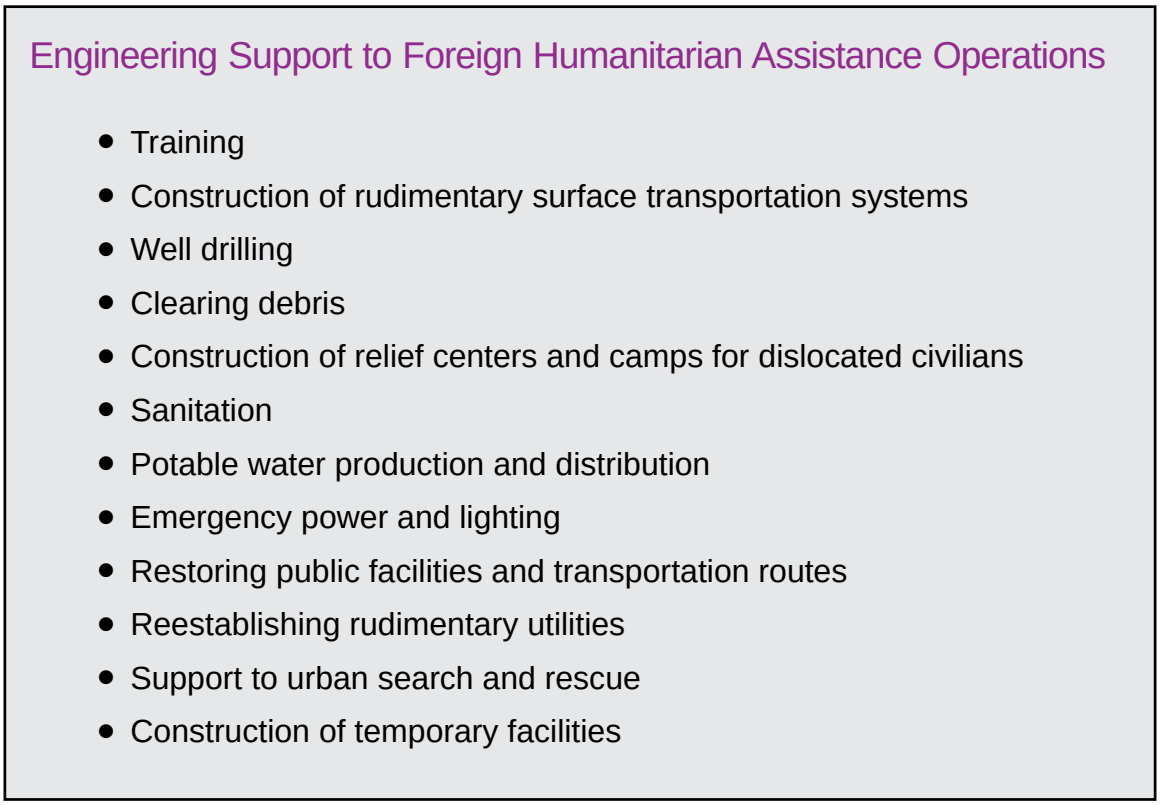


Figure II-2. Engineering Support to Foreign Humanitarian Assistance Operations

participate in the civil-military operations center (CMOC) that serves as the interface between civil and military authorities. Assistance provided by US forces is intended to supplement or complement efforts of the HN, government agencies, NGOs, and IGOs. In large FHA and disaster relief operations, engineer units provide essential general engineering support including facility construction, structural repair, and camp construction for deployed forces. Initially, US military forces may be the only organization in the OA capable of providing assistance, and military engineers will normally be tasked to provide extensive cleanup and construction services. US military forces will transition support to civilian authorities as soon as possible. Requests for military support, including engineering support, should continue to be initiated and coordinated through the CMOC.

For additional information on civil and military coordination, refer to JP 3-57, Civil-Military Operations.

For additional information on FHA operations, refer to JP 3-29, Foreign Humanitarian Assistance.

(c) **Noncombatant Evacuation Operations.** Engineers supporting noncombatant evacuation operations may construct temporary facilities and protective structures, conduct reconnaissance, repair airfields and ports, and clear helicopter LZs.

(d) **Peace Operations.** The engineer's role in peace operations typically changes as the operation progresses. For example, peace operations in East Timor were initially complex, multifaceted relief operations, then transitioned to rebuilding efforts that included assistance by US military engineers. These long-term operations require significant engineering support, especially in the initial phases of a joint operation. A long-term operation requires a higher degree of facility construction and services (e.g., utilities) to maintain morale and quality of life. As the operation transitions to a more stable environment, military engineers can be replaced by external support contracting. General engineering missions could include rebuilding roads, utility systems, and essential infrastructure.

1. **Peacekeeping Operations.** Engineers participate as part of a combined arms force and may construct and maintain roads, airfields, LZs, ports, pipelines, force protection enhancements, and other associated missions such as land mine detection and destruction. Clearance of mines by engineers during peacekeeping operations is based on operational requirements. HDM will provide the preponderance of mine removal.

2. **Peace Enforcement Operations.** Engineers may participate in disarming to include seizing ammunition, collecting, and destroying weapons and supplies, closing weapons and ammunition factories, and preventing resupply. Demining is ultimately an HN responsibility. However, the US promotes its foreign policy interests through HDM. Engineers do not remove mines, but will assist and train others in demining techniques and procedures. Engineer participation in HDM focuses on mine-awareness education and, most important, training of HN personnel in the surveying, marking, and clearing or lifting of mines. US military personnel are prohibited from conducting HDM, but they may assist and train others in demining techniques and procedures. EOD and engineer personnel are also included in these programs and integrated into operational training missions.

For additional information on peace operations, refer to JP 3-07.3, Peace Operations. *For additional information on HDM, see JP 3-15,* Barriers, Obstacles, and Mine Warfare for Joint Operations.

(3) **Military Engagement, Security Cooperation, and Deterrence.** These operations may involve engineer forces in diverse activities and services as part of small-scale operations conducted by tactical units or special operations forces.

(a) **Antiterrorism.** Measures taken to establish a defense may include the use of engineer assets for force protection or construction of obstacles and barriers, fortification, and fixtures.

For additional information on antiterrorism, refer to JP 3-07.2, Antiterrorism.

(b) **Security Cooperation.** The US promotes its foreign policy interests through various programs, including foreign internal defense, security assistance, and HCA, as coordinated by GCCs under their theater campaign plans. US military assistance to the local populace is provided in conjunction with military operations and exercises. Engineer assistance may include training, construction of rudimentary surface transportations systems,

well drilling and construction of basic sanitation facilities, and construction or repair of public facilities (e.g., clinics and schools).

c. **General Engineering Activities**

(1) **Establishing LOCs.** LOCs can be strategic, operational, and tactical and consist of logistic nodes and transportation lines to support the JFC's mission. Establishing and maintaining LOCs are primarily a general engineering function. The logistics concept of the COA supports the CONOPS by planning for a base of operations and opening and maintaining MSRs and LOCs, providing ISBs intermediate bases of operations to support phasing and sustainment, and establishing priorities for service and support. Combat and general engineers provide the JFC with maneuver options through MSRs and LOCs by constructing and repairing roads, bridging, railroads, ports, and airfields that link tactical-level and operational-level logistics. Combat engineers provide MSR repair and replace for tactical units to ensure maneuver. General engineers support mobility by providing LOC development and sustainment support at the operational level through base development, facilities and infrastructure construction, and real estate management. Changes to base development and adjustments to LOCs by general engineers continue as forces adjust to phases of the JFC's campaign or operations. The joint force depends on ports and airfields for OA access and links to the US base of operations. The joint force depends on roads and railroads, of which bridges are a necessary element, for a link to its base of operations.

(a) **Ground LOC Network.** An adequate ground LOC network is a critical part of the logistic network and one of the keys to sustaining operations. Engineers are responsible for the construction and maintenance of roads, railroads, and gap crossings.

(b) **LOC Bridging.** Few ground LOCs will exist without some form of bridge, bypass, or detour. Engineers enable mobility of ground forces through construction, repair, and reinforcement of bridges, bypasses, and detours. New construction of LOC bridges is possible; however, improving existing structures is the primary engineering focus because of the intense resource requirements of new construction. While the joint force has limited ability to erect temporary bridges in a combat environment, permanent bridging will most likely require contracted construction.

(2) **Airfield, Port, and Beddown Engineer Operations**

(a) **Airfield Engineer Operations and Contingency Planning.** Engineer support to airfields and heliports is a vital mission for joint forces. Engineers should be included in airfield contingency planning because of their understanding of an airfield's operational mission and the impact the types and numbers of aircraft will have on the airfield's complex system of collective facilities and utility networks. Engineer units selected to open, establish, and sustain airfield operations will deal with complex issues of safety, compatible land use, test and evaluation of pavements, certification of pavements for specific military aircraft types, installation and maintenance of visual air navigation systems, and mitigation of environmental impact from airfield operations. For joint air bases, the JFC should establish clear responsibilities for engineering support to the base and designate the senior airfield authority (SAA). The SAA is responsible for the control, operation, and

maintenance of the airfield to include the runways, associated taxiways, and parking ramps. The SAA controls flight line access and is responsible for the safe movement of aircraft in the airport traffic area and on all airfield surfaces. Airfield operations have primary responsibility for operating the airfield, enforcing airfield requirements, and coordinating airfield requirements on behalf of the SAA. Engineers should also consider long-term plans for airfields, other Services' requirements, and potential influxes of personnel or activities occurring from the airfield, and support the SAA and the base operating support-integrator (BOS-I). Since personnel and equipment will likely flow incrementally into the site, the site plan should be developed to reflect a phased buildup of facilities and support infrastructure for the anticipated requirement. If necessary, the procurement of funds and programming actions should take place immediately after site plans are complete.

1. **Opening Airfields.** Early in the planning process, operations, logistics, and engineer planners should identify potential forward airfields to support offensive air operations and logistics buildup, and outline the engineer tasks necessary to open the airfields. It is critical that joint force engineers ensure early and effective coordination between airfield planners and the commands which will operate aircraft at the airfield. Many of the decisions made early in the airfield planning process (e.g., airfield siting and layout) can have critical impacts on an airfield's utility for aircraft operations. In hostile or uncertain operational environments, engineers should plan to repair major damages to airfield pavements and clear airfield obstructions as part of the initial airfield seizure operations. Follow-on engineer actions are required to complete airfield repairs, provide aircraft rescue and firefighting, EOD support, airfield lighting, and aircraft arresting systems, and support tactical airlift control, air traffic control, communications, and petroleum, oils, and lubricants (POL) systems installation. Engineers support the installation of expeditionary airfield (EAF) systems that include AM-2 mat [aluminum matting]; folded fiberglass matting; airfield lighting; minimal operating lighting systems and field marking lighting systems; aircraft terminal guidance systems; and aircraft arresting systems. Use of one or more of these systems provides the commander with the ability to conduct and support flight operations from existing airfields, highways, parking lots, rooftops, and open fields. Engineers also accomplish all earthmoving tasks to install these systems and construct expeditionary fueling locations and systems, expeditionary munitions storage, and all aircraft beddown infrastructure.

2. **ADR.** Engineer support is critical to quickly restoring airfields after damage from enemy attack. Airfield repair operations normally are done on an emergency basis. All Services have capabilities to participate in ADR and may be called upon to assist such operations. In order to enable air operations to resume quickly, engineer teams must be designated, trained, and prepared for short-notice employment, and adequate materials must be stockpiled nearby. ADR includes all actions required for damage assessment, EH reconnaissance and neutralization, minimum airfield operating surface assessment, pavement repair, airfield marking, airfield lighting, arresting system installation, and utility system repairs required to establish, sustain, or recover flying operations capability at an airfield.

3. **Air Force Engineering Support to Airfield Operations.** The primary mission of Air Force engineers is to provide mission-ready base systems, to include force beddown and aircraft beddown. Air Force engineer units, organized as Prime BEEF or RED

HORSE units, are structured, trained, and equipped to provide the full range of support required to establish, operate, and maintain garrison and contingency air bases that support fixed-wing and rotary-wing aircraft. Due to their specialized expertise in airfield operations, Air Force engineers take the lead role to open, establish, and sustain airfield operations that support large and high-performance aircraft, or at locations where primarily Air Force aircraft will operate. Another Service may provide base operating support (BOS) engineers. Prime BEEF units are typically assigned OPCON to a specific installation commander to provide force beddown, infrastructure maintenance and repair, firefighting, EM services, EOD, and CBRN defensive operations for that installation's weapon systems, organizations, and personnel. Normally, RED HORSE units are assigned OPCON to the Air Force forces and are tasked through the commander, Air Force forces (COMAFFOR), to provide force beddown, construction, heavy repair, or other general engineering and limited combat engineering capabilities as needed throughout the theater of operations. Other Service engineers may provide these and other services in support of airfield operations.

4. **Army Engineering Support to Airfield Operations.** In addition to the participation of combat engineers in airfield seizure, Army general engineers are capable of survey, design, construction, or improvement of airfields and bases. Army engineers assist Air Force teams to repair critical airfield or base support facilities when such repairs exceed the Air Force's capability. The level and focus of general engineering support to airfields is significantly more specialized than the combat engineering skills associated with the mobility task of forward aviation combat engineering.

5. **Navy Engineering Support to Airfield Operations.** The NCF can perform the full range of support required for EAF construction supporting fixed-wing, rotary-wing, and tiltrotor aircraft. Construction capabilities include runways, taxiways, aircraft maintenance hangars, ADR, and other infrastructure that directly supports airfield operations. The NCF also constructs base operations facilities. The NCF is a viable first responder and can deploy an air detachment within 48 hours of notification. The NCF may be assigned in a supporting role to the MAGTF to sustain operations and support USMC engineers in the construction of EAFs, and to provide construction of more permanent facilities at forward operating bases.

6. **Marine Corps Engineering Support to Airfield Operations.** The MWSS provides AGS to the ACE within the MAGTF. Four MWSSs are organic to each MAW. The MWSS has one engineer company which is capable of survey, design, construction, repair, and improvement of EAFs and bases. Additionally, AGS provides the following functions to the MAGTF ACE: internal airfield communications; EAF services; aircraft rescue and firefighting; aircraft and ground refueling; EOD; essential engineer services; intrabase motor transport; field messing; medical; CBRN defense security; air base commandant functions to include air base ground defense; and organic and support unit personnel training. The MAGTF commander may direct the ESB of the LCE to reinforce/augment MWSS efforts during the construction of an EAF or improvement/repair of a bare base air facility. The NCF may also be assigned in a supporting role to the MAGTF to sustain MAGTF operations and to provide construction of more permanent facilities. Additionally, Marine geographic intelligence specialists from the MEF intelligence battalion support the National Geospatial-Intelligence Agency (NGA) Terminal

Aeronautical GNSS [Global Navigation Satellite System] Geodetic Survey program, which provides highly accurate World Geodetic System 1984 coordinates for aerodromes that include runways, navigation aids, vertical obstructions, and ground control points, and can augment MWSS AGS support to the EAF survey.

(b) **Port Engineer Operations.** The GCC's plans for the entry of joint forces into the AOR and sustaining those forces may include the availability and use of ports. Use of existing ports has immediate advantages over the construction of new ports and facilities. Construction of new port facilities is a large task normally undertaken by military engineers with the support of contractors.

1. **Considerations Prior to Port Occupation.** Before occupying a port, planners must consider the current and expected physical condition and the logistic capabilities of the port. Army and Navy engineers would be involved in initial reconnaissance and survey teams to determine an existing port's physical condition, repair requirements, and bare beach transfer sites, and in the leasing of port facilities. Reconnaissance and survey teams should be identified and sent into existing port facilities as soon as possible to assist the planners by collecting crucial information on the existing port and infrastructure. Planners study the relative value of rehabilitation and construction and the value of specific facilities to the construction effort required. The JFC coordinates indicated changes and their impact on logistics through Army engineer, transportation, and other command channels, as well as with naval units conducting clearance, dredging, and other harbor projects.

2. **Improvements to Existing Facilities.** Army transportation and Navy expeditionary logistics groups operate port facilities and coordinate construction and repair requirements with Service engineers. Army or Navy divers clear underwater mines and obstructions, conduct underwater surveys, and investigate bottom materials. They inspect sunken vessels and other obstructions and assist in developing salvage plans and removal requirements. General engineers construct shelters that increase the length or height of natural formations such as reefs and islands and build breakwaters or jetties as protection for the inner water. General engineers construct or repair container ports, non-container cargo ports, and other loading/unloading facilities, elevated causeways, and piers. Army and Navy engineers provide waterfront utilities and services of potable water, electricity, fire protection, and fuels. Geospatial information requirements (IRs) include hydrographic surveys from which topographic units create products for engineer use. The joint force engineer coordinates the work of all topographic units. Concurrent supporting engineer construction outside the port area may include roads, railroads, canals, and storage facilities to keep pace with port operations.

(c) **Beddown Engineer Operations**

1. Most contingency operations of any significant size conducted by joint forces require facilities for rapid force beddown, providing expedient facilities for troop support to allow for force projection. General engineer support optimizes facility and force beddown requirements consistent with expected operational requirements, duration of need, and forces to be supported. Early assessment by engineers is critical in site selection for

troops and aircraft beddown. Geospatial engineer products are extremely useful in identifying adequate geographical sites. Engineers will consider the adequacy of roads, ports, airfields, construction material supply, and existing real estate facilities. Site selection includes engineer requirements for force protection, countermine, counter obstacle, and early entry force support operations. Early in the beddown planning, particular attention should be paid to the electrical power generation and distribution plan. Environmental engineers will consider sites that safeguard human health and do not significantly harm the environment. The engineer support plan (ESP) will include guidance on general engineer requirements for force beddown construction. On site, principal tasks of the joint force engineer include providing beddown facilities and infrastructure for reception, onward movement, and sustainment of deploying forces. Beddown planning is also key during the transition to stability operations after decisive combat operations. Successful joint engineer beddown support operations also require adequate logistics and strategic lift capabilities. All the Services are capable to some extent of planning and executing beddown support operations. However, differences among each Service's equipment, construction standards, and doctrine may pose compatibility, equivalency, or interoperability challenges.

2. **Basing Requirements.** In accordance with (IAW) DODD 3000.10, *Contingency Basing Outside the United States*, GCCs will determine contingency basing requirements and maintain a contingency location master list identifying contingency locations within their AOR. The GCC will characterize each contingency location as initial, temporary, or semipermanent, and will designate the lead Service component responsible for each initial and temporary contingency location and recommend to the Chairman of the Joint Chiefs of Staff (CJCS) the designation of a lead Service for each semipermanent contingency location. The GCC will establish contingency basing criteria and specify the common service standard for BOS. The designated lead Service component will coordinate general engineering support requirements at contingency locations, to include real estate and construction.

For further guidance on contingency basing, refer to DODD 3000.10, Contingency Basing Outside the United States*; and JP 4-0,* Joint Logistics.

(3) **Contingency Basing/Facilities**

(a) **Base Defense and Force Protection.** Engineers play an important role in supporting force protection and in helping to protect the force from a variety of threats. Engineers analyze existing terrain and advise on its optimal use for force protection. Engineers support the force protection effort through the construction of protective structures such as berms, revetments, obstacles, fortifications, specially designed and reinforced buildings, and sophisticated facility alarm systems. Engineers are also members of force protection assessment teams. General engineer operations also accomplish specific requirements for area damage control (ADC) in support of base defense. ADC includes the measures taken before, during, and after hostile action or natural and accidental disasters to reduce the probability of damage and minimize adverse effects. Plans for base construction and operations must consider ADC requirements. Plans for ADC should also include the joint force capabilities and a summary of potential threats against the advanced base. General engineering support for base defense includes:

1. Hardening of structures and shelters to include incorporating stand-off distances when creating or improving base infrastructure.

2. Protecting utility systems and establishing redundant capabilities.

3. CCD measures.

4. Construction and emplacement of obstacles and barriers.

For additional information on base defense, refer to JP 3-10, Joint Security Operations in Theater.

(b) **Facilities Construction.** Facilities are fundamental to the success of force projection, play a critical role in preparing the OA and infrastructure to support the joint force, and are critical to sustaining joint operations. Facilities are fundamental to JRSOI, logistic sustainment, and some combat operations. The GCCs are responsible for prioritizing, planning, and coordinating the proper siting construction and maintenance of facilities necessary to support their mission and should ensure that minimum essential engineering capabilities and facilities required to support theater operational and tactical requirements are assigned to the Service components. All Services are capable of some facilities construction to support the JFC in a variety of mission requirements in any environment. Examples of general engineering facilities construction include shelters, warehouses, terminals, hospitals, water and electric power facilities, sanitation and environmental facilities, fuel storage and distribution facilities, and APOD and SPOD facilities. General engineering facilities construction includes new construction to satisfy force beddown and EAF construction.

(c) **Logistics Support Facilities.** Engineers contribute to theater logistics operations by constructing and upgrading logistics bases, troop beddown facilities, airfields, ports, and MSRs. Engineers at all levels construct, maintain, and repair facilities for receiving, storing, and distributing all classes of supply, and supporting all other logistic functions, to include hazmat management facilities. Engineers tasked to support logistic installations have three major missions: provide new facilities; maintain existing facilities; recover and repair facilities damaged by hostile actions. In some AORs, peacetime construction and HN agreements provide extensive facilities. In less-developed theaters with no preexisting logistic facilities, adapting and converting commercial property to military use or constructing new facilities may be required.

(d) **JLOTS Operations.** The establishment of JLOTS capability requires a period of preparation and facility installation that will precede the initiation of JLOTS operations. Engineer support to JLOTS operations may be considerable and may include, but is not limited to: improving beaches and port facilities to increase cargo and personnel throughput; shore stabilization, site grading, drainage, facility construction and improvements at SPODs; environmental damage mitigation; and utility installation. General engineer operations may also include the assembly and insertion of modular causeways, elevated causeways, and sea-delivered bulk fuel and water systems. However, Army modular causeway units include organic equipment and forces to conduct general engineer

operations associated with floating modular causeway placement. Navy amphibious construction battalions (PHIBCBs) assemble and operate lighterage, causeways, and bulk fuel/water systems. Navy underwater construction teams (UCTs) provide hydrographic surveys and assist in the installation of fixed systems such as the offshore petroleum discharge system (OPDS) and the elevated causeway system. Typical engineering support activities in support of JLOTS operations are shown in Figure II-3. JLOTS requires significant engineer support for site survey and to prepare access routes to and from the beach. Army and Navy engineer units will provide the majority of construction and transportation equipment and most engineering construction tasks.

For further guidance on JLOTS, refer to JP 4-01.6, Joint Logistics Over-the-Shore.

(e) **Environmental Support Operations.** The intent of environmental support operations is to minimize adverse environmental impact and to ensure the safety and health of personnel. Typical environmental support operations are listed in Figure II-4. While deployed engineering units may have the capability to provide initial environmental support, the use of DOD civilian employees, HN support, or contractors is usually required for long-term or large-scale projects. Environmental issues can have strategic implications and affect mission success and end states if not recognized early and incorporated into planning and operations. Protection of natural resources may be a key strategic mission objective, important to HN reconstruction. Failure to recognize environmental threats can result in significant health risks to the population and joint force. If not appropriately addressed, environmental issues have the potential to negatively impact local community relations, affect insurgent activities, and create diplomatic problems for the chief of mission (COM).

Engineering Support to Joint Logistics Over-the-Shore Operations

- Conduct beach reconnaissance.
- Perform hydrographic surveys.
- Conduct and document baseline environmental survey.
- Establish, operate, and maintain lighterage and amphibious discharge sites.
- Establish and maintain beach roadways, landing pads, and storage areas.
- Install and maintain bulk fuel and/or water systems and storage points.
- Prepare beach interfaces for amphibious systems.
- Clear obstacles.

Figure II-3. Engineering Support to Joint Logistics Over-the-Shore Operations

Environmental Support Operations

- Initial environmental baseline surveys
- Site surveys to determine environmental and cultural conditions
- Integration of environmental considerations into plans
- Recommendations for nontoxic, environmentally benign material substitution
- Emergency response plans, training, and initial actions
- Establishment of solid and liquid waste disposal systems
- Establishment of hazardous material distribution centers
- Establishment of hazardous waste collection, long-term storage, and shipment center
- Sampling of water sources for contaminants
- Closure environmental baseline surveys and removal of wastes and excess supplies

Figure II-4. Environmental Support Operations

For additional information on environmental considerations, refer to Appendix C, "Environmental Considerations."

(f) **Real Estate Management.** Real estate operations involve planning, acquisition, management, and disposal of land and facilities to support joint operations. General engineering encompasses real estate management from acquisition of real property to final turnover of land and facilities upon completion of an operation. USACE (contingency real estate support team), AFCEC, and NAVFAC have experts who can deploy in support of these requirements.

1. **Responsibilities.** GCCs are responsible for coordination of real estate requirements within the theater. GCCs will resolve conflicting requirements for additional real estate and incompatible use of existing real estate. GCCs or the JFCs within their ESP typically designate USACE, NAVFAC, or AFCEC the responsibility for executing all real estate actions for a contingency operation. The Services are normally responsible for facility acquisition funding and support.

2. **Planning, Acquisition, and Coordination.** Real estate planning should be initiated as OPLANs are developed to identify land and facility requirements needed in support of joint operations. Real estate planning and surveys are initiated as campaign plans are developed to provide timely and adequate facilities to sustain the combat force. Deployment of real estate personnel is essential early in an operation to ensure that needed land and facilities are acquired in a timely manner. Real estate acquisition,

maintenance, and disposal require special contracting procedures that are performed by USACE, NAVFAC, or a designated executive agent. When facilities and real estate can be obtained through host-nation support (HNS) and commercial leases, or through international agreements, facilities acquisition and real estate management becomes an important component of general engineering. Local HN officials can help identify available facilities or land that meets military requirements. If local governments are capable of maintaining or improving existing infrastructure, agreements may be developed for their support. Engineer real estate teams coordinate with HN agencies and private owners to acquire and dispose of real estate and establish the terms of lease agreements. CA and real estate personnel may be required to work through HN governments to settle agreements with property owners. Acquisition of land and facilities not owned by the USG is accomplished through assignment, international agreements such as status-of-forces agreements (SOFAs), memoranda of agreement, leasing from the HN, or direct leasing from the private sector. Within the DOD, the Secretaries of the Military Departments are authorized to use leases to acquire real property relating to structures in foreign countries that are needed for military purposes (see Title 10, USC, Section 2675).

(4) **Specialized Capabilities.** Sustaining military operations include the general engineering support activities required for effective operation of advanced bases, LOCs, ISBs, and other general engineering support activities. Examples include installing central power plants, contracting base service support, replacing field latrines with dedicated portable assets, implementing quality of life improvements to billeting areas, and replacing tents and other equipment with more robust temporary structures. These structures can be acquired, installed, and operated by deployed engineering units or through contingency contracting procedures. General engineers are essential to ensuring the continuous operation of airfields.

(a) **Power Generation.** Access to safe, reliable power is critical to the military's ability to complete nearly every mission at every level, from the tactical to strategic. In some cases, the level of electrical service available may serve as a measure of success for the operation itself. Since power generation is a component of general engineering, this consideration must include synchronizing work on power systems with the overall general engineering effort and associated environmental considerations. Effective planning of power generation and distribution systems, to include the proper utilization of alternative energy, will ensure that electrical power is utilized efficiently and logistical requirements are minimized.

(b) **Pipelines.** The joint force is dependent on petroleum products. Bulk petroleum is delivered through ports or JLOTS, off-loaded into storage facilities, and shipped forward. The preferred method of shipment of petroleum products to joint forces in the OA is pipeline. The engineer mission is to provide general and specialized assistance in constructing and maintaining pipeline systems. For example, engineers install the inland petroleum discharge system. Environmental considerations are huge and can impact the JFC simply due to the volume of petroleum and the hazards associated with its movement.

(c) **Wells and Water Distribution.** Maintaining a constant supply of water is critical to sustaining the joint force. Specialized engineer teams are capable of drilling water wells and supporting water distribution systems. However, for engineers to successfully drill producing wells, sufficient data on location and availability of groundwater is required. Such data is maintained for DOD in the Water Resources Database at the US Army Geospatial Center. Engineers also have water purification capabilities to include reverse osmosis water purification units which can be used to purify most water sources, including saltwater or brackish water.

3. Geospatial Engineering

a. **Overview.** Geospatial engineering encompasses those tasks that provide geospatial information and services (GI&S) to enhance awareness, understanding, and effective use of the operational environment for commanders and staffs across the range of military operations. Geospatial engineering provides the JFC with terrain analysis and visualization of the operational environment through the utilization and display of accurate terrain and other geospatially referenced information and derived actionable advice that is referenced to precise locations on the earth's surface. This geospatial data forms the foundation upon which all other information on the operational environment is layered to form the common operational picture (COP) for the JFC and is an element of GEOINT. Geospatial engineer units provide strategic, operational, and tactical terrain analysis; terrain visualization; digital terrain products; nonstandard or updated map products; and baseline survey data to all forces.

(1) Geospatial engineering support is provided based on OPLAN, concept plan, and training requirements. These requirements are determined and validated by the GI&S officer in coordination with the joint force engineer. It is required to support all joint operations and should meet the anticipated needs of the JFC. Examples of geospatial engineering support include terrain analysis, terrain visualization, creating digital geospatial products, special map production, general and precision survey, and geospatial data management and conflation, all of which contribute to an understanding of the operational environment and its effect on operations.

(2) The joint community requires geospatial data to function effectively within the operational environment and to help establish the COP. Joint forces use geospatial data to provide an understanding of the terrain. Lower-resolution terrain data enables leaders at the theater level to plan operations, while higher-resolution products facilitate tactical-level operations. Because forces deploy worldwide on short notice, there will never be enough terrain data immediately available to meet all needs. It is important that data be requested as early as possible and that the terrain data requirements be defined carefully to focus the limited geospatial production assets on the areas that are the most important.

(3) NGA is the functional manager for GEOINT with the responsibility to provide standard geospatial products and services. The GI&S officer serves as the primary link to ensure that support from NGA and the extended National System for Geospatial Intelligence community, including allies and the geospatial assets of the Services, is developed and provided during all phases of an operation throughout the theater. Geospatial content may be

delivered as maps, imagery, elevation data, and feature data. Maps, whether in digital form or hard copy, are the geospatial mainstay for joint forces and provide the foundation for the COP. It is important to have both a hard copy and digital versions depending on type of use. To be useful all imagery needs to be georeferenced. Orthoimagery provides a digital map-like photo of the terrain, enabling it and other geospatial content to be stacked on top of each other like overlays. Digital terrain elevation data (DTED) provides a digital representation of the bare earth's surface; it is a key element for terrain reasoning as it is used to derive slope and other reference aspects of the surface of the earth that directly impact maneuverability. DTED also gives a basic understanding of the land when its three-dimensional surface is draped with imagery. Higher resolution digital surface models provide a detailed representation of structures in urban and complex environments.

(4) Feature data identifies and provides attributes for natural and man-made entities like roads, bridges, rivers, utilities, and buildings. Attribution conveys detail, such as bridge specifications, number of lanes in a road, stream velocity and bank height, for use with analysis-type software and high-end computer systems to predict mobility, cover and concealment, countermobility, and other aspects of the terrain important to the force.

(5) C2 systems and platforms require the ability to evaluate the terrain and use terrain reasoning tools and planning tools to meet mission requirements. Geographic information system (GIS) software using terrain reasoning gives the CCDR the ability to perform "what if" terrain analysis based on changes in the terrain using a C2 system in real time. For example, if a bridge is destroyed or suddenly blown, the user can enter an icon to indicate the road is blocked and the terrain reasoning GIS tool will conduct a new route analysis yielding several choices for the commander. Parameters such as fastest route, most concealed from the ground, most concealed from the air, on-road, off-road, or a best combination are set by the user. Terrain reasoning requires elevation and feature data that is detailed and complete enough to enable automated analysis. Geospatial engineers have access to and help build and maintain the data sets required for terrain reasoning predictions.

b. **Collection and Development of Accurate Information.** Detailed and accurate geospatial information may require long lead times for collection and extraction. The GI&S officer must carefully plan for product support from the total geospatial community and ensure that the most critical requirements are met in time. Stereo imagery and ranging sensors such as interferometric synthetic aperture radar and light detection and ranging provide elevation data and some indications of features and their attributes. Ephemeris and attitude data, which accompanies the imagery and other sensed data, allows for the precise positioning of the images and mensuration of features. Commercial systems supplement national imaging systems and meet a critical need when images must be shared with multinational partners, NGOs, and others. Once geospatial data has been collected, it must be extracted and processed into useful geospatial information. While NGA fulfills the bulk of DOD standard geospatial data extraction requirements through contracts and agreements with allies, the Services and joint forces also possess limited data extraction capabilities best suited for the production of system- or theater-specific data and the update of standard data sets.

c. **Information Management.** Detailed, high-resolution data is subject to rapid change as the forces of nature and man modify the landscape and seas with the construction of roads and obstacles and the shifting of beaches and waterways. The JFC requires up-to-date GEOINT in order to make the best tactical decisions. Digital systems allow the JFC access to tremendous amounts of updated geospatial data and current information. The management of the enhanced data must not become a burden as the GI&S officer, engineer, intelligence directorate of a joint staff (J-2), and the JFC determine what data is tactically significant.

d. **Development of Geospatial Knowledge.** The geospatial terrain analyst evaluates available content for fitness for use in needed analyses or visualizations, filters needed data to remove irrelevant content that would slow analysis or clutter displays, checks the integrity of content to ensure its completeness and logical consistency, and then performs analyses to generate tactical decision aids. These analyses move geospatial content from information to knowledge, generating actionable advice for supported commanders and staff.

e. **Geospatial Visualization.** Geospatial engineers assemble geospatial content for visual presentation to decision makers. This might involve bringing together data such as orthoimagery and elevation surfaces, information such as road networks, and knowledge such as mobility predictions within three-dimensional space for fly-throughs, or superimposing the content in plan view and clipping it into combat graphics for printing in the quantity needed for an operation. Geospatial engineers use standardized symbology and processes to assure quality of visualization products and services.

f. **Sharing Geospatial Knowledge.** Geospatial content in databases, the results of analyses, and products and other services are shared across the geospatial engineering community and disseminated to commanders and staffs in many ways. Standard products on media (such as compact discs or printed hard copy) from NGA and its co-producers are distributed through the DLA. Tailored products on media from the national level may move through DLA channels or be shipped directly to customers depending on urgency. Most products and services are digital or have digitized versions and are hosted on NGA's portal, through which geospatial engineers, commanders, and staff may also reach hosted geospatial content from databases. Army geospatial planning cells (GPCs) at the Army Service component commands have established theater geospatial databases that hold content from NGA that is relevant to the theater as well as additional content obtained or collected in theater and integrated to provide a trusted, maintained data store for theater operations. For major operations, NGA may deploy support teams to theaters and augment organic or assigned geospatial engineers in producing and sharing geospatial data across the force.

g. **Geospatial Engineering Integration.** Geospatial engineering plays a key role in the range of military operations. The JFC uses geospatial information to help determine friendly and enemy COAs and to plan for the deployment of forces. Coupled with intelligence data, the disposition of friendly forces, weather, and the logistics situation, geospatial information assists the JFC to visualize and develop the operational environment. Joint forces require geospatial data for targeting. During planning, the JFC's GI&S officer and J-2 work closely with subordinate command GI&S officers, J-2s, GPCs, the Army Geospatial Center, and

NGA to develop a strategy to provide GEOINT support for future operations. The GI&S officer coordinates and shares information with other directorates. Services provide GEOINT-capable forces and requirements to the joint force to support planning. Army geospatial engineers and Marine Corps geographic intelligence analysts can provide special geospatial products that support mobility, countermobility, and survivability operations. The geospatial engineer products are also extremely useful in the engineer planning process as a means of identification and feasibility determination for beddown and staging areas, possible resource (gravel, sand, etc.) locations, and capability of LOCs.

CHAPTER III
COMMAND AND CONTROL

1. Responsibilities

a. The responsibilities and functions of CCDRs and their subordinate commanders are specified and described in the Unified Command Plan and JP 1, *Doctrine for the Armed Forces of the United States*. The engineer staff of a joint force assists the JFC by furnishing engineer advice and recommendations to the commander and other staff officers; preparing those portions of plans, estimates, and orders that pertain to engineering; participating on boards and working groups, as necessary; and coordinating and supervising specific engineer activities for which the engineer staff division is responsible.

b. **GCC's Engineer Staff.** The engineer staff assists the GCC by performing a variety of functions to synchronize engineer operations in the AOR. These include:

(1) Coordinating with functional combatant commander (FCC) engineer staffs on FCC construction equities within their theaters.

(2) Coordinating with DOD construction agents and other engineer support agencies.

(3) Planning and coordinating theater engineering support.

(4) Providing recommendations to the GCC on the assignment of engineering missions to subordinate commanders. Recommendations may include which subordinate commander (Service/functional component, subordinate joint task force [JTF], or subunified commander) will be assigned the mission, the scope of the project, and which commanders will be placed in a supporting role.

(5) Furnishing recommendations on the tasking of components for theater engineering missions, tasks, or projects.

(6) Recommending policies and priorities for construction and real estate acquisition, and for Class IV supplies (construction materials) through the use of available automated construction management tools.

(7) Furnishing advice on the impact of joint operations on the environment IAW applicable US, international, and HN laws and agreements.

(8) Recommending construction standards.

(9) Recommending theater operational energy policy, objectives, priorities, and resource programming.

(10) Identifying engineering support requirements that exceed component funding authorizations and organized engineer capabilities.

(11) Furnishing advice on the assessment of the risk to mission accomplishment of engineering support shortfalls.

(12) Furnishing advice on the feasibility, acceptability, and suitability of component engineering plans.

(13) Preparing, as part of the joint operation planning process (JOPP), the engineer parts of OPLANs and OPORDs; see Figure IV-2.

(14) Reviewing all engineer-related annexes/appendices (see Chapter IV, "Engineer Planning") of OPLANs and OPORDs.

(15) Providing input to the theater campaign plan. Developing HCA and exercise-related construction programs to support building partner capacity.

(16) Developing training and exercise programs to evaluate and improve preparedness for engineering missions.

(17) Planning and coordinating the procurement and distribution of required materiel based on established priorities. Service components are responsible for procurement and distribution of their Class IV requirements.

(18) Coordinating with FCCs' engineer staffs on FCC construction equities within their theaters.

(19) Coordinating with DOD construction agents and other engineer support agencies.

(20) Managing the exercise-related construction program within the AOR in support of CJCS-approved exercises.

c. **FCC Engineer Staff.** The engineer staff assists the FCC by performing functions to synchronize engineer operations that support their command's global response commitments. These include many of those listed above and the following:

(1) Advising the commander on engineering-related doctrine, policy, and issues affecting FCC support of GCCs.

(2) Providing input to the FCC global campaign plans, theater posture/infrastructure master plans, or other key FCC plans.

(3) Providing input on the selection, characterization, and nomination of contingency locations, and the establishment of contingency basing criteria, including the common service standard for general engineering support functions (e.g., utility services).

(4) Coordinating with the GCC's engineer staffs on FCC construction equities within their theaters.

(5) Synchronizing engineer aspects of FCC global plans.

d. **Subordinate Joint Force Engineer Staff.** The joint force engineer serves as the principal advisor to the JFC for matters pertaining to the planning and execution of joint engineering support operations. The joint force engineer manages several engineering functions to include the following:

(1) Planning for and coordinating the conduct of operational mobility, countermobility, survivability, and construction tasks.

(2) Providing recommendations to the JFC on the assignment of engineering missions to subordinate commanders.

(3) Construction and maintenance of required facilities and LOCs.

(4) Coordination of materiel requirements.

(5) Furnishing advice, with legal assistance, on the impact of JFC operations on the environment IAW applicable US law, regulations, and policy; HN law; international agreements; and the appropriate final governing standards (FGSs) or, in countries where no FGSs exist, DOD 4715.05-G, *Overseas Environmental Baseline Guidance Document* (referred to as OEBGD).

(6) Geospatial engineering in conjunction with the GI&S officer.

(7) Real estate acquisition and management.

(8) Other specialized engineering support functions.

(9) Emergency repair of war damage to facilities and infrastructure.

(10) Preparing the engineer parts of OPLANs and OPORDs.

(11) Reviewing all engineer-related annexes/appendices of OPLANs and OPORDs.

(12) Providing input to the JFC plan for HCA and exercise-related construction programs to support building partner capacity as required.

(13) Planning and coordinating the procurement and distribution of required materiel based on established priorities. Service components are responsible for procurement and distribution of their Class IV requirements.

(14) Coordinating with DOD construction agents and other engineer support agencies.

2. Authority and Control

a. **Commander of a Combatant Command (CCMD).** CCDRs have broad authority and control over subordinate commands and forces. Particularly pertinent to engineer operations are:

(1) The directive authority for logistics that CCDRs have and their authority to delegate directive authority for common support capabilities, which include engineering support.

For more information about directive authority for logistics and directive authority for common support capabilities, see JP 1, Doctrine for the Armed Forces of the United States.

(2) The GCCs' responsibility to determine contingency basing requirements within their AORs.

For more information on contingency basing, see DODD 3000.10, Contingency Basing Outside the United States.

b. **Subordinate JFC.** A subordinate JFC normally exercises OPCON over assigned forces and OPCON or TACON over attached forces and is responsible for the employment of their capabilities to accomplish the assigned mission or objective. Additionally, the JFC ensures that cross-Service support is provided and that all engineering forces operate as an effective, mutually supporting team. The JFC assigns engineering tasks to subordinate commanders.

For further guidance on joint C2, refer to JP 1, Doctrine for the Armed Forces of the United States; *JP 3-31,* Command and Control for Joint Land Operations; *JP 3-32,* Command and Control for Joint Maritime Operations*; and JP 3-30,* Command and Control of Joint Air Operations.

3. Command and Control Options

a. Simplicity and clarity of command relationships are paramount to the effective and efficient use of engineer forces due to the varied nature of engineer tasks, units, and capabilities. Engineering forces are extremely adaptable and can be tailored to any joint force organizational structure. In addition, the structure that is developed needs to be flexible enough to change as the situation warrants. Transitions between offensive, defensive, and stability operations will have a significant effect on the frequency and type of missions performed and therefore the type of engineer support required. The different authority and control options presented in this chapter are designed to take advantage of this flexibility. Most often, joint forces are organized with a combination of Service and functional component commands.

b. **Service Component Command.** Service component commanders maintain OPCON over their Service engineer forces under this organizational option (see Figure III-1). This structure maintains traditional command relationships and is best used when the JFC chooses to conduct operations through Service component commanders and when engineer forces are

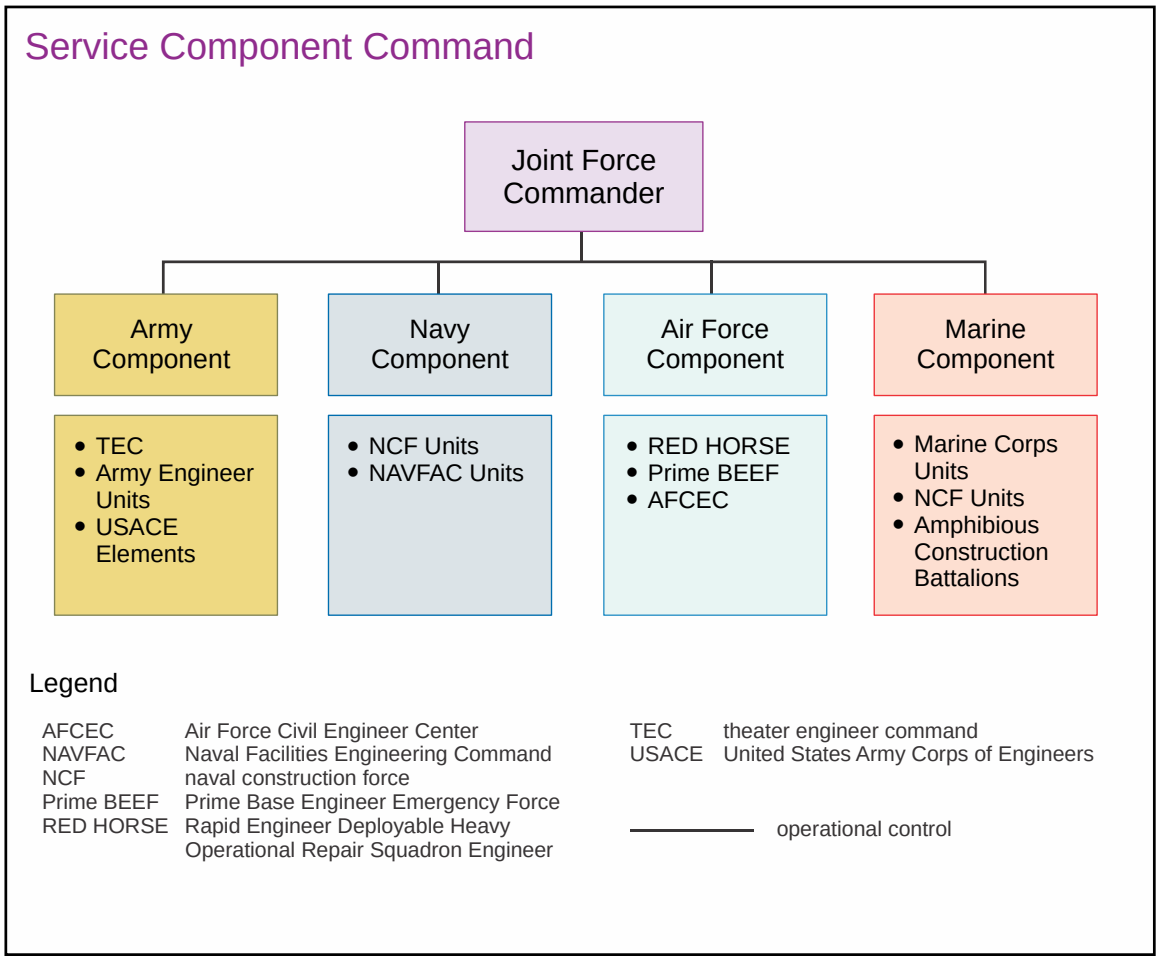


Figure III-1. Service Component Command

used in direct support of Service component missions. A Service component command may be delegated OPCON or TACON of engineer forces from another Service to accomplish the assigned mission or tasks. For example, NCF units may be placed under OPCON or TACON of the Marine component commander for general engineering support. In addition, the JFC may also establish support relationships between subordinate commanders to aid, protect, complement, or sustain another force.

c. **Functional Component Command.** The JFC may also organize using one or more functional component commands (see Figure III-2). Under this organizational option, the JFC establishes command relationships for engineer forces based on the requirement for engineer missions. The JFC is responsible for establishing the appropriate relationships between components to accomplish the required tasks. For example, Air Force or Navy engineers may be placed TACON to the joint force land component commander. Use of engineering forces either in direct support of or attached to a functional component commander is a viable option when providing capabilities tied directly to the functional component's mission. The functional component command will not normally be responsible for providing common logistic support (e.g., beddown construction) to the joint force. When a joint force component commander does not have adequate engineer forces assigned, the component commander should coordinate engineering support requirements through the JFC

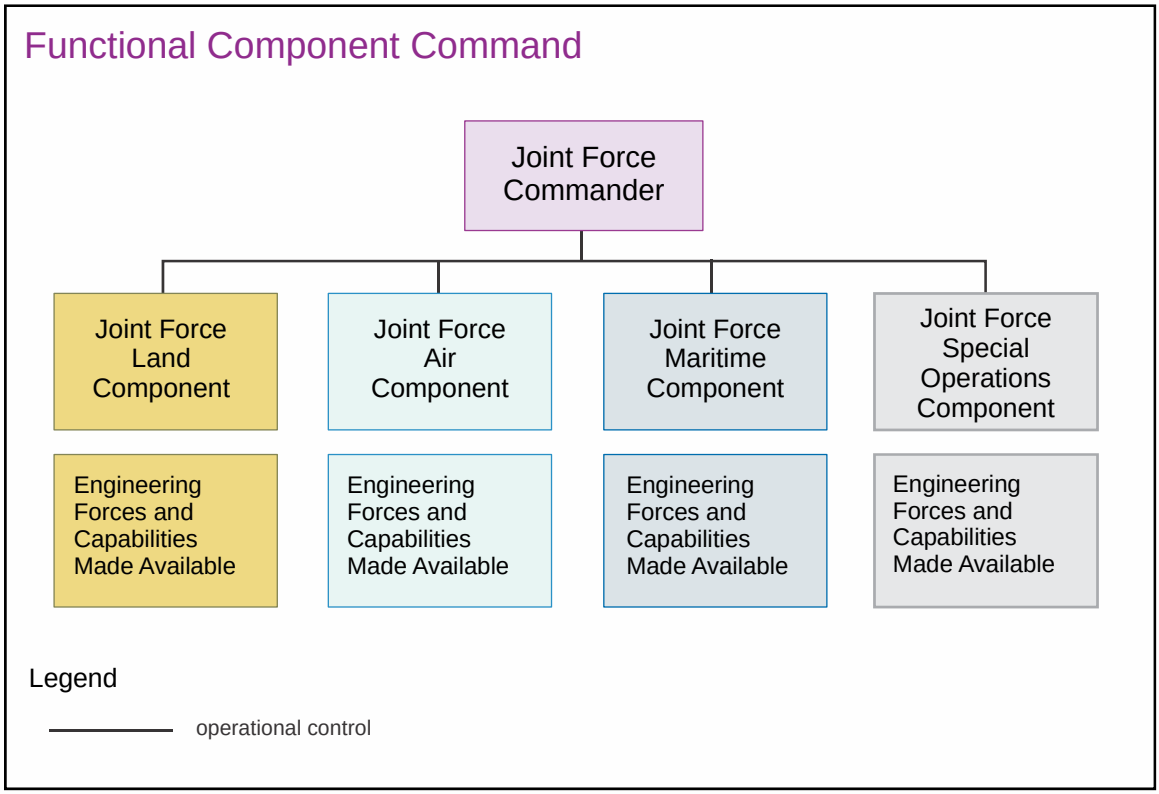


Figure III-2. Functional Component Command

to obtain the support from other components of the JTF. There are numerous variations in organizing engineer forces under this command structure that provide significant flexibility to the joint force. The key advantage of this option is that it provides the JFC with the ability to tailor the engineer capabilities within the joint force by crossing Service component lines to best achieve mission requirements.

d. **Subordinate JTF.** Some operations, such as DSCA, mitigating the consequences of an incident, or FHA, are extremely engineer-intensive. In such cases, the JFC may opt to establish a subordinate JTF to control extensive engineer operations and missions. Such a JTF may be formed around an existing TEC, Army engineer brigade, MAGTF, naval construction regiment (NCR), or RED HORSE squadron. The JFC designates the military engineer capabilities that will be made available for tasking and the appropriate command relationships. Engineer forces could be placed under OPCON, TACON, or in a supporting role, depending on the degree of control that the JFC desires to delegate to the subordinate JTF. The engineer assets attached to the subordinate JTF will normally be made up of a mix of engineer assets drawn from the entire force's engineer resources. If the subordinate JTF is to provide a common support capability, it will require a specific delegation of directive authority from the CCDR for the common support capability that is to be provided.

For further guidance on the organization of joint forces, refer to JP 3-0, Joint Operations.

4. Command and Control Considerations

a. **Service Engineer Considerations.** Service engineering forces must be flexible to allow the JFC to organize them in the most effective manner. A CCDR may delegate responsibility for engineering support to the Service component having a preponderance of forces and expertise. In addition to or coinciding with component missions specified by the CCDR or subordinate JFC, each Service component may provide engineering support to the other components or multinational partners, as required or directed. While deployed, engineers from all Services may use reachback from the field to USACE, NAVFAC, and AFCEC for technical support, assistance in planning and designing infrastructure, environmental assistance, real estate acquisition, geospatial engineering, and contract construction. Prior coordination with these organizations to establish support procedures is critical.

A description of Service engineer organization and capabilities is provided in Appendix A, "Service Engineer Organizations and Capabilities."

b. **Establishment of a JTF**

(1) **Deliberate Planning.** The delegation of functions from the CCDR to a subordinate JFC is a requirement that is critical to the success of joint operations. The subordinate JFC should have the benefit of any deliberate planning conducted by the CCDR's staff and associated planning elements for the conduct of contemplated operations. The requisite information and expertise should be embedded within the JTF staff as early as possible so that the JFC can plan and execute mission requirements, including engineering support operations that will serve to prepare the joint operations area (JOA).

(2) **Crisis Action Planning (CAP).** When CAP is initiated for an operation, effective interaction between the CCMD and the JTF staff is essential to optimize information flow and coordinate planning activities. To enhance the planning process, the JFC may form a planning group that will include members of the CCDR's staff, members of the JTF staff, and representatives of associated planning and advisory elements. Composition of the group will depend on the activities being conducted and will include engineer participation as required.

For further guidance on the CAP process, refer to JP 5-0, Joint Planning.

(3) **Joint Enabling Capabilities Command (JECC).** JECC is a subordinate command of United States Transportation Command (USTRANSCOM) responsible for providing mission-tailored, ready joint capability packages to CCDRs in order to facilitate the rapid establishment of a joint force headquarters (HQ). JECC provides short-duration support to rapidly establish, organize, and operate a JTF HQ. The JECC consists of three alert-postured subordinate commands: Joint Communications Support Element, Joint Public Affairs Support Element, and Joint Planning Support Element. USTRANSCOM deploys JECC forces in the form of a joint enabling capability package. By design, this package is modular, scalable, and tailored to the mission.

For more details about forming JTFs and JECC capabilities, refer to JP 3-33, Joint Task Force Headquarters.

c. **Communications System Support for Engineer Forces.** Supporting engineer forces with an effective communications system for C2 is an essential consideration for the JFC and the joint force engineer. Engineer forces have organic communications capabilities within Service channels up to the component HQ. When operating in a joint environment, engineer units retain organic communications capabilities, but may also require additional communications system support from the Service component, other Service components, or the joint force. Specific requirements will depend on the C2 arrangement of the engineer forces within the joint force, mission tasking, and geographic location in the JOA. Tactical communications can be a challenge between the Services, and options must be considered by the joint engineer initially during the planning phase. The following description of capabilities may be helpful in developing the communications for engineer forces supporting the joint force:

(1) **Army.** Army engineers have sufficient capabilities to perform internal communications to communicate to higher, subordinate, and adjacent HQ, as part of a Service component command. Army engineers at the BCT level employ secure voice systems over frequency modulation, ultrahigh frequency (UHF), very high frequency (VHF), and tactical satellite, and can communicate by Nonsecure Internet Protocol Router Network (NIPRNET) and SECRET Internet Protocol Router Network (SIPRNET) (including Voice over Internet Protocol) using systems organic, or attached (based on reporting requirements to higher HQ) to the BCT. In addition to those capabilities, the Army Battle Command System is used at the tactical level for extended range of communications and commanders' situational awareness. When employed with an intermediate tactical or higher HQ, such as a corps or Service component HQ, Army engineers can access the Global Command and Control System (GCCS) and the Global Combat Support System (GCSS) for access to the Joint Operation Planning and Execution System (JOPES), Joint Engineer Planning and Execution System (JEPES), and other information management tools. JOPES and JEPES are integrated with the planning formats and guidance found in Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3130.03, *Adaptive Planning and Execution (APEX) Planning Formats and Guidance.* Army engineer units may possess the TeleEngineering Toolkit, a secure video teleconferencing communications device with a valuable suite of analysis tools, to reach back to the USACE Reachback Operations Center to leverage technical engineering capabilities across USACE.

(2) **Navy.** The NCR has adequate organic communications capabilities to install, operate, and maintain communications systems for internal and limited external communications requirements, including secure tactical voice, video, and data links using high frequency (HF), VHF, super-high frequency (SHF), UHF, and military and commercial satellite, telephone, wire, wireless, and fiber optic connectivity. The unit requires bandwidth allocation by the supported unit to use satellite communications (SATCOM) equipment. Communications support is provided by a small permanent staff of information system technicians (ITs), electronics technicians (ETs), and construction electricians.

(a) The naval mobile construction battalion (NMCB) possesses sufficient organic communications capabilities to install, operate, and maintain communications systems for internal and limited external communications requirements including secure tactical voice, video, and data links using HF, VHF, SHF, and UHF, and military and commercial satellite, telephone, wire, wireless, and fiber optic connectivity. The unit requires bandwidth allocation by the supported unit to use SATCOM equipment. Communications support is provided by a small permanent staff of ITs, ETs, and construction electricians. A communications platoon organized with trained personnel from across the battalion is a secondary function that is stood up as required to establish the communications infrastructure and to meet mission requirements. Other unit capabilities are degraded when the communications platoon stands up.

(b) The construction battalion maintenance unit (CBMU) possesses sufficient organic communications capabilities to install, operate, and maintain communications systems for internal and limited external communications requirements including secure tactical voice and limited data links using HF, VHF, telephone, and wire assets. The CBMU requires tactical data network (TDN) support from its parent NCR or supported command. Communications support is provided by the communications officer and a small permanent staff of ITs, ETs, and construction electricians. CBMU detachments only have sufficient organic communications capability to provide internal and external communications including tactical, secure voice, and limited data systems.

(c) The UCT has both conventional and underwater communications systems capabilities in order to support diving operations. It possesses sufficient organic communications capabilities to install, operate, and maintain communications systems for internal and limited external reachback communications requirements, including secure voice and data links through HF, VHF, and UHF using military and commercial satellite, telephone, wire, wireless, and fiber optic connectivity. The unit requires bandwidth location by the supported unit to use SATCOM equipment. Detachments have limited TDN capability at the workgroup level without pulling network services from a third party. The UCT does not have stand-alone TDN assets. Communications support is provided by a small permanent staff of ITs, ETs, and construction electricians. UCT members are only trained as basic communications equipment operators and support technicians. Each detachment has an IT petty officer assigned to it who operates the detachment's communications equipment.

(d) The PHIBCB possesses sufficient organic communications capabilities to install, operate, and maintain communications systems for internal and limited external communications requirements. These requirements include voice, video, and data links using HF, VHF, SHF, UHF, and military and commercial satellite, telephone, wire, wireless, and fiber optic connectivity. The unit requires bandwidth allocation by the supported unit to use SATCOM equipment. Communications support is provided by a small permanent staff of ITs, ETs, and construction electricians. A communications platoon organized with trained personnel from across the battalion is a secondary function that is stood up as required to establish the communications infrastructure and to meet mission requirements. Other unit capabilities are degraded when the communications platoon stands up.

(3) **Marine Corps.** MAGTF engineer units that are employed supporting military operations have the minimum required capability to perform internal communications operations and to communicate with subordinate, adjacent, and higher HQ at the division, Marine logistics group, MAW, and below. Marine Corps engineer units may rely on higher HQ capabilities or request additional C2 assets during operations, particularly when subordinate units support multiple task-organized units. With appropriate augmentation, MAGTF engineer units can maintain single and multichannel radio, secure telephone, and satellite systems with subordinate units and higher HQ by VHF, HF, and limited UHF and transmit data and achieve limited NIPRNET and SIPRNET access via UHF SATCOM. When employed as part of a MEF or a MEB, MAGTF engineer units have access to GCCS-Marine Corps via the respective MAGTF's communication network. When operating in a joint force or multinational force (MNF), MAGTF engineer units rely on organic communications capability but may require additional support to maintain external connectivity requirements.

(4) **Air Force.** Air Force engineer forces' communications requirements beyond unit level capability are provided by deployed installation communications elements. These communications elements are embedded in the base information infrastructure. Base information infrastructure packages are scalable, modular communications support packages that offer deployed personnel access to such standard services as secure and unsecured telephones and facsimiles, NIPRNET, SIPRNET, and land mobile radio repeaters. When operating out of an Air Force, joint, or combined operations center, Air Force engineer forces can gain access to a wide range of mission support systems. These systems provide linkage to the GCCS, JOPES, GCSS (JEPES), and other intelligence collection systems necessary for mission planning.

5. Engineer Organization Considerations

a. **Engineer Staff Organization.** The JFC should establish an engineer staff for engineering matters. When a functional component command employs forces from more than one Service, the staff should reflect each Service represented. A notional engineer staff is depicted in Figure III-3, and key engineer staff functions are noted in Figure III-4.

(1) **Plans.** The engineer staff participates in the planning process through representation on the joint planning group (e.g., plans directorate). The engineer staff addresses all potential engineer requirements during the planning process.

(2) **Operations.** The engineer staff monitors the deployment, employment, mission, and redeployment status of major subordinate Service component engineer forces. The engineer staff works directly with the operations staff (e.g., representation in the joint operations center [JOC]). It provides engineer representation on the joint targeting coordination board (JTCB) to prevent destruction of key infrastructure essential to future operations, integrates environmental considerations, and provides guidance on emplacing obstacles, barriers, and mines. The engineer staff is also represented on numerous other boards, centers, cells, and working groups as determined by the joint force's standard operating procedure.

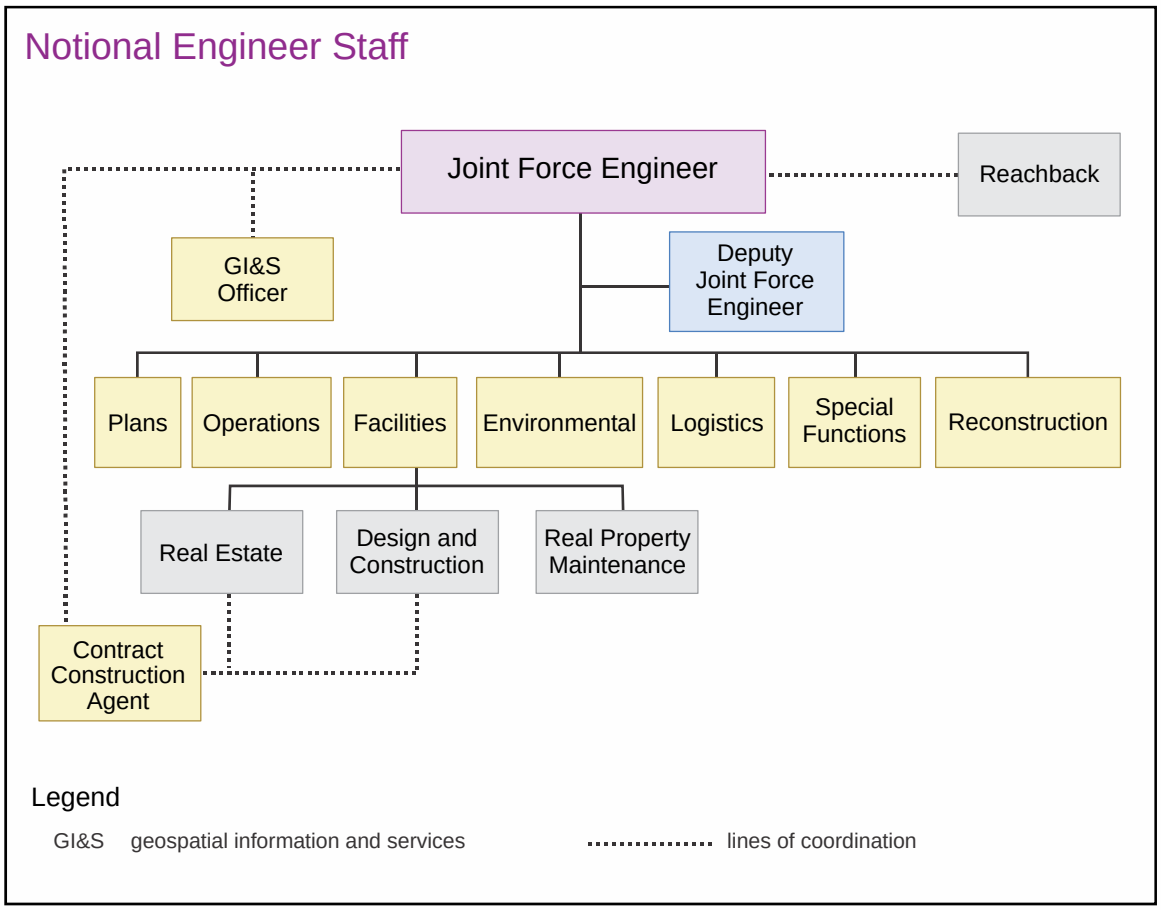


Figure III-3. Notional Engineer Staff

For further guidance on the organization of the JFC's staff, see JP 3-0, Joint Operations; *JP 3-33,* Joint Task Force Headquarters; *and JP 3-31,* Command and Control for Joint Land Operations.

(3) **Facilities.** The engineer staff section has the responsibility for oversight of base establishment and development, real estate contracting and management, facility construction, and operation and maintenance (O&M). Key considerations should include guidance on base master planning, construction policies, priorities, and standards, setting repair or replace policy for real property, and maintenance support contracts.

(4) **Environmental.** Key tasks should include coordinating with the staff judge advocate (SJA) to provide advice on applicable requirements and actions, mitigation and actions for mishaps, coordination for completion of all environmental baseline surveys (EBSs), and providing input to annexes and appendices with significant environmental considerations.

(5) **Logistics.** Key tasks of the staff section should include monitoring Class IV materials and Class V ammunition and the coordination of service support via LOGCAP, GCSMAC, GCCMAC, and AFCAP. Oversight of operational needs statements and distribution of engineer equipment also is executed by the logistics section.

Engineer Staff Functions

- Develops and coordinates combat engineering, general engineering, and geospatial engineering requirements for the joint force.
- Acts as the intermediary, facilitator, and coordinator between joint task force elements, including nonmilitary elements, requesting engineering services. Receives guidance and reports actions to joint civil-military engineering board, if established.
- Develops and coordinates tasks for component engineer forces.
- Coordinates and facilitates the joint facilities utilization board, joint civil-military engineering board, and joint environmental management board. Integrates actions from these boards, assigns tasking based on board recommendations, and monitors completion.
- Screens, validates, and prioritizes all engineering projects and mission assignments.
- Plans, programs, and controls facility utilization. Receives guidance and reports actions to joint facilities utilization board, if established.
- Prepares logistic reports on engineer resources using the Joint Operation Planning and Execution System.
- Develops the engineer support plan.
- Plans and coordinates the distribution of construction and barrier materials and engineer munitions based on established priorities.
- Functions as the primary interface between the joint force, host nation, and contingency contractors, and other theater construction organizations.
- Establishes the statement of work, development of contracts, and employment of services.
- Plans and provides guidance for environmental considerations that impact joint operations.
- Serves as the program manager for all engineer-related functions.

Figure III-4. Engineer Staff Functions

(6) **Reconstruction.** If this section is established, it is responsible for coordination and integration of outside the wire construction projects. It also serves as executive secretary of the joint civil-military engineering board (JCMEB) and acts as the key engineer linkage to the assessment working groups/boards.

(7) **Special Functions.** The joint force engineer may have staff responsibility for the following areas dependent upon JTF organizations and assigned Service capabilities. The following functions reside within the engineer capability of at least one Service:

(a) Geospatial engineering support.

(b) Intelligence. Throughout the intelligence process, the engineer staff assists the J-2 in coordinating intelligence requirements and providing geospatial products and services to civil support operations. The engineer staff provides technical assistance in identifying, prioritizing, and validating engineer intelligence needs and assists in coordinating collection of engineer information. The joint force engineer, J-2, GI&S officer, and SJA should coordinate for the use of intelligence from both classified and open sources in addressing environmental considerations and considering potential collateral damage associated with targeting.

(c) EOD. Though EOD is task-organized under engineers in the Air Force and partially in the USMC, EOD staff oversight within the joint force will be accomplished by the EOD staff cell within the J-3.

(d) Fire and emergency services.

(e) Support to CBRN and monitoring, reporting, decontamination, and recovery operations within Service limitations.

b. **Joint Manning Document (JMD).** The joint engineer staff JMD should reflect representation from each Service. When possible, a memorandum of understanding or equivalent should be developed to ensure effective wartime augmentation with Service and Reserve Component organizations. Staff engineers should work closely with civilian and multinational partner organizations to develop wartime organization augmentation manning. The JMD should be built based on analysis of the mission and the engineer staff capabilities and training required to support the operation.

c. **Staff Engineer Training.** The Services and CCMDs should ensure engineer personnel augmenting the JFC's staff are qualified to fill JFC staff billets, trained in joint operations, or have multi-Service deployment experience. The joint force engineer must clearly identify personnel requirements and closely coordinate with the manpower and personnel directorate of the joint force to ensure that qualified personnel are requested. Several opportunities also exist for individual augmentee training to help prepare personnel for assignment to the JTF.

d. **Engineer Assignment.** Careful planning for the assignment of engineers to the joint force engineer allows the joint force engineer to more effectively matrix limited engineer assets throughout directorates and to boards, centers, cells, and working groups. Other advantages of centralized engineer assignment include:

(1) Better situational awareness for the joint force engineer.

(2) More efficient utilization of engineer resources.

(3) Better engineers focus on engineer issues.

(4) Best engineer skills aligned with engineer tasks irrespective of Service affiliation.

e. **Engineer Placement Options.** The CCDR and subordinate JFC will organize their staffs to carry out their respective assigned duties and responsibilities. Based on mission-specific requirements, the engineer staff may be placed within the J-3, J-4, or organized as a separate staff to the JFC. The JFC may choose to organize geospatial engineers or GEOINT officers within the J-2. Regardless of the option or combination of options utilized, the requirement for the staff engineer remains, as well as the need for constant communication, liaison, and coordination throughout the entire staff.

(1) **Operations Directorate Staff.** When the focus of engineer effort predominantly supports operational movement and maneuver, fires, and force protection, the JFC should consider placing the engineer staff as a cell within the J-3. This option will provide the fastest exchange of information during CAP and optimize the use of supporting capabilities.

(2) **Logistics Directorate Staff.** When the engineer effort predominantly supports sustainment of the joint force, the JFC should consider placing the engineer staff as a cell within the J-4. This option facilitates planning and coordination among engineers and logisticians for construction and repair of LOCs, MSRs, airfields, other logistic facilities, and infrastructure in general.

(3) **Separate Engineer Staff.** When the engineer effort is a significant focus or a key element of the joint operation, or where the engineer effort is primarily combat support and CSS operations, the JFC should consider establishing a separate engineer staff element that reports directly to the JFC. This option provides the greatest flexibility in orchestrating diverse engineer operations. The JFC's vision of the integration of engineer capabilities into the operation or campaign drives the choice between a joint engineer command versus a joint engineer staff.

(4) **Separate Engineer Command.** The JFC may designate that the engineer commander be also dual-hatted as the staff engineer. When the engineer effort is a significant focus or a key element of the joint operation, and there are a significant number of theater level engineer requirements which can only be accomplished with high-demand engineer assets, the JFC may establish a separate engineer command that reports directly to the JFC. Establishment of this command will require GCC approval based on the command relationship the JFC has with the other Service forces. This option provides maximum flexibility in synchronizing diverse engineer operations and provides the greatest unity of effort through visibility of engineer capabilities, requirements, and responsibilities throughout the staff.

6. Engineer Boards, Centers, Cells, and Working Groups

a. **Engineer-Specific Boards and Cells.** A JFC may establish engineer boards or cells to manage engineer-intensive activities and to ensure an effective use of resources to meet

mission requirements. Engineer boards establish policies, procedures, priorities, and oversight to coordinate efficient use of engineer resources. Engineer boards serve as the forum to address issues outside of daily operations and to ensure coordination at the leadership level and across staff directorates. The joint force engineer and staff will carry out responsibilities of the engineer-specific boards until the boards are formed. An important distinction between a board and a working group is that a board is usually a decision-making body. Working groups conduct staff coordination at the action officer level and prepare materials for decisions to be made at a board. Cells within the JTF are a group of personnel with specific skills who are listed together on the HQ JMD to accomplish key functions. It is important for the Services and components to be represented on the engineer boards to facilitate vertical and horizontal integration that will allow the joint force engineer to capitalize on the advantages of joint capabilities. Collaborative tools allow components to participate in boards without having to physically be present at the joint force HQ. The joint force engineer is responsible for the following boards:

(1) **JCMEB.** The JCMEB provides overall direction for civil-military construction and engineering requirements in the theater or JOA. The JCMEB is a temporary board, activated by the GCC or subordinate JFC and staffed by personnel from the components and agencies or activities. It recommends policies, procedures, priorities, and overall direction for civil-military construction and engineering requirements in the theater or JOA. The JCMEB evaluates and prioritizes engineer resource utilization to ensure the JFC's operational requirements are supported. The JCMEB is an integral link to the civil-military coordination board (CMCB); the CMCB consists of JTF staff representation to coordinate CMO support. Figure III-5 depicts some typical inputs and outputs for the board as well as primary membership and outside stakeholders.

For further details on CMCBs, refer to JP 3-08, Interorganizational Coordination During Joint Operations.

(2) **Joint Facilities Utilization Board (JFUB).** The JFC may establish a JFUB to assist in managing Service component use of real estate and existing facilities. The JFUB is a temporary board chaired by the CCMD or subordinate joint force engineer, with members from the joint force staff, components, and any other required special activities (e.g., legal, force protection, comptroller, contracting, and CA). If the JFC decides that all engineer-related decisions will be made at the JCMEB, then the JFUB functions as a working group to forward recommendations for decision to the JCMEB. The JFUB evaluates and reconciles component requests for real estate, use of existing facilities, inter-Service support, and construction to ensure compliance with priorities established by the JFC. It serves as the primary coordination body within the JTF for approving construction projects within the wire to support troop beddown and mission requirements. For long-standing JTFs, the JFUB may issue master planning guidance and develop the JTF MILCON program to support enduring base operations. The joint force engineer handles most of the JFUB's work with assistance from other selected board members. Unresolved issues may be forwarded to the JCMEB.

(3) **Joint Environmental Management Board (JEMB).** The CCDR or subordinate JFC may establish a JEMB to assist in managing environmental requirements.

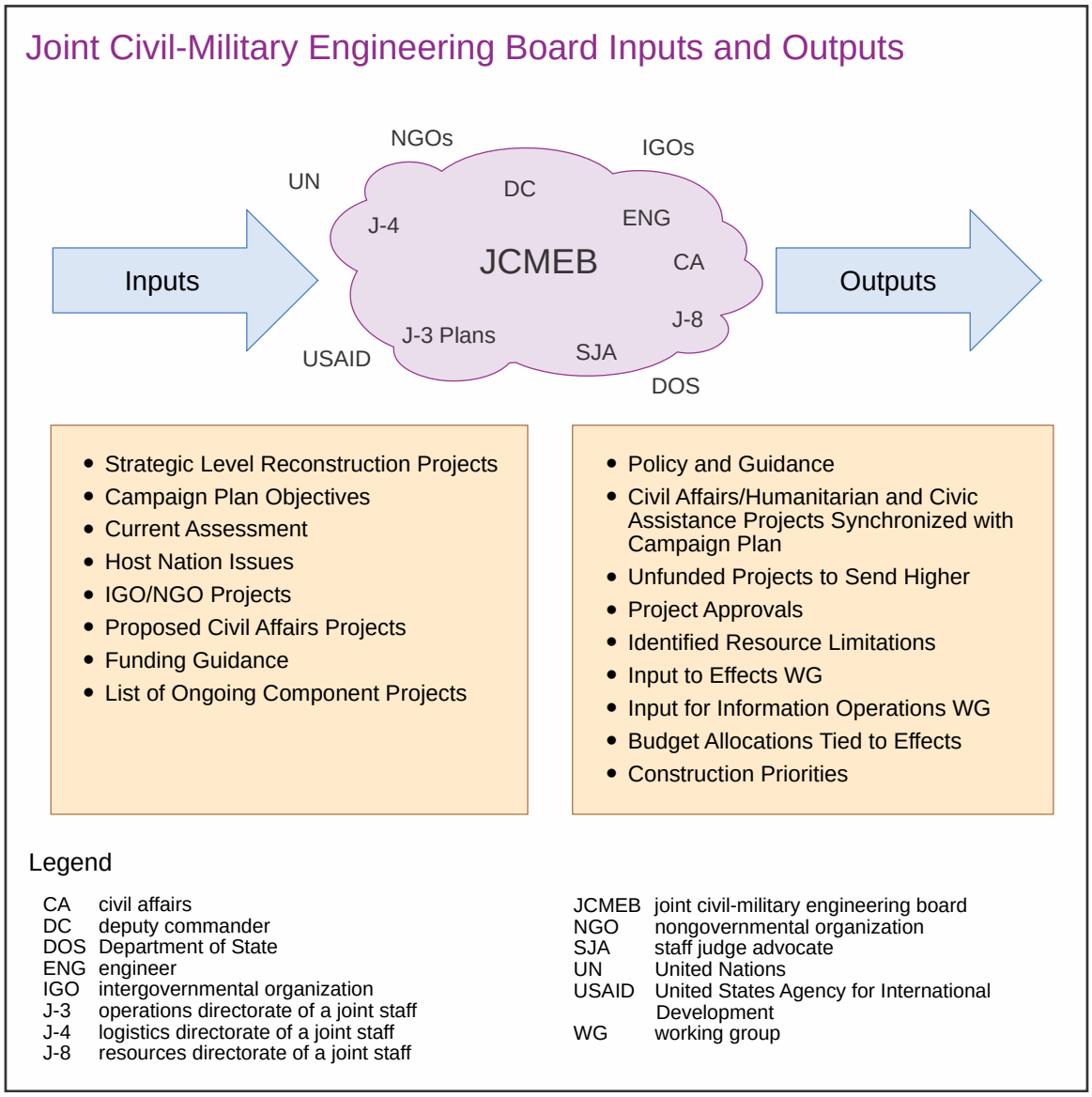


Figure III-5. Joint Civil-Military Engineering Board Inputs and Outputs

The JEMB is a temporary board, chaired by the CCMD or subordinate joint force engineer, with members from the joint force staff, components, and any other required special activities (e.g., legal, medical, and CA). The board establishes policies, procedures, priorities, and the overall direction for environmental management requirements in a JOA. The JEMB will coordinate its activities with the CCMD or subordinate joint force engineering staff. The JEMB also provides guidance on development of annex L (Environmental Considerations) of the OPLAN, and, if appropriate, assumes responsibility for preparation and appropriate updates of this annex.

For additional information on environmental considerations, refer to Appendix C, "Environmental Considerations."

(4) **Explosive Hazards Coordination Cell (EHCC).** The JFC may establish the EHCC to predict, track, distribute information on, and mitigate EHs within the theater that affect force application, focused logistics, protection, and awareness of the operational environment. The EHCC should establish and maintain an EH database, conduct pattern analysis, investigate mine and IED strikes in conjunction with EOD, and track UXO hazard areas. The cell provides technical advice on the mitigation of EHs, including the development of tactics, techniques, and procedures (TTP), and provides training updates to field units. The EHCC coordinates EH teams. Key capabilities of the EHCC include:

(a) Establishing, maintaining, and sharing the EH tracking database within the joint force.

(b) Ensuring accuracy of EH information.

(c) Coordinating site evaluations or strike incident investigations.

(d) Conducting unit EH training.

(e) Assisting intelligence planners with EH pattern analysis and intelligence collection management.

(f) Providing updated TTP and guidance for route and area clearance operations.

b. **Other Boards, Centers, Cells, and Working Groups.** Engineer participation in a number of other boards, centers, cells, and working groups is essential to joint mission accomplishment. Compared to the formal, non-standing nature of the boards, centers are standing organizations typically operating 24 hours, and cells are functionally oriented groups meeting on a regular basis. Engineer staff participation and support to these organizations will be significant, but the resultant exchange of relevant information is vital in maintaining situational awareness and facilitating the horizontal staff integration of the joint force engineer. Joint force engineer participation includes the following boards, centers, and cells:

(1) **Planning Groups.** Engineers are represented on the planning group to enhance the formulation of joint force plans. The engineer planner ensures that joint force plans are supportable from an engineer perspective. Support by the rest of the joint force engineer cell with products facilitates engineer input in and impact on the planning cycle. The engineer planner should leverage the rest of the engineer staff to provide products throughout the planning process. The key for the engineer is to ensure representation and establish hand-off procedures for products developed within all three planning horizons within the joint force—future plans, future operations, and current operations.

(2) **JOC.** The JOC plans, monitors, and guides the execution of the JFC's decisions. The joint force engineer maintains a presence in or close contact with this center. This is the engineer's link to current operations, and the engineer watch officer is responsible for keeping the rest of the engineer staff situationally aware.

(3) **JTCB.** On the JTCB, the joint force engineer contributes to the planning and integration of minefields into the barrier plan and participates in target coordination to ensure critical infrastructure preservation. The joint force engineer should ensure that implications on stability operations are considered during the targeting process for decisive operations. Engineer expertise can enable the JFC to achieve objectives with minimal long-term infrastructure damage and protection of significant cultural and natural resources in the OA.

(4) **Information Operations Cell.** In the information operations cell, the joint force engineer coordinates with other staff elements on the preservation of critical adversary facilities and infrastructure. During stability operations, engineer reconstruction efforts focused on the HN can support the commander's communication synchronization plan by aligning actions with words.

(5) **CMOC.** The CMOC provides the joint force engineer a meeting place to coordinate nonmilitary activities with other agencies, departments, organizations, and the HN. If formed, the CMOC is the focal point where engineers coordinate any support provided by the joint force to IGOs and NGOs. Outputs from the CMOC (e.g., lists of IGO and NGO projects) are useful input into the JCMEB and help facilitate unity of effort.

(6) **Joint Logistics Operations Center.** Engineers are represented at the joint logistics operations center to respond to information received from supporting command, Service components, and external sources for presentation to the CCDR.

(7) **Protection Working Group.** The protection working group will often generate engineer requirements as they develop or modify JTF force protection policy and guidance. Examples include hardening of key facilities and modifications to entry control points.

(8) **Joint Requirements Review Board (JRRB).** The JRRB is the subordinate JFC's formal mechanism to review, validate, prioritize, and approve selected Service component contract support requests. The JFC engineer may be asked to serve as a primary or advisory member on the JRRB based upon the JFC's mission. Additionally, engineer contract support requirements that are validated from a technical perspective by the JFUB may require routing through the JRRB for prioritization of resources and funding.

(9) **Special Purpose Boards, Centers, Working Groups, and Cells.** Through necessity, new boards, centers, and cells and require engineer participation. For example, an IED working group may be required as a central clearinghouse for developing solutions to an IED problem within the JOA. The engineer should also have representation at the protection and assessment working groups/boards, if established. Engineer construction efforts, whether inside or outside the wire, are closely tied to the issues addressed at these two working groups/boards.

c. **Contingency Engineering Management Organizations**

(1) **Augmenting the Joint Force Staff.** Experience in contingency operations has emphasized the importance of timely planning and preparation in providing essential engineer support requirements to the joint force. The JFC may form a contingency engineering management organization as an option to augment the joint force staff with

additional Service engineering expertise to support both deliberate planning and CAP and provide construction management in contingency and wartime operations. When established, the contingency engineering management organization is led by the joint force engineer and coordinates daily operations to ensure the delivery of engineering services to the joint force. The contingency engineering management organization also functions as a clearinghouse for engineering plans, reports, and external coordination. The contingency engineering management organization directly interfaces with component engineer staffs and the JFC.

(2) **Contingency Engineering Management Cells.** The CCDR may form a theater contingency engineering management (TCEM) cell and similar organizations, such as regional contingency engineering management (RCEM) cells or JTF contingency engineering management cells, may be formed at subordinate levels of command. Several GCCs have a standing TCEM as part of their assigned Reserve Component staffing. Additionally, a standing organization that may logically become the base for the creation of a TCEM is the TEC. These contingency engineering management cells should be staffed with Service component engineer personnel with expertise across the engineer functions. The TCEM, RCEM, and JTF contingency engineering management organizations support OPLAN development and the management of contingency engineer operations. These organizations provide additional engineering capability to include planning, construction management, regional or country expertise, or specific technical support. Service components with operational forces supporting a contingency operation and DOD construction agents may provide LNOs to the TCEM or RCEM organizations to enhance coordination. The TCEM and RCEM organizations can assist in plan development during peacetime and in the management of contingencies by completing the following:

(a) Analyzing the JFC's intentions for joint operations across the range of military operations, assisting in preparation of OPLANs, and formulating engineer support and a construction program based on the commander's priorities.

(b) Identifying potential shortfalls in construction capabilities, assessing associated risks, and developing related options.

(c) Developing construction policies, including construction standards, project approval procedures, recommendations for resource allocation, and reporting requirements.

(d) Reviewing and monitoring HNS agreements as they pertain to the general engineering effort. This includes tracking HN construction, infrastructure, facility support capabilities, and the status of projects accomplished by HN forces or agencies.

(e) Monitoring and recommending the use of construction assets based on operational requirements and tasking for general engineering assets.

(f) Monitoring the operational status of engineering forces and influencing engineering, construction, and logistic support issues for those forces.

(g) Monitoring and influencing the management of funds for the construction effort.

(h) Advising on environmental management requirements.

7. Interorganizational Coordination

a. Because engineers are likely to operate with the other departments and agencies, foreign governments, NGOs, and IGOs in a variety of circumstances, their participation in the JFC's interagency coordination is critical. Several organizations, including the United States Agency for International Development (USAID) and USACE, work together to establish civil security and civil control, restore essential services, repair critical infrastructure, and provide humanitarian relief. Two methods for facilitating such coordination are the CMOC and the joint interagency coordination group (JIACG).

b. The Department of State (DOS) has developed the Civilian Response Corps and the Interagency Management System, whose mission is to lead, coordinate, and institutionalize USG civilian capacity to prevent or prepare for post-conflict situations, and to help stabilize and reconstruct societies in transition from conflict or civil strife so they can reach a sustainable path toward peace, democracy, and a market economy.

For further guidance on interagency coordination and support to the JTF engineering forces, refer to Chapter II, "Engineer Functions," and JP 3-08, Interorganizational Coordination During Joint Operations.

CHAPTER IV
ENGINEER PLANNING

1. Strategic, Operational, and Tactical Planning

The challenges of planning successful engineer operations within diverse theaters are vast and varied. The engineer staff must be involved in the planning of strategic, operational, and tactical operations from the initial stage of the process. Understanding how engineer actions affect military operations equips the planner with the background to form a comprehensive plan of engineer actions. The omission of engineer considerations in any phase of an operation may adversely impact the entire plan.

a. **Strategic Planning.** Engineer planning activities at the strategic level include force planning and the execution of campaigns and operations, focusing primarily on the means and capabilities to generate, sustain, and recover forces. Additionally, infrastructure development is a critical aspect of enabling and sustaining force deployments and places a heavy demand on engineer requirements. Consideration of lessons learned and best practices from previous operations may provide solutions to planning problems and tasks to evaluate. Engineers at the strategic level advise on terrain, infrastructure (to include SPODs and APODs), force generation, priorities of engineer support, LOCs, contingency basing selection and characterization, Class III and Class V storage considerations, joint targeting, FHA, environmental considerations, engineer interoperability, input to the rules of engagement, rules for the use of force (RUF), and force protection.

b. **Operational Planning.** The GCC's engineer planning concepts for the AOR focus on the impact of geography and force-projection infrastructure on the CONOPS. Engineer planners must determine the basic yet broad mobilization, deployment, employment, and sustaining requirements of the CCDR's CONOPS. Operational planning merges the OPLAN/OPORD of the joint force, specific engineer missions assigned, and available engineer forces to achieve success. JFC engineer planners also need to understand the limitations of Service engineer forces in both capacity and force strength. Many of the engineer planning activities conducted for strategic operations are also performed at the operational level. At the operational level, engineers prioritize limited assets and mitigate risks. Engineers conduct OA/environment assessments and work with intelligence officers to analyze the threat during the joint intelligence preparation of the operational environment (JIPOE) process. Engineers seek ways to contribute to decisive, shaping, and sustaining operations by setting the conditions for success and facilitating the JFC's objectives. Consideration of lessons learned and best practices at this point may assist engineers in delivering the proper response. Engineers anticipate requirements and request capabilities to meet them. In concert with operational planning, engineers conduct site assessments using geospatial data and other technological means to assess and map proposed beddown locations and assist in developing plans for deployment, reception, beddown, employment, and sustainment. As the link to tactical engineer integration, operational planning ensures adequate engineer capabilities are provided to accomplish combat, general, and geospatial engineering support requirements. Collection of observations and lessons learned during the process will assist engineers in the planning of future operations.

c. **Tactical Planning.** Engineer planning activities at the tactical level focus on supporting the JFC's objectives. While tactical planning is conducted by each unit in the context of engineer operations, this translates to a focus on combat engineering tasks and planning done within tactical organizations. With the support of the engineer, the subordinate JFC ensures that engineer capabilities are effectively integrated into the OPLANs and tasks are appropriately assigned.

2. Planning Process

JOPP underpins planning at all levels and for missions across the full range of military operations. Engineering considerations are similar for both deliberate planning and CAP. This section illustrates some of the engineer planning activities during each phase of JOPP. Figure IV-1 shows some additional planning activities specific to engineering.

For additional information about the deliberate planning and CAP processes, see CJCSM 3122.01, Joint Operation Planning and Execution System (JOPES), Volume I (Planning, Policies, and Procedures); *CJCSM 3130.03,* Adaptive Planning and Execution (APEX) Planning Formats and Guidance; *and JP 5-0,* Joint Planning.

a. **Step 1 (Initiation).** During these activities, the joint force engineer assembles the resources required to support plan development and begins the initial engineer staff estimate. The joint force engineer also develops a request for information required for mission analysis and prepares engineer experts for a JOA survey team to gather RSOI planning data. Preliminary RSOI planning data may be obtained via the Global Combat Support System-Joint (GCSS-J). Initial expectations for geospatial engineering are also forwarded to allow the lead time necessary for focusing geospatial assets and beginning the production of required geospatial products and services to support the planning process. Throughout the process, the joint force engineer will rely upon guidance contained within the respective CCDR's contingency basing strategy, DOD directives, and the Unified Facilities Criteria (UFC). Additionally, those engineer planning products formulated by the joint force engineer during this step will form part of the appendix 6 (Engineering Support Plan) to annex D (Logistics) of the OPLAN or OPORD.

For additional information on joint engineering planning considerations when establishing, maintaining, and closing or transferring bases, see DODD 3000.10, Contingency Basing Outside the United States, *and UFC 1-201-01,* Non-Permanent DOD Facilities in Support of Military Operations.

b. **Step 2 (Mission Analysis).** Engineer considerations during this step of planning include, but are not limited to:

(1) Terrain and related weather analysis in support of OA/environment visualization.

(2) HN infrastructure and facilities assessment to include operational energy, water, and waste management.

(3) Assessment of multinational and HN engineer capabilities.

Engineer Considerations During the Joint Operation Planning Process

Planning Process	Engineering
Step 1, Initiation 1. CCDR receives planning task from Chairman of the Joint Chiefs of Staff (CJCS) 2. Major forces available for planning	• Review joint orders, particularly Appendix 6 (Engineering Support Plan), Annex D (Logistics), Appendix 15 (Force Protection), Annex C (Operations), Annex G (Civil Affairs), Annex L (Environmental Considerations). • Receive higher HQ construction directive(s).
Step 2, Mission Analysis 1. Mission statement is deduced 2. Subordinate tasks are derived 3. CCDR's strategic concept is developed Product: Concept of Operations	• Determine availability of construction materials. • Review availability of construction assets to include Service, joint, multinational, host nation, and contract. • Determine/review theater construction standards and base camp master planning documentation (if required). • Review unified facilities criteria as required. • Conduct site reconnaissance, request geospatial products and services, environmental baseline surveys, environmental health site assessments, and determine the threat (to include mine, UXO, IED, and environmental hazards). • Obtain necessary geological, hydrologic, climatic data. • Determine the level of interagency cooperation required. • Determine funding sources as required.
Step 3, Course of Action (COA) Development 1. Forces selected and time-phased 2. Support requirements computed 3. Strategic deployments simulated/analyzed 4. Shortfalls identified and resolved 5. Operation plan (OPLAN) completed Product: Complete OPLAN	• Produce different options that meet the commander's intent. • Determine alternate construction location, methods, means, materials, and timelines in order to give the commander options. (Utilize JEPES to supplement this action.) • Determine real property and real estate requirements. • Utilize the Critical Path Method to determine length of different COAs and their ability to accelerate project execution and completion. • Determine the most feasible, acceptable, and suitable methods of completing the engineering effort in terms of cost, time, and assets available. • Determine and compare risks of each engineering COA. • Gain approval or assist others in gaining approval for the construction management plan, safety plan, security plan, logistic plan, and environmental plan as required.

Figure IV-1. Engineer Considerations During the Joint Operation Planning Process

Engineer Considerations During the Joint Operation Planning Process (cont.)

Planning Process	Engineering
Step 4, COA Analysis 1. OPLAN/CONPLAN reviewed and approved by CJCS. 2. CCDR revises plan IAW review comments. Product: Potential decision points Evaluation criteria Potential branches and sequels Refined COAs Revised staff estimates	• Produce construction directives as required. • Provide input to the appropriate plans and orders. • Ensure all resources are properly allocated. • Conduct construction pre-briefings. • Conduct pre-inspections and construction meetings. • Synchronize construction plan with local and adjacent units. • Maintain as-built and red line drawings. • Project turnover activities.
Step 5, COA Comparison 1. Wargaming	• Provide input to supporting plans.
Step 6, COA Approval	
Step 7, COA Plan or Order Development	

Legend

CCDR	combatant commander	IED	improvised explosive device
CONPLAN	concept plan	JEPES	Joint Engineer Planning and Execution System
HQ	headquarters	UXO	unexploded ordnance
IAW	in accordance with		

Figure IV-1. Engineer Considerations During the Joint Operation Planning Process (cont.)

(4) Additional digital mapping requirements for projected missions.

(5) Capabilities of assigned engineer forces.

(6) Threat engineer capabilities.

(7) Environmentally sensitive areas and other environmental considerations.

(8) Historic and cultural resources.

(9) Beddown requirements for the supported friendly force.

(10) LOCs and APOD and SPOD supportability.

c. **Step 3 (COA Development).** The engineer assesses all available information derived from the mission analysis process to provide the commander with input required to develop the initial COAs. The joint force engineer uses this combined assessment to identify the resources required to support each COA, to make recommendations based upon available

time and resources, and to recommend force tailoring to best support the CCDR's intent. This assessment is the linchpin of successful engineer integration into operations. As part of the staff, engineers conduct parallel planning and analysis and prepare the engineer staff estimates to ensure that the engineer effort will support the COA. During COA development, the engineer may consider the following:

(1) Options for joint force operational movement and maneuver, force protection, and the ramifications for engineer support to tactical operations.

(2) Recommendations on ISBs, forward operating bases, beddown sites, forward logistic support sites, munitions storage areas, and avenues of approach.

(3) MSRs and available APODs/SPODs and railway stations to facilitate effective JRSOI.

(4) Construction standards given planned disposition of JTF constructed or modified infrastructure upon redeployment.

(5) **Staff Estimates.** As part of staff estimates, the engineer develops a detailed engineer assessment of each COA and its supportability from an engineer perspective. At this point in planning, the engineer considers the following:

(a) Specific engineer tasks necessary to support each COA.

(b) Identify and address any engineer factors that may influence or affect force deployment.

(c) Availability of engineer assets to meet requirements. Use of engineer planning factors (e.g., equipment, personnel, and unit capabilities) is essential in determining engineer support for each COA.

(d) Engineer logistics requirements to support each COA.

(e) Construction requirements to support each COA.

(f) Force protection.

(g) Engineer actions and capabilities, plus the resources needed during transition from sustained combat operations to termination of joint operations.

(h) Identification and planning for engineer transition points.

d. **Steps 4 and 5 (COA Analysis and COA Comparison).** The engineer participates in wargaming, analyzing, and comparing available COAs to produce a commander's estimate to support a COA comparison matrix. At a minimum, the engineer evaluates the following:

(1) Criteria for risk assessment (includes environmental risk).

(2) Resource requirements.

(3) Resources available.

(4) Advantages and disadvantages of each COA for each engineer function.

e. **Step 6 (COA Approval).** The engineer ensures that all requirements developed during the mission analysis and staff estimate processes are accounted for in the COA and supportable from an engineering perspective.

f. **Step 7 (Plan or Order Development).** The engineer prepares several annexes and appendices, provides significant input to others, and must review still others due to their possible significant impact on engineer operations as shown in Figure IV-2. Some considerations for their development and review include:

(1) **Annex A (Task Organization).** Engineers provide significant input to annex A (Task Organization) to ensure there is sufficient engineer capability to meet identified requirements and that command relationships are clear and appropriate. Additionally, planners provide input to the flow of the engineer force and materials as detailed on the TPFDD.

(2) **Annex B (Intelligence).** As part of the JIPOE process, engineers evaluate impacts on engineer operations and provide engineer-related intelligence requirements to the J-2 for inclusion within the intelligence planning products. Additionally, appendix 7 (Geospatial Intelligence) to annex B, contains information on the geospatial engineering forces assigned or attached, their manner of employment, and the required geospatial products and services. Engineers assist the CCDR in identifying geospatial assets available to support the plan. Engineers should review available geospatial products and services for adequacy and recommend additional geospatial capabilities.

(3) **Annex C (Operations).** Engineers review and participate in the writing of annex C (Operations). Their participation is, or may be, required in many of the subordinate appendices as well. Each of the following appendices requires special engineering considerations:

(a) **Annex C (Operations), Appendix 9 (Air Base Operability).** Engineer input to this appendix focuses on engineer support to airfield operations, including the five basic functions: to defend (installations), survive (provide expedient force protection), recover (assess damage, make repairs), generate (work-around for damaged systems), and support (the recovery effort).

(b) **Annex C (Operations), Appendix 12 (EOD).** Engineer input to this appendix must ensure that it is integrated with engineer operations to defeat EHs (including operations of the military mine action center and/or the EHCC).

(c) **Annex C (Operations), Appendix 13, (Amphibious Operations).** Engineer input to this appendix should focus on those engineering capabilities that are critical to amphibious operations (e.g., breaching, clearing, gap crossing, improving ground

Operation Plan Annexes

Subject	Annex
Task Organization	**A**
Intelligence	B
App 7, Geospatial Intelligence Tab A, Geospatial Information and Services Requirements List	
Operations	**C**
App 4, Special Operations **App 9, Air Base Operability** App 12, Explosive Ordnance Disposal **App 13, Amphibious Operations** **App 14, Force Protection** **App 15, Critical Asset Risk Management**	
Logistics	D
App 5, Mobility and Transportation *App 6, Engineer Support Plan*	

Subject	Annex
Personnel	E
Public Affairs	F
Civil Affairs	**G**
Meteorological and Oceanographic Operations	H
Command Relationships	J
Communications System	K
Environmental Considerations	*L*
Operational Contract Support	**W**
Execution Checklist	X
Distribution	Z

The joint force engineer:
- Prepares *italicized annex and appendix*.
- Provides significant input for the development of **bolded annexes and appendices.**
- Reviews all other annexes and appendices due to their possible significant impact on engineer operations and provides input as appropriate.

Figure IV-2. Operation Plan Annexes

trafficability, and beach to support ship-to-shore maneuver/movement, improving survivability of critical supplies/infrastructure).

(d) **Annex C (Operations), Appendix 14 (Force Protection).** Engineer input to this appendix focuses on engineer support to force protection, including the following: facility hardening, revetments, berms, and installation security improvements (barriers, perimeter fencing, monitors, and cameras). This appendix does not typically include those force protection actions associated with close combat such as the development of fighting and protective positions.

(e) **Annex C (Operations), Appendix 15 (Critical Asset Risk Management).** This appendix supports the critical asset (infrastructure) protection plan with input provided by the joint force engineer.

(4) **Annex D (Logistics).** The engineer planner should review all of annex D (Logistics) for engineer inputs, which will likely be required throughout.

(a) **Annex D (Logistics), Appendix 5 (Mobility and Transportation).** Engineer input to this appendix will be general or geospatial engineering-related and will include LOCs/MSRs and staging areas.

(b) **Annex D (Logistics), Appendix 6 (Engineer Support Plan).** The ESP is the principal engineer document in a joint plan and is written by the engineer. It addresses essential engineer support requirements, and its development ensures that essential engineering capabilities, to include those for combat, general, and geospatial engineering, are identified and will be provided as required to support the JFC's plan. The ESP should cover release authority, rules of engagement, any reserved obstacles, control measures, and key areas or obstacle groups for area denial systems such as mines and networked munitions. The ESP establishes requirements for facilities, facility support, projected construction, Class IV construction materials, and engineering capability in support of joint forces. The ESP should identify the overall facility requirements and summarize the existing US assets, HNS and multinational assets, and construction needed to satisfy those requirements. It should include consideration of the apportionment and allocation of engineering forces under existing plans, TPFDD (or other force flow model), and Service-specific capabilities. It should include the requirements for HN, contract, multinational, and US engineering forces and identify the engineering capability available for accomplishing construction, as well as essential combat engineering; emergency war damage repairs; maintenance of LOCs and MSRs; troop beddown; base camp construction (and associated standards); arms, ammunition, and explosives storage and maintenance facilities; construction support to force protection; and acquisition of construction and engineering support. The ESP should summarize shortfalls in terms of unsatisfied requirements. The ESP should reflect operational energy planning policies that emphasize reduced energy demand, expanded and more secure energy sourcing, and improved water and waste management.

For further guidance on the ESP, refer to CJCSM 3130.03, Adaptive Planning and Execution (APEX) Planning Formats and Guidance.

For additional information on operational energy, see DODD 4180.01, DOD Energy Policy.

For additional information on waste management, see Technical Manual (TM) 3-34.56/ Marine Corps Interim Publication 4-11.01, Waste Management for Deployed Forces.

(5) **Annex G (Civil Affairs).** Engineer input to this annex focuses on engineer plans for assistance to displaced persons, HCA, HDM, government stability, and the reconstruction of civilian utilities and infrastructure. A thorough understanding of CA plans, and interface with NGOs and IGOs, is essential for success.

(6) **Annex L (Environmental Considerations).** The joint force HQ engineer prepares this annex of the OPLAN with contributions provided by members of the JEMB and other members of the staff and Service components, to include legal, logistics, health services, and contracting personnel. From this analysis, the engineer staff plans for and schedules assets to provide environmental support (e.g., EBSs/environmental health site assessments [EHSAs]).

For additional information, see Field Manual (FM) 3-34.5/Marine Corps Reference Publication (MCRP) 4-11B, Environmental Considerations.

For additional information about OPLAN annexes, see CJCSM 3130.03, Adaptive Planning and Execution (APEX) Planning Formats and Guidance.

3. Development of Time-Phased Force and Deployment Data

Additionally, engineers should be involved in the development of the TPFDD, one of the most time-consuming and intensely managed aspects of plan development. The use of JEPES can help facilitate this action. Engineer participation in developing the TPFDD is critical to ensure that:

a. Critical engineer reconnaissance and assessment capabilities are positioned early in the TPFDD.

b. Engineer capabilities (units) arrive in the OA with assessment and repair capabilities to mitigate antiaccess effects to PODs including clearing debris or repairing infrastructure following attack.

c. Facilities required to support force projection and RSOI are in place and available to deploying units. JFCs need to plan for the early acquisition (leasing) of real estate and facilities for force and logistic bases where temporary occupancy is planned and/or the HN provides inadequate or no property. Early negotiation for facilities can be critical to the successful flow of forces.

d. Construction materials, equipment, and resources are available when required, including those required to achieve the CCDR's standards for base camp beddown.

4. General Planning Considerations

a. In tailoring the engineer support to operations, the joint force engineer should address a number of general considerations for engineer planning, including speed, economy, flexibility, decentralization of authority, and establishment of priorities (see Figure IV-3).

b. **Assured Mobility.** Assured mobility is the framework of processes, actions, and capabilities that assures the ability of the joint force to deploy and maneuver where and when desired, without interruption or delay, to accomplish the mission. This construct is one means of enabling a joint force to achieve the commander's intent. Assured mobility emphasizes proactive mobility and countermobility actions and integrates all of the engineer functions in accomplishing this. Assured mobility should not be confused with the limited application of the mobility function. While focused primarily on the joint function of movement and maneuver, it has linkages to each of the joint functions and both enables and is enabled by those functions. While the engineer has the primary staff role in assured mobility, other staff members support its integration and have critical roles to play. Ultimately, assured mobility is the commander's responsibility. The fundamentals of assured mobility include:

Engineer Planning Considerations

Speed

Engineering tasks are resource intensive in terms of time, materials, manpower, and equipment. Practices that support speed include utilization of existing facilities, standardization, simplicity of design and construction, bare-base construction, and construction in phases.

Economy

Engineering demands efficient use of personnel, equipment, and materials. Practices that support economy include the conservation of manpower, equipment, and materials and the application of environmental consideration early in the process.

Flexibility

Standard plans that allow for adjustment, expansion, and contraction will be used whenever possible. For example, forward airfields should be designed and located so that they can be expanded into more robust facilities.

Decentralization of Authority

Dispersion of forces requires that engineer authority be decentralized as much as possible. The engineer commander at a particular location must have authority consistent with responsibilities.

Establishment of Priorities

Establish priorities and resource allocation to determine how much engineer effort must be devoted to a single task. All levels of command, beginning with the joint force commander, will issue directives establishing broad priorities. Resources are initially assigned to the highest priority tasks while low priority tasks may be left undone while recognizing and mitigating the risk.

Figure IV-3. Engineer Planning Considerations

(1) **Predict.** Engineers and other planners must accurately predict potential enemy impediments to joint force mobility by analyzing the enemy's TTP, capability, and evolution. Prediction requires a constantly updated understanding of the operational environment.

(2) **Detect.** Using intelligence collection assets, engineers and other planners identify the location of natural and man-made obstacles, preparations to create/emplace obstacles, and potential means for obstacle creation. They identify both actual and potential obstacles and propose solutions and alternate COAs to minimize or eliminate their potential impact.

(3) **Prevent.** Engineers and other planners apply this fundamental by denying the enemy's ability to influence mobility. This is accomplished by forces acting proactively before the obstacles are emplaced or activated. This may include aggressive action to destroy enemy assets and capabilities before they can be used to create obstacles.

(4) **Avoid.** If prevention fails, the commander will maneuver forces to avoid impediments to mobility, if this is viable within the scheme of maneuver.

(5) **Neutralize.** Engineers and other planners plan to neutralize obstacles/impediments as soon as possible to allow unrestricted movement of forces. In this case, the term "neutralize" means to render enemy personnel or materiel incapable of interfering with a particular operation.

(6) **Protect.** Engineers and other elements plan and implement protection measures that will deny the enemy the ability to inflict damage as joint forces maneuver. This may include countermobility missions to deny the enemy maneuver and provide protection to friendly maneuvering forces.

c. **Geospatial Planning Information.** Examples of geospatial information useful for planning purposes are shown in Figure IV-4.

Geospatial Planning Information

Geospatial engineering provides commanders with terrain analysis and visualization, which improve awareness and enhance decision making. Examples of information that can be obtained include:

- Three-dimensional terrain fly-throughs
- Avenues and routes for joint forces, as well as likely enemy avenues of approach
- Obstacle-zone locations
- Potential engagement areas
- Potential unit positions/beddown sites
- Airfield and port information and capabilities
- Maneuver options
- Support to urban operations
- High-payoff target information
- Deep-target information
- Communications or visual line of sight
- Locations of lines of communications and main supply routes and potential locations of base camps
- Identification of flood plains and potential landing zones
- Ability to use fused data from multiple databases to enhance awareness

Figure IV-4. Geospatial Planning Information

d. A key consideration throughout the planning process and on to the execution process is assessment. The assessment process evaluates changes in the environment and measures the progress of the joint force toward mission accomplishment. It is a continuous process that begins during mission analysis when the commander and staff establish what and how to measure the progress of achieving objectives. This process and the measures developed assist commanders in making decisions. For more information on assessment, refer to JP 3-0, *Joint Operations*; JP 5-0, *Joint Planning*; and Joint Doctrine Note 1-15, *Operation Assessment*.

e. **Engineer Reconnaissance**

(1) The joint force engineer must identify requirements for engineer reconnaissance and see that they are met. These requirements will occur throughout an operation, and the timing of reconnaissance missions is critical. While engineer reconnaissance capabilities exist in many forms, few engineer reconnaissance organizations are permanently organized and designed specifically for the engineer reconnaissance mission. Organization of engineer reconnaissance capabilities (mix of engineer specialties, expertise, and equipment) and required supporting assets (environmental, preventive medicine, or other specialties and force protection elements) is a critical planning consideration to ensure an accurate and sufficient reconnaissance. Most engineer reconnaissance planned by the joint engineer will be in support of general engineering tasks as planning for engineer reconnaissance in support of combat engineering is typically conducted at lower levels. The range of engineer reconnaissance and its basic relationship to the engineer functions is shown in Figure IV-5.

(2) One critical engineer reconnaissance mission highlighted here is the infrastructure reconnaissance. The assessment and the survey are two types/levels of infrastructure reconnaissance used to gather necessary infrastructure information. The purpose of the assessment is to provide immediate feedback concerning the status of the basic services necessary to sustain the local population. The basic services or categories evaluated depend on the situation, mission, and commander's intent. While the assessment is typically performed by, or under the leadership of, engineers, other specialties can become important participants in infrastructure reconnaissance. The basic assessment may even be accomplished by others when an engineer is not available, depending on the expertise available and the type and quality of information required. If available, leaders should also consult military and NGOs in the area to determine if there are extenuating circumstances that may influence the outcome of the assessment. Typically, engineer and other planners use this information to define immediate needs and determine priorities of work. Leaders must continue to expand and refine the assessment as time and specific expertise become available.

(3) As follow-on to the assessment, the infrastructure survey provides a very detailed description of the condition of specific major services. Both the assessment and survey should pursue available documentation to identify waste management considerations, environmental hazards, and sensitive natural and cultural resources and sites. The primary difference between the assessment and the survey is the degree of technical information and the expertise required. They are not always clearly distinguishable from each other. See Figure IV-6 for a visual representation of the infrastructure assessment and survey model.

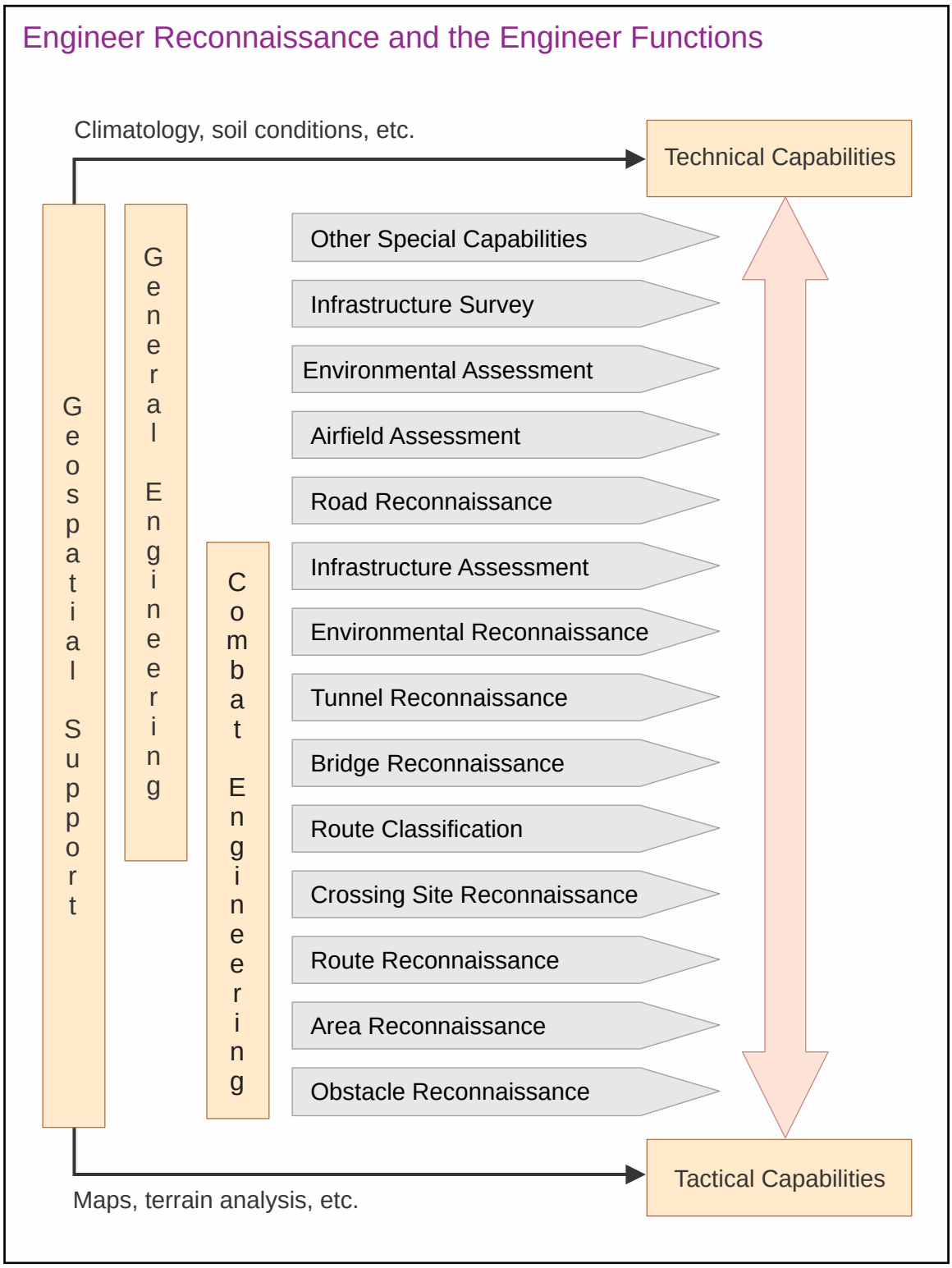


Figure IV-5. Engineer Reconnaissance and the Engineer Functions

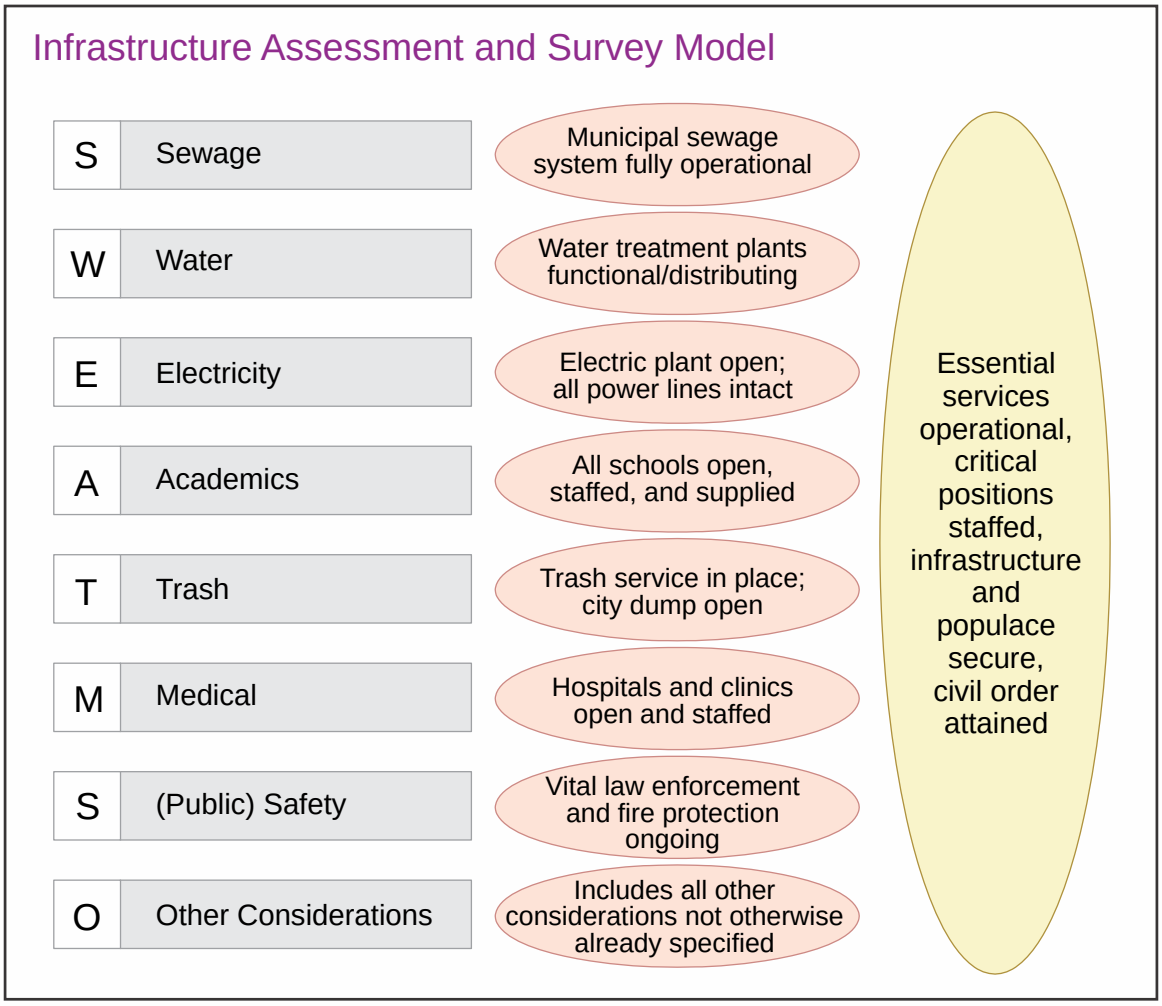


Figure IV-6. Infrastructure Assessment and Survey Model

The model contains seven areas to assess: sewage, water, electricity, academics, trash, medical, public safety, and other considerations; SWEAT-MSO is used as a memory aid for these infrastructure and assessment areas. The survey is normally conducted by a core of engineering specialties that will integrate necessary engineer specialties, expertise, and equipment with other technical specialties (e.g., medical, CA, military police) to enhance the quality and completeness of the survey. UFC 1-201-02, *Assessment of Existing Facilities for Use in Military Operations,* provides contingency personnel with procedures to assess an existing facility to determine if the building achieves the minimum life safety and habitability requirements to allow for occupancy in support of military operations. It also provides options for mitigating the risks inherent with common building deficiencies.

f. **Logistics.** The JFC's concept of logistics helps synchronize joint operations. The engineer support planning effort focuses on supporting the mobilization, deployment, employment, sustainment, and redeployment of the joint force. Since engineering requirements are often unique and situation-specific, logistics and engineering support planning should be conducted in concert to accurately forecast requirements (e.g., Class IV equipment and construction materials requirements; hazmat and waste management

requirements). Logistics requirements, including general engineering support, will affect the flow of forces into the OA by necessitating the early deployment of support units to enlarge the force reception throughput.

g. **JEPES.** JEPES is a GCSS-J tool used to support engineer planning and execution. It provides the general requirements for engineer assets and capabilities to support the selected planning COA or specific operations. JEPES assists the engineer planners to:

(1) Generate time-phased facility requirements based on the plans or specific scheme of operation.

(2) Analyze and assess engineering support by comparing requirements to in-theater assets and HN, contract, and troop engineering capability.

(3) Provide manpower, equipment, and construction materials, and nonunit cargo requirements for other processes.

(4) Provide engineer planning data to assist in mission analysis and COA development.

(5) Provide real-time monitoring capability needed to track plan execution.

5. Additional Planning Details

a. **Information and Intelligence Requirements.** A wide variety of national and DOD intelligence organizations, as well as open sources, can provide information essential to support engineering planning efforts. In addition, the joint force engineer and staff can play an effective role in the identification of intelligence requirements and assist in the collection and assessment of that data. The joint force engineer and staff determine IRs and submit those that concern the enemy to the joint force J-2 and those covering HNs, allies, and partner nations to the joint force J-3 for resolution.

(1) **JIPOE.** Engineer participation in the JIPOE process improves planning by identifying the most effective use of terrain and infrastructure. General engineer operations may require additional data and information beyond that required by other staff planners. The following are general engineering IRs at the operational level:

(a) **Geology.** Knowledge of the surface and subsurface strata for foundation designs and selection of anchoring systems.

(b) **Hydrology.** Planning requires site surveys of the hydrologic characteristics of the OA as critical considerations in the placement of logistic base complexes and base camps.

(c) **Hydrography.** Hydrographic conditions in the near shore and surf zones of littoral areas impact the selection of sites for amphibious assault, assault follow-on, maritime pre-positioning force, and JLOTS operations.

(d) **Weather and Climate.** The immediate impact of weather or seasonal aspects of climate can limit the progress of general engineer operations and project execution. Certain types of general engineering work are especially impacted by adverse weather or climatic conditions.

(e) **Infrastructure.** Information on infrastructure (e.g., facilities, airfield data, utilities systems, and transportation structures) includes HN design, construction, and maintenance practices as well as overall condition assessment (particularly of roads, bridges, ports, and airfields). This should include detailed engineering data on APOD/SPODs, road networks, etc., including surface and subsurface soil conditions, quantities (mile of road), and construction materials. This will probably require technical engineer reconnaissance to facilitate an infrastructure assessment.

(f) **Availability of Construction Resources in the HN and Region.** Class IV construction materials may be acquired anywhere in the world; however, not all construction material is of adequate quality and quantity to meet mission needs. In order to meet operational requirements per UFC 1-201-01, *Non-Permanent DOD Facilities in Support of Military Operations*, the JFC may decide to adopt local building codes/construction standards and use locally available construction materials. This allows joint force engineer units to construct facilities that meet the basic needs of the mission. Capability of construction contracting resources, labor, and equipment available for rent are also key elements of information.

(g) **Effect on HN Economy.** Significant general engineer operations can have an impact on the HN economy. As the US increases its reliance on contracting for logistic support, more is demanded from the HN and regional economies. The JFC should closely manage the US military demands on the local economy to maintain the minimum capabilities (e.g., skilled personnel, materials, and equipment) needed to sustain the HN's own requirements.

(h) **Environmental Information.** Environmental characteristics may affect the JFC's COA and should be considered in the planning process. These characteristics include, but are not limited to: important cultural and historical resources; sensitive flora and fauna; environmental hazards and health threats; and valuable natural resources such as coal, oil, clean air and water supplies, and arable land. Institutional information (e.g., environmental procedures and standards expressed in treaties, conventions, SOFAs, and HN laws or standards) is also critical to planning.

(2) **Engineer Information Collection.** Engineer organizations may also be considered sources of information to assist intelligence personnel to satisfy the CCDR's or subordinate JFC's priority intelligence requirements and IRs. As the result of military engagement activities over the years, the CCMD, subordinate joint force engineer, and Service engineer organizations (e.g., USACE, NAVFAC, AFCEC) have acquired vital engineering data and information not otherwise available from traditional intelligence resources. For example, the AFCEC pavements evaluation team provides an array of information on airfields around the world. Engineers can also make important contributions to the information collection effort by conducting on-site reconnaissance and discussions

with local officials. Engineers can determine if the local infrastructure can support military operations through technical engineer reconnaissance.

(3) **Engineer Assessment of Information.** As data and information are collected, the joint force engineer can contribute to the assessment of that information. Additionally, the joint force engineer can support the development of special products, studies, and new materials and systems. The engineer assessment process serves the following purposes:

(a) Contributes to the JFC's development of COAs.

(b) Allows the joint force engineer and staff to consider potential support for anticipated engineering missions.

(c) Leads to refinement of the engineer force list.

(d) Documents and disseminates lessons learned.

b. **General Engineer Reporting.** The JFC requires accurate status on general engineering support as part of ensuring timely logistic support and sustainment of joint operations, as well as the prioritization of future projects within the context of the JFUB, JCMEB, and JEMB. Status of the following general engineering support is essential: deployment of engineering forces and assets; construction and improvement of LOCs including APODs, SPODs, and MSRs; force beddown and construction of bases, operations, maintenance, and logistic facilities; engineer manpower, equipment, and construction materials; power generation and distribution infrastructure; and environmental conditions. Components generally submit reports to the JFC varying from daily to weekly, depending on the situation and established reporting requirements from the JFC and higher HQ. The joint force engineer and staff employ automated planning tools like the GCSS-J and the Joint Construction Management System to forecast engineering effects requirements in support of the joint force mission. These tools enable them to provide guidance, collect, consolidate, and track essential general engineering status reports to effectively monitor execution, as well as recommend changes to the JFC in a timely manner. The joint force engineer and staff develop specific formats, contents, and rating systems, based on JFC requirements and instructions. Important aspects in general engineering status reports may include the following:

(1) APOD construction and improvement—runway condition, the condition of the airfield lighting and navigation systems, maximum-on-ground number, capability to refuel aircraft, aircraft arresting barriers, and construction projects.

(2) SPOD construction and improvement—port berthing status, beach status, littoral support assets, and construction projects.

(3) LOCs—MSRs, bridges, railroads, and waterways.

(4) Force beddown—advanced base and ISB status, force protection construction support, and major projects.

(5) Engineer manpower and capabilities—military, civilian, HN, and contractors.

(6) Engineer equipment—in-service rates and critical maintenance.

(7) Class IV material—quantity reports, delivery dates, and HNS status.

(8) Power generation and distribution infrastructure—service outages and repair times.

(9) Environmental—reportable incidents and materials.

(10) Other project status—humanitarian, CA, reconstruction, force protection.

6. Functional Planning Considerations

Each engineer function has unique planning considerations, many of which are addressed in Chapter II, "Engineer Functions." Some of those that are most significant to the joint force engineer's planning activities include:

a. **Combat Engineering.** Emplacing barriers and obstacles and countering their use by adversaries are often significant requirements for engineers. Collectively these roles are covered primarily by the functional categories mobility and countermobility. Under combat engineering, these are focused on support to combat maneuver forces conducting operations on land and as a part of amphibious operations. This planning includes both the creation of barriers and obstacles and breaching or crossing those placed by nature or the enemy. This is a primary focus of the engineer role assuring mobility for the joint force. Survivability is also performed as a part of combat engineering and is focused on the hardening of facilities, personnel, equipment, and critical supplies in support of the maneuver commander at the brigade or regimental and lower echelons. It includes CCD support to tactical ground maneuver forces. This may include employing barriers, walls, shields, berms, and the construction of fighting positions and/or protective positions. Combat engineers typically provide the "lower end" hardening and CCD support while general engineering support is focused on aspects that are not involved with close combat. The joint force engineer should consider the following:

(1) Analyzing intelligence data, including ground and aerial reconnaissance and geospatial data to identify existing barriers, obstacles, and areas that require friendly barriers or obstacles.

(2) Evaluating terrain and climate to determine and enhance the integration of barriers and obstacles into the overall plan. This includes accounting for controlling the movement of civilians as well as anticipating how the enemy may use the terrain and identifying any critical intelligence requirements to verify this information.

(3) Evaluating terrain, climate, and enemy capabilities to assess the magnitude of survivability support that will be required from combat engineers.

(4) Assessing how much general engineering support will be required to augment/reinforce available combat engineer capabilities to meet the desired/required levels of protection and security.

(5) Identifying the weapon systems and delivery assets available to deliver or employ the selected barriers and obstacles.

(6) Coordinating with operations on the limitations and expenditure of selected obstacles and the designation of restricted areas.

(7) Publication of the barrier and obstacle plan, mine-recognition handbooks, and land mine recognition and warning posters for deploying forces.

(8) Establishing, disseminating, and enforcing route and area land mine clearance and marking procedures.

(9) Providing engineer input to the appropriate annexes and appendixes to the OPLAN or OPORD.

(10) Planning for the removal or deactivation of barriers, obstacles, and mines when they are no longer needed.

(11) Assessing base damage repair and ADR.

For further guidance on barriers, obstacles, and minefield planning, refer to Chapter II, "Engineer Functions," and JP 3-15, Barriers, Obstacles, and Mine Warfare for Joint Operations.

b. **General Engineering**

(1) **Technical Expertise.** One of the challenges joint force engineers face in planning general engineering is access to specialized technical expertise. Much of this expertise resides within the Services and can greatly assist joint force engineers. Joint force engineers should understand how to access this expertise. A good place to start is by establishing contact with the Services' engineer organizations (USACE, NAVFAC, and AFCEC). These organizations have vast expertise in engineer planning and operations with various capabilities to reach back to technical subject matter experts, augment JFC planning staffs, and rapidly deploy specialized teams for engineering assessments and analyses.

(2) **Requirements for Facilities.** The joint engineer plans for general engineering requirements in support of base camps and facilities (to include the construction standards to be applied). The requirements should reflect the general engineering support necessary for the expected duration and intensity of operations, be limited to the forces employed (to include multinational, HN, and contractors), and be time-phased. Newly constructed facilities must meet criteria defined in UFC 1-201-01, *Non-Permanent DOD Facilities in Support of Military Operations,* and existing facilities must be assessed and meet the criteria defined in UFC 1-201-02, *Assessment of Existing Facilities for Use in Military Operations*. The JFC determines what facilities are needed to satisfy operational requirements.

(a) **Categories.** 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 be met from these categories in the following priority order:

1. US-owned, occupied, or leased facilities (including captured facilities).

2. US-owned facility substitutes pre-positioned in theater.

3. HN and multinational support where an agreement exists for the HN and partner nation to provide specific types and quantities of facilities at specified times in designated locations.

4. Facilities available from commercial sources.

5. US-owned facility substitutes stored in the US.

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

(b) **Construction.** The joint force engineer should plan expeditious construction of facility requirements that are considered shortfalls (e.g., those facilities that cannot be sourced from existing assets). In these circumstances, the appropriate Service, HN, or partner nation should to the extent possible perform construction during peacetime. Contracting support should be used to augment military capabilities. If new construction cannot be finished in time to meet mission requirements, the CCDR and joint force engineer should seek alternative solutions to new construction. Expedient construction (e.g., rapid construction techniques such as prefabricated buildings, clamshell structures) should also be considered, as these methods can be selectively employed with minimum time, cost, and risk.

(c) **Funding.** Adequate funding (see Appendix E, "Construction Authorities and Funding") must be available to undertake early engineer reconnaissance and acquisition of facilities to meet joint force requirements, whether by construction or leasing. Funding constraints are a planning consideration. The JFC articulates funding requirements for construction and leasing of facilities by considering the missions supported and the amount of funds required. The JFC should take steps to assure that the Service components allocate sufficient funds for facility construction, including 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, on-the-shelf designs are completed to expedite facility construction in time of need.

c. **Geospatial Engineering**

(1) **IRs.** Geospatial data provides the foundation for analysis and visualization of the operational environment, is required for many military functions such as navigation, mission planning, mission rehearsal, targeting, obstacle and minefield reconnaissance, and

terrain analysis. Engineers assist in visualization of the operational environment through theater geospatial assets. When coupled with threat analysis, environmental effects, weather, the friendly situation, and the logistics situation, geospatial information may lead to identification and location of operational centers of gravity (both friendly and enemy), a more accurate view of the operational environment, and improved situational awareness of environmental conditions and related health threats. Accurate visualization of the area in which joint forces conduct operations allows commanders to plan for branches to current operations. Requirements for GI&S are determined and validated by the GI&S officer and J-2 during the deliberate planning and CAP processes.

For further guidance on GI&S, refer to Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3901.01, Requirements for Geospatial Information and Services; *JP 2-01.3,* Joint Intelligence Preparation of the Operational Environment; *and JP 2-03,* Geospatial Intelligence in Joint Operations.

(2) **Geospatial Engineer Support.** Joint operations may be conducted in areas that have limited up-to-date geospatial coverage. When providing geospatial engineering to the joint force, the geospatial engineer should coordinate the following with the GI&S officer and J-2:

(a) Evaluating the availability of standard and nonstandard map and imagery products in the OA. If shortfalls exist, the geospatial engineer, the GI&S officer, and the J-2 should define specific requirements and coordinate the collection and creation of necessary data to build the joint force geospatial database. Standard data sets that are created should be coordinated back to the national level to update the Geospatial Intelligence Knowledge Base for the benefit of the rest of DOD and interagency organizations.

(b) Early collection of both classified and open-source geospatial information in the OA through reconnaissance, topographic survey, site survey, data mining, and satellite imagery.

(c) Requesting digital geospatial and imagery information from the NGA immediately after mission requirements are established. NGA produces a variety of digital geospatial data sets. During peacetime, CCMDs may establish a basic requirement for these standard data sets. As contingencies arise, data sets tailored to the specific operation should be requested early in the planning process to ensure that these products will be available to the joint force. The request should also include data sets for all the subordinate units involved in the operation and should identify the expected capacity of geospatial engineers in the CCMD and subordinate joint force to assist in producing and maintaining required data.

(d) Ensuring that terrain analysis and other geospatial capabilities are available to the joint force early in the JOA or through split-basing capabilities from the US. Engineer forces deploy worldwide on short notice. It is important to define geospatial data requirements early and focus limited geospatial assets on the most important areas.

(e) Establishing a geospatial product storage and distribution capability in conjunction with the J-2, J-4, and GI&S officer. Requirements are established by the CCDR.

(f) Establishing special geospatial engineering procedures with special operations forces and other deployed forces.

7. Detailed Planning Considerations

a. **Transitions.** Engineering planning for operational phase transition is essential to ensuring uninterrupted support to the joint force. Many times operational planning details are not known in enough time to adequately respond with fully resourced ESPs, given that design, material, sourcing, and funding approvals may require long lead times. Accordingly, engineers, together with logisticians, must anticipate the JFC's phase transition decisive points in order to ensure adequate resources are available for the next phase of the campaign. For example, basing arrangements for US and/or multinational/indigenous forces must be anticipated far ahead of the JFC's decision to transition from phase III to phase IV in order to set the conditions for a smooth transition from the engineer's perspective. Another JFC decision that is important to engineers is the transition from organic support equipment and tentage to a more robust, efficient, and sustainable base support system. These engineering and logistics decisions must be made in coordination with multiple stakeholders, including the operational contract support community, as many engineering services functions can be provided by the civil augmentation program (LOGCAP, AFCAP, and GCCMAC/GCSMAC) given the right conditions.

(1) **Engineer Force Organization.** Engineer force packages must contain the right mix of capabilities to ensure timely and relevant engineer support to the JFC. This mix will often need to change drastically during transitions, and the joint force engineer must anticipate and plan for these changes. For example, in early operational phases combat engineers often make up the majority of engineer forces in theater during sustained combat operations, but they must be reinforced during transition to later phases as they typically do not have the right capabilities to accomplish all the general engineering tasks required. Also, since EOD support requirements during transition operations are often significantly higher than during combat operations, more EOD capabilities may be required.

(2) **Engineer Missions.** Engineer missions related to this type of transition will typically fall into four general categories:

(a) **Engineer Reconnaissance.** The joint force engineer must anticipate requirements for engineer reconnaissance, for example: the condition of the civilian infrastructure, facilities requiring immediate engineer effort, and hindrances to mobility. The reconnaissance conducted at this time will ideally be focused on refining plans created as a result of initial proactive planning. The initial EBS for contingency location and other selected sites should also occur as a part of this reconnaissance if possible and be linked to the occupational site assessment and EHSA.

(b) **Base Camp Construction and Maintenance.** The GCC designates a lead Service component responsible to execute the basing process for each initial and temporary base camp location. This includes, but is not limited to, performing the engineering functions required for the beddown of its assigned forces and other units assigned to that location. Each Service is responsible to meet its own expeditionary basing requirements to

support contingency beddown of their forces. Services perform the base engineering functions on designated joint expeditionary bases where that Service has the majority of the forces. Theater construction policies will dictate the level of effort for construction and management of Service or joint expeditionary bases in each theater. Engineer planners must also consider Services' organic ability to provide base engineering maintenance services at CCMD-designated joint bases. This is especially critical in instances where one Service component is required to act as the BOS-I. In instances where the BOS-I chooses to use the civil augmentation program to provide base services, early planning by engineers and logisticians for these and other base camp support requirements will help remove undue burdens from the operational staff during critical points in the campaign. Considerations include the size of the force projected to operate from the base camp(s), the duration the base camp will be required, and the level of construction standards to be applied. Other important parameters include geographical location, weather, available construction materials, resources, utilities, political concerns for permanency, localized environmental hazards and health threats, and impact on the local populace. These decisions should be included early in the planning process for all projected/potential base camp locations. Automated planning tools like the GCCS-Joint and Joint Construction Management System can be employed to forecast construction labor, materiel, and equipment requirements in support of the JFC's contingency basing strategy and the joint BOS-I's mission.

For additional information on base camp planning considerations, refer to Army Techniques Publication (ATP) 3-37.10/MCRP 3-17.7N, Base Camps.

(c) **Civilian Infrastructure Repair and Maintenance.** Rapid repair or improvement in the infrastructure will have far-reaching impacts on mission success at all levels. Engineers typically work in conjunction with CA to conduct civilian infrastructure reconnaissance and assessment.

(d) **Other General Engineering Considerations**

1. Construction support to force protection operations and post-combat beddown.

2. SPOD and APOD facilities maintenance and expansion.

3. Repair and construction of MSRs and facilities to support future retrograde and redeployment operations.

4. Termination of real estate rights of entry, leases, and conduct of closeout activities.

5. Coordination of EOD forces for the destruction of remnants of war, such as ammunition, mines, and UXO.

6. Conduct of HN infrastructure and operational environment damage assessment.

7. Clearance of debris and emergency repairs to critical HN infrastructure.

8. Control and removal of hazmat and waste.

9. Conduct of environmental remediation (see Appendix C, "Environmental Considerations") when required by international agreement or to prevent immediate exposure of US forces and personnel to environmental contamination that poses a substantial impact to human health and safety.

10. Reconstitution of assets.

11. Management and quality assurance of contracted construction projects.

(3) **Intelligence.** The JFC obtains the greatest intelligence benefit by focusing the right engineer expertise on the right missions. The engineer staff officers must maintain close liaison with the intelligence staff to provide, coordinate, and integrate technical expertise, engineer-related IRs, and specialized engineer assets to enhance information collection efforts. Engineer reconnaissance teams are particularly valuable in this role. Special operations forces can also provide valuable information for the engineer planner due to their early presence in the OA.

(4) **Logistics.** Timely delivery of the proper engineer supplies, personnel, and equipment is essential for success during transition. Logistical requirements change as operations transition to stability operations. Construction and specialized equipment requirements will impose different Class IX repair parts requirements than combat engineering equipment, and Class IV construction materials will differ from those required during combat operations. Estimates should be revised over time as more up-to-date intelligence is gathered. Engineers should work closely with logisticians to monitor Class IV stock levels to ensure materials are on hand when required.

(5) **Coordination with USG Departments and Agencies and Other Organizations.** USG departments and agencies, IGOs, NGOs, multinational partners, civilian contractors, and the HN will all have a role in the transition to peace and normalcy. As the joint force mission begins to shift, more and more of these organizations will become involved. A successful military and political transition to USG departments and agencies, IGOs, and NGOs requires knowledge and understanding of the roles, responsibilities, constraints, and capabilities of these agencies and organizations. The joint force engineer will play a key role during this process.

b. **Force Protection.** Engineers have unique equipment and personnel capabilities that can be used to support force protection efforts. Engineers construct protective facilities, bunkers, emplacements, vehicle barriers, fences, and other structures. Combat engineering tasks like the development of fighting and protective positions (survivability) are also a part of force protection. Engineer support to force protection also includes the support of CCD. Planners should consider the following:

(1) Establishing the required level of protection based on the expected threat.

(2) Identifying and implementing force protection construction standards, including requirements for security fencing, lighting, obstacles, and guard posts. Publish proper safety standards for construction of long-term fortifications, fighting positions, bunkers, and berms.

(3) Ensuring that early-entry forces have adequate force protection construction materials, materials handling equipment, and holding areas. Service component engineers should review these materials annually to ensure the theater stocks are sufficient to meet initial entry requirements.

(4) Establishing facility security inspection procedures with military and local law enforcement personnel to quickly identify and repair breaches.

(5) Delineating force protection construction responsibilities between engineer units and supported units.

(6) Providing adequate engineer capabilities to facilitate survivability for combat maneuver forces as a part of combat engineering.

c. **EOD.** EOD support to the engineer force is critical. This capability must be requested through their higher EOD HQ, and units may be placed in a direct support or general support role. The speed and efficiency with which UXO hazards, weapons caches, and IEDs are eliminated directly impacts overall mission success, both militarily and politically. Selective EOD staff integration into engineer staffs and in organizations like the EHCC or military mine action center are both desirable and in some cases essential. In addition, when possible, JFC engineer staff coordination and/or integration into EOD staffs is desirable.

d. **Real Estate Requirements.** Joint force engineers must plan for the acquisition of land and facilities and their management and ultimate disposal to support joint operations, including:

(1) Operational facilities (e.g., command posts [CPs], airfields, ports).

(2) Logistics facilities (e.g., maintenance facilities, supply points, warehouses, ammunition supply points, and APOD/SPOD for sustainment).

(3) Force beddown facilities (e.g., dining halls, billeting, religious support facilities, clinics, and hygiene facilities).

(4) Common-use facilities (e.g., roads, JRSOI facilities).

(5) Force protection planning considerations (e.g., site selection, proximity to potential threat areas, sniper screening); establishment of appropriate perimeter standoff for bases and air bases IAW CCDR standards.

For additional information about real estate management, see Chapter II, "Engineer Functions."

e. **Construction Planning.** The joint force engineer and Service component engineers must ensure that facilities are available to support the joint force. This will often require new construction, but where possible, it is important to maximize the use of existing facilities. Facility requirements are dependent on numerous factors as indicated in Figure IV-7. Planning will include those facilities that are considered shortfalls, i.e., those facilities that cannot be sourced from existing assets. In these circumstances, the appropriate Service, HN, or partner nation should to the extent possible perform construction during peacetime. Because construction is time-consuming and entails the risk of not being finished in time to meet mission requirements, the joint force engineer should seek alternative solutions to new construction. Expedient construction (e.g., rapid construction techniques such as prefabricated buildings, clamshell structures) should also be considered, as these methods can be selectively employed with minimum time, cost, and risk. Besides military engineers, construction assets include HN and civilian engineers and contractors. While all of these assets are capable of executing similar projects, they are not necessarily interchangeable. The engineer planner should consider the strengths, capabilities, and availability of each.

Facility Requirements Factors

- Mission and operational objectives
- Total force structure to be supported
- Expected duration of force deployment
- Types of equipment to be employed
- Number of days of supply to be stocked in the operational area
- Standards of construction
- Operational area medical policy
- Operational area climatic conditions
- Time-phasing of force deployment
- Force protection (e.g., antiterrorism/force protection standoff distances)
- Hazardous material management and waste disposal
- Proximity to lines of communications
- Utility requirements
- Availability and suitability of existing host-nation infrastructure
- Real property factors
- Environmental restrictions
- Cultural and historic sites and sensitive natural resources
- Safety requirements (e.g., explosive safety distances, airfield clearances, fire prevention)

Figure IV-7. Facility Requirements Factors

Specialized unit requirements such as water well drilling or underwater demolition or construction teams should be identified early in the planning process. Joint force engineers must also plan to ensure the joint force has adequate construction management capability.

(1) **Funding and Resource Management.** Joint force engineers must understand funding authorities and references. Engineers should coordinate with comptrollers and legal staff and be familiar with peacetime construction authorities and procedures. However, contingency and wartime construction require different procedures. See Appendix E, "Construction Authorities and Funding," for more detailed information.

(2) **Construction Standards.** Construction standards provide a framework to ensure efficient application of limited engineering assets and to responsively support the commander's intent and executing the theater CONOPS. The CCDR in coordination with Service components and the Services, specifies the construction standards for facilities in the theater to optimize the engineer effort expended on any given facility while assuring that the facilities are adequate for health, safety, and mission accomplishment. UFC 1-201-01, *Non-Permanent DOD Facilities in Support of Military Operations,* provides life safety and habitability-related design requirements for non-permanent facilities designed and constructed for use by DOD personnel in support of military operations. Figure IV-8 illustrates the beddown and basing continuum and highlights the need for early master planning efforts to help facilitate transition to more permanent facilities as an operation develops. Timelines provide a framework to plan for the transition of standards, but the actual trigger for transition will be based on conditions. In addition to using these guidelines when establishing initial construction standards, the JFUB should be used to periodically revalidate construction standards based on current operational issues and provide recommendations to the JFC on potential changes. Ultimately, it is the CCDR who determines the exact construction type based on location, materials available, etc. The joint engineer must recommend the most feasible solutions to each requirement. Construction standards are guidelines, and the engineer must consider other factors in planning such as US policy and HN limitations on permanency. Example standards for expeditionary, initial, and temporary construction are detailed in Figure IV-9.

(a) **Contingency Phase (Typically 0 to 2 Years)**

1. **Organic.** Organic construction is set up on an expedient basis with no external engineer support, using unit organic equipment and systems or HN resources. Intended for use up to 90 days, it may be used for up to six months. It typically provides for initial force presence and maneuver activities until force flow supports arrival of engineer resources.

2. **Initial.** Characterized by facilities set up on an expedient basis with minimal external engineering design support, using Service, HN, or contracted equipment and systems. Initial standard construction is intended for immediate use by units upon arrival in theater for up to six months. Typical to transient mission activities, it may require system upgrades or replacement by more substantial or durable facilities during the course of operations.

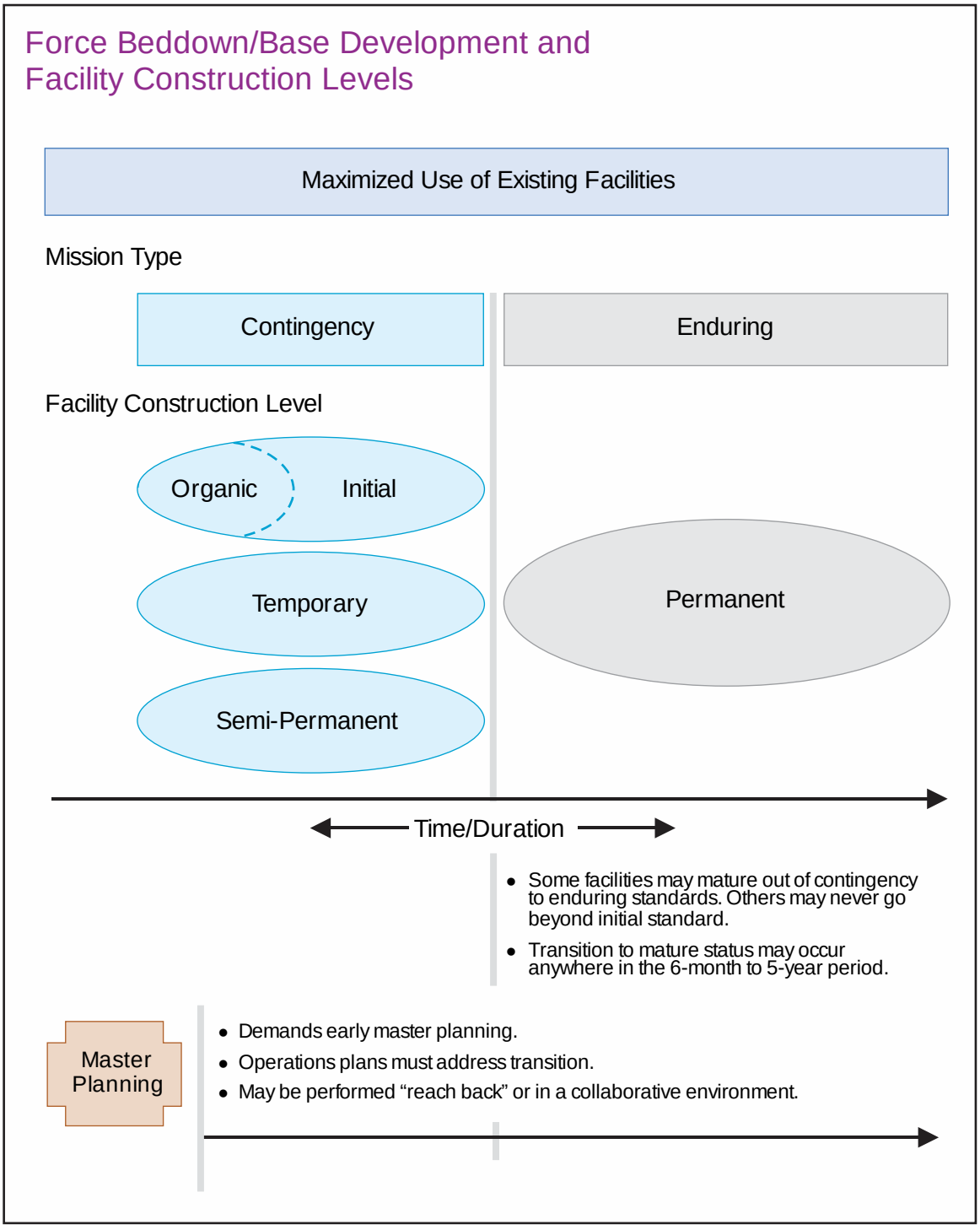


Figure IV-8. Force Beddown/Base Development and Facility Construction Levels

Contingency Construction Standards in Theater

Organic Standard

- Support on expedient basis with no external engineer support. Uses unit organic equipment and systems and/or host nation resources.
- Intended for use 90 days up to 6 months.
- Provides for initial force presence and maneuver activities until force flow supports arrival of engineer resources.

Initial Standard

- Characterized by minimum facilities that require minimal engineer effort and simplify material transport and availability.
- Intended for immediate operational use by units upon arrival for use up to 2 years.
- May require replacement by more substantial or durable facilities during the course of operations.

Temporary Standard

- Characterized by low cost, expedient construction utilizing locally available materials and construction methods and equipment.
- Intended to increase efficiency of operations for use up to 5 years.
- Provides for sustained operations.
- Replaces initial standard in some cases where mission requirements dictate. The temporary standard may be used initially if so directed by the combatant commander.

Type of Construction	Organic	Initial	Temporary
Site Work	Minimal to no site work; maximized use of existing facilities	Clearing and grading for facilities including drainage, revetments of petroleum, oils, and lubricants, and ammunition storage and aircraft parking; aggregate for heavily used hardstands; and soil stabilization	Engineered site preparation, including paved surfaces for vehicle traffic areas and aircraft parking, building foundations, and concrete floor slabs
Troop Housing	Unit tents	Tents (may have wood frames and flooring)	Wood frame structures, relocatable structures, and modular building systems
Electricity	Unit tactical generators	Tactical generators: high and low voltage distribution	Nontactical or commercial power and high or low voltage
Water	Water points and bladders	Water points, wells, and/or potable water production and pressurized water distribution systems	Limited pressurized water distribution systems that support hospitals, dining halls, firefighting, and other major users
Cold Storage	Contracted or unit purchased	Portable refrigeration with freezer units for medical, food, and maintenance storage	Refrigeration installed in temporary structures
Sanitation	Unit field sanitation kits, pit latrines	Organic equipment, evaporative ponds, pit or burnout latrines, lagoons for hospitals, and sewage lift stations	Waterborne to austere treatment facilities – priorities are hospitals, dining halls, bathhouses, decontamination sites, and other high-volume users
Airfield Pavement*		Tactical surfacing, including matting, aggregate, soil stabilization, and concrete pads	Conventional pavements
Fuel Storage	Bladders	Bladders	Bladders and steel tanks

* The type of airfield surfacing to be used will be based on soil conditions and the expected weight and number of aircraft involved in operations.

Figure IV-9. Contingency Construction Standards in Theater

3. **Temporary.** Buildings and facilities designed and constructed to serve a life expectancy of five years or less. A minimal facility intended to increase efficiency of operations and moderately improve quality of life for occupants. Maintainability is a secondary consideration. Construction features are characterized by low cost, expedient construction utilizing locally available materials and construction methods and equipment. Temporary construction typically cannot be economically converted to a higher construction level. Temporary standard construction can be used from the start of an operation if directed by a CCDR. It is typical for non-transient mission activities.

(b) **Enduring Phase (Typically 2 Years and Beyond).** DOD construction agents (USACE, NAVFAC, or other such DOD-approved activity) are the principal organizations to design, award, and manage construction contracts in support of enduring facilities, which shall be IAW the applicable UFC.

1. **Semipermanent.** Buildings and facilities designed and constructed to serve a life expectancy of less than 10 years. With maintenance and upkeep of critical building systems, the life expectancy of a facility can be extended to 25 years. Expediency of construction and material availability may be a factor. Facilities are intended for a more enduring presence with operational characteristics and functional performance similar to permanent construction. The types of structures used will depend on duration. It may be used initially if directed by the CCDR after carefully considering the political situation, cost, quality of life, and other criteria.

2. **Permanent.** Designed and constructed with finishes, materials, and systems selected for high energy efficiency and low maintenance and life-cycle costs, permanent standard construction has a life expectancy of more than 10 years. Construction standards should also consider the final disposition and use of facilities and any long-term goals for these facilities to support HN reconstruction. The CCDR must specifically approve the use of permanent construction standards at non-enduring locations.

(c) **Transition and Strategic Support.** The GCC directs transitions between initial, temporary, and semipermanent contingency locations within the theater; SecDef approval is required for transitions from temporary to semipermanent status, and from a contingency location to an enduring location. Changes to facilities construction standards should coincide with changes to basing characterization. Relative timelines of acquiring funds and resource availability will challenge execution of any planned efforts. Potential enduring bases and conditions for transition should be addressed in OPLANs, along with early master planning of the required bases. This planning may be performed by reachback to distribute engineer staff workloads to other support areas or centers of excellence. Given the implications the transitions bring about, centralized management of these decisions is essential to effective theater support and consistency. In any case, the joint engineers at the strategic, operational, and tactical level must all be involved to ensure the best utilization of engineer resources.

(d) **Construction Standard Considerations.** Decisions on construction standard are not to be based on time alone; there are many other factors to consider. For example:

1. Is it cost-effective to use building systems (facility-equivalent equipment) or local labor and materials? Does it make sense to use a temporary standard for a mission that has an expected duration of less than a year? Consider the use of expeditionary soft-walled shelters (or similar systems) and the fact that it may cost more to relocate these systems than to hire local labor to build initial standard indigenous tent systems or semipermanent structures with local material. Assuming there is no political constraint limiting the visibility of permanency and the local labor source can build the facilities within the required time, it may be more cost-effective to build to the semipermanent standard with a higher quality of life for the troops.

2. Should different standards be applied to the same location if variations in missions warrant it? Consider a base camp with units permanently assigned to the location compared with units transiting through the location.

3. When planning for new construction, one must also account for supervisory and administrative costs, planning and design costs, and contingency costs in the overall project amount when incorporating any of the DOD contract construction agents (CCAs) into construction management.

4. What will be the facility life-cycle sustainment requirements (manpower, maintenance requirements, HN capability, etc.)?

(e) **Construction Standards Implementation.** Construction standards need not be stepped through progressively; there are many other factors to consider. For example:

1. For troop housing, the initial standard may be met by billeting personnel in available facilities or constructing general purpose medium or equivalent indigenous tents. Expeditionary base camp sets (i.e., expeditionary soft-walled shelters or similar systems) could be considered initial standard when austerely configured and requiring minimal engineer effort. Otherwise these complete expeditionary base camp systems meet the minimum facility requirements of the temporary standard and when directed by a CCDR can be used from the start of an operation. Likewise, construction of basic Southeast Asia huts may meet this temporary need. Development of semi-permanent and permanent standard facilities would include Southeast Asia huts, expeditionary structures, local contract brick or steel frame construction, and prefabricated buildings according to their life expectancy.

2. Other requirements may follow different timelines. Power production facilities, for example, may follow a much quicker timeline than the facilities they support. The initial standard of tactical power production may move to the temporary standard local contractor generation followed by semi-permanent connection to commercial power all within the contingency timeframe.

3. It may sometimes be prudent to “step” over standards. For example, a unit supported with initial standard systems may be enhanced to semi-permanent structures if the situation justifies it. Likewise, forces may transition from organic standards to a temporary standard construction.

(3) **Building Systems.** Building systems may provide a rapid solution to facilities requirements. The engineer planner analyzes cost, availability, and timeline for execution of construction when considering the procurement and use of building systems (e.g., fabric skin, metal frame structures, steel arch structures, and panel building systems).

(a) The US Air Force and the US Army maintain and deploy a number of expeditionary basic camps that consist of tents and fabric skin and metal frame structures that are rapidly assembled. These systems may require engineer support for site preparation and set layout and assembly.

(b) Commercial building systems are also available worldwide. These systems include basic shelters and modular building systems complete with built-in utility wiring and utilities. While rapidly assembled and usually capable of being relocated, they are typically more expensive than austere facilities constructed in the field.

(4) **Service Standard Designs.** Service standard designs should be considered for use in support of joint operations and are starting points for Service component general engineer planners. The designs may be modified based on operational, environmental, and unusual site conditions or unique customer requirements. Examples of standard designs can be found in the Theater Construction Management System for land and maritime components.

(5) **Procurement of Construction Materials.** Engineer planners must understand the commander's intent and CONOPS, including expected duration of operations, to ensure appropriate material selection. Sustaining military operations usually requires large amounts of construction materials. Obtaining materials on time and in the quantity and quality needed must occur in order to bring other resources (time, personnel, and equipment) together to complete the project. The ESP is used to establish the initial requirements during initial planning. Materials can be procured through military supply channels or local procurement, or they can be produced locally. Each method has inherent costs and benefits.

(a) **Military Supply Channels.** Obtaining materials through the normal military supply channels requires extensive planning and material forecasting, and in cases where the objective is building partner capability or economic development, it is less desirable than local procurement, but will often be necessary if materials are not locally available. To support these shipments, adequate port or airfield facilities must be available for early reception of required equipment and materials. If adequate facilities are not available or existing facilities cannot be adapted or modified, it may be necessary to establish sites for JLOTS operations. Many Class IV materials are bulky, require handling and transportation over long distances, and are in high demand. Due to long lead time, it may take several months for certain materials to arrive. For these reasons, initial construction material forecasts based on the ESP are usually submitted by the Service components.

(b) **Local Procurement.** Procuring construction materials locally from countries within or near the AOR is often the most advantageous. To maximize its benefits, local procurement should occur as close as possible to the actual construction site in order to minimize transportation requirements. Use of local building materials and techniques

minimizes shipping of materials and produces structures that are best suited to the local environment, and may simplify facility maintenance and repair requirements.

(c) **Quality of Materials.** The quality of locally available materials often varies widely and may differ significantly from those used in standard designs. This can have a significant effect on a structure's safety and constructability.

(d) **Quantity of Materials.** The ESP gives an order of magnitude for the quantities of materials required to support the operation. Because operational requirements may change after the materials have been ordered and shipped, engineer planners should consider materials and building systems that can be adapted for other uses.

(e) **Production of Construction Materials.** Certain materials required in large quantities make it advantageous to be produced locally. Engineers may operate borrow pits and quarries or contract with suppliers. Significant environmental restrictions may be placed on joint forces when creating or operating these sites.

(f) **Cost.** The cost of construction materials is highly visible to the JFC. Whether built by military engineering forces or contractors, procurement of materials is funded by the Service components for support to joint operations. The engineer planner must consider the impact of limited funding on the overall priority of projects to meet essential facility requirements of the joint force.

For additional information on construction costs and funding, refer to Appendix E, "Construction Authorities and Funding."

f. **Construction Contracting Support.** Construction contracting in contingency operations is conducted in a highly dynamic and uncertain environment. Often, reconstruction is begun before or even in the midst of combat operations. Multiple partners from the military, government agencies, NGOs, HN and partner nations coupled with tenuous security and political environments can severely impact planning, execution, oversight, and completion of construction projects. Overlapping jurisdictions, competing interests, and changing goals further complicate the task of rebuilding. Joint engineers must consider the capabilities of all Services when addressing how to support contingency contracting requirements.

(1) **Contractor Planning Considerations.** The challenge for engineer planners is to achieve the optimal mix of engineering capabilities, which may include contractor support. Planning considerations influencing the use of contractors include:

(a) Duration, scope of work, security, and stability.

(b) Availability of local resources (labor and construction materials).

(c) Impact on intratheater lift and port facilities.

(d) Availability of funding.

(e) Impact on local area political and economic stabilization.

(f) Impact of force limitation imposed by force caps that could limit the number of military engineering forces.

(g) Capabilities of contractors.

(h) Limitations on the immigration and employment of other country nationals in the HN.

(2) **DOD CCAs.** The DOD CCAs are USACE, NAVFAC, or other approved DOD activity such as AFCEC. Their responsibilities include the design, award, and management of construction contracts for projects associated with the peacetime MILCON program. Overseas, USACE, NAVFAC, and the Air Force are assigned specific geographical areas under DODD 4270.5, *Military Construction*.

(3) **Contingency CCAs.** The GCC shall use the designated CCAs for design, award, and management of construction contracts in support of military operations. Unspecified minor MILCON in these areas may be executed by the requiring Military Department or in the case of a DOD agency or a DOD field activity, by the Military Department having jurisdiction over the facility. For countries where there is no designated DOD construction agent, the GCC will usually designate a CCA for support in a contingency. USACE, AFCEC, and NAVFAC also provide facilities planning, contract administration, and technical engineering support to JFCs (e.g., advanced base master planning, geospatial engineering, force protection engineering, and cold weather mobility).

For additional information on CCAs, refer to Appendix D, "Contract Construction Agents."

(4) **Civil Augmentation Programs.** Civil augmentation programs, such as the Army's LOGCAP, the Navy's GCCMAC and GCSMAC program, the Air Force's AFCAP, and DOD's civilian employee volunteers are additional support sources that can provide worldwide facilities construction support and provide the JFC and joint force engineer with additional options and flexibility in facilities construction. Civilian contractor augmentation programs are managed by a contract agent and are structured with one contractor responsible for providing support that effectively integrates construction, facility maintenance, and logistic support to the joint force. Funding of these programs is a key issue. A single contractor prevents multiple agencies and their contractors from bidding against one another for services and materials in the JOA. Use of civilian augmentees requires planning and operational oversight as well as quality control and assurance to ensure that costs are effectively controlled, while support is provided consistent with the JFC's CONOPS.

(a) **Army.** LOGCAP is an Army umbrella support contract that can be utilized to provide broad based logistic and selected engineering support in contingency operations. LOGCAP is managed by the US Army Materiel Command. An important aspect is that, in peacetime, the LOGCAP contractor maintains an on-call, preplanned, ready capability. The contractor demonstrates readiness through the development of a worldwide plan, supporting plans to OPLANs, specific regional plans, and participation in exercises.

1. **LOGCAP Support Contract.** The LOGCAP support contract provides general logistic, minor construction, and facilities support services to the joint force as directed by the JFC approved operational contract support plan (Annex W). Contract administration for this contract is provided by the AOR aligned contracting support brigade (potentially augmented by the Defense Contract Management Agency [DCMA], USACE may also provide construction design and technical oversight assistance in some major operations.

2. **LOGCAP Support Execution.** In the JOA, the US Army Materiel Command Army field support brigade, which is OPCON to the senior Army logistics command, manages the contract execution through attached LOGCAP forward personnel. The LOGCAP forward personnel provide direct assistance to designated requiring activities in planning and managing LOGCAP support throughout the JOA.

(b) **Navy.** The Navy's GCCMAC is focused on construction, while the GCSMAC is focused on facilities support. The GCCMAC provides construction, design/build construction, and related engineering services in response to natural disasters, humanitarian assistance missions, conflicts, or projects with similar characteristics. This includes occasional projects to ensure readiness to perform during emergencies and military exercises. GCCMAC is also an acquisition tool that NAVFAC utilizes to support roles for authorized DOD construction agents as outlined in DODD 4270.5, *Military Construction*. GCSMAC is designed to provide a wide range of facility services in response to natural disasters, humanitarian efforts, contingencies, or other requirements such as nonperformance by an incumbent contractor or instances where there is an unanticipated lapse in service.

(c) **Air Force.** AFCAP is a multi-year/vendor task order contract for all types of contingencies established to rapidly augment engineer and services capabilities to support worldwide contingency planning and deployment operations. The AFCEC at Tyndall Air Force Base, Florida, manages AFCAP. AFCAP may augment a base sustaining force at any Air Force base where engineer and services forces have been deployed. Furthermore, AFCAP can provide construction support at existing overseas locations and can support base recovery operations as a result of natural disasters, accidents, or terrorist attacks. Major capabilities include the full scope of engineer capabilities and logistics, with the exception of EOD and flight line fire and emergency services including aerospace rescue firefighting, to include the following:

1. Professional engineering services and infrastructure support, including architectural and engineering design, maintenance, repair, and construction.

2. Emergency incident management, firefighting, technical rescue, emergency medical care, hazmat response, weapons of mass destruction/terrorism response, EM capabilities, facility hardening, dispersal, obstacles, redundancy measures, reconstitution of assets, and non-environmental site restoration.

3. Environmental management services including permits and hazmat and/or waste management and disposal.

4. CSS capabilities and logistics to include food service, troop support, lodging, laundry, fitness, and recreation. CSS capabilities and logistics does not include mortuary affairs or field exchanges.

For further guidance on construction contracting and civilian augmentation programs, refer to Appendix D, "Contract Construction Agents," and JP 4-10, Operational Contract Support.

g. **Environmental Considerations**

(1) **Shared Responsibility.** Successful planning and execution of joint engineer operations requires ever-increasing attention to environmental considerations. Environmental considerations extend far beyond the engineer and logistic communities. Operators, intelligence staffs, medical representatives, legal counsel, and other members of a JFC's staff have a shared responsibility to ensure that environmental considerations are incorporated into operation planning. An environmental site assessment (i.e., a multi-branch effort to include engineering and medical expertise at a minimum) should be conducted prior to deployment whenever possible to document current/known environmental conditions of specific sites. This provides a screening mechanism and will also support the completion of an EBS for each of those sites. Coordination with preventive medicine functions assessing environmental health risks to deployed personnel is essential. Joint force engineers develop annex L (Environmental Considerations) to OPLANs in coordination with other staff elements and the JEMB, to include medical, logistics, operations, intelligence, legal, and CA. Coordination with other DOD agencies, such as DLA, and other USG departments and agencies, such as DOS and the Department of Energy, may also be necessary. In the event other nations are involved in the operations, coordination with appropriate multinational counterpart staff agencies must also be considered. Requirements related to environmental considerations can be divided into overseas requirements and requirements applicable in the US and its territories, and are discussed in detail in Appendix C, "Environmental Considerations."

(2) **Environmental Planning.** Executive Order (EO) 12114, *Environmental Effects Abroad of Major Federal Actions,* and Title 32, Code of Federal Regulations (CFR), Part 187, provide direction and policy guidance regarding environmental planning when major federal actions have significant effect on the environment outside the US and its territories. For operations within the US, its territories, and jurisdictions, environmental planning must be accomplished as required by the National Environmental Policy Act, and the implementing regulations of the Council on Environmental Quality. In cases of emergency or where national security interests are involved, DOD actions may be exempted from environmental planning requirements or applicable requirements may be modified. Legal counsel should be consulted to determine applicable requirements and confirm that DOD actions are lawful. USACE, NAVFAC, and AFCEC have capabilities (either deployable or through reachback) available to the joint engineer to assist with environmental planning in the JOA.

(3) **Natural and Cultural Resources.** Joint operations have the potential to adversely affect natural and cultural resources. As required by law, and as practicable and consistent with operational requirements, planners should identify these resources, including

endangered or threatened species, historic and archeological resources, and other cultural or natural resources in the OA, whether overseas or in the US, so that appropriate action can be taken to minimize potential damage.

For further guidance on environmental considerations, refer to Appendix C, "Environmental Considerations."

h. **HNS.** HNS can be an important, and in some cases an essential source of support for US joint forces or MNFs. During the Cold War, deploying US forces planned on predeployed equipment and supplies in mature theaters with HNS. Since then, deployments have become increasingly expeditionary, with greater dependency on HNS and a greater engineering effort to develop secure ports and forward operating bases. Through national planning channels, HNS and contingency mutual support agreements are developed to facilitate joint operations. Whenever possible, available and suitable HNS should be considered as an alternative to deploying major or specialized support. HNS may also increase the timeliness of response to a developing situation. While HNS may be encouraged for common support items, the use of HNS must be weighed against mission requirements. The JFC must carefully balance the advantages of using HNS with the danger of establishing dependence on potentially unreliable sources. See Figure IV-10 for HNS areas. In addition, HN military engineer forces may supplement joint force engineer assets.

For guidance on environmental considerations during North Atlantic Treaty Organization (NATO) operations, refer to Allied Joint Publication 3.12, Allied Doctrine for Engineer Support to Joint Operations*, and NATO Standardization Agreement 2238.*

(1) **HN Engineer Considerations**

(a) **Deployment Preparations.** Joint force engineers should review HNS agreements, identify logistic support items requiring negotiation, and coordinate additional support requirements through the joint force engineer. Country studies of the OA should be conducted and composed of the following types of information:

Figure IV-10. Host Nation Areas of Support

1. The real property ownership laws of the country.

2. Land tenure and property rights constraints.

3. How ownership is documented and recorded in the HN.

4. Determine whether there is an established market (private land sales).

5. The property taxation system.

6. Identify any constraints on individual property ownership.

7. Determine if water rights or mineral rights are vested in individuals or government owned.

8. Identify process and contacts to obtain the use of HN facilities.

9. Determine if country has quick take or eminent domain laws.

10. Determine and/or confirm acceptable identification documents for land owners.

11. Determine if unique local land measurement systems exist.

12. Develop a baseline for land value and rental values for vacant agricultural land, commercial land, office space, warehouse space, and housing.

(b) **APODs and SPODs.** Engineering support includes the evaluation of the quantity and type of HN facilities available for offloading and staging of personnel, equipment, and supplies. Engineering support operations may include the construction, improvement, and maintenance of APOD, SPOD, and RSOI facilities. Because existing HN capabilities can vary widely, especially at APODs, SPODs, and RSOI facilities, military engineers may supplement HNS through the civilian augmentation programs.

(c) **Government Infrastructure.** A viable HN government infrastructure at all levels for stability during negotiations and coordination of logistics is essential. Countries without a government infrastructure may provide limited support, resulting in strained engineer assets. To maximize the logistic effort, HNS functions should be centralized and coordinated within the J-4.

(d) **HN Forces and Personnel Considerations.** Doctrine, operational competence, training, experience, types and quality of equipment, and types of units can vary substantially among HN military engineer forces. To facilitate matching missions with capabilities, the joint force engineer will implement measures to assess the capabilities, strengths, and weaknesses of HN engineer forces. Where HN engineer forces have unique or special capabilities (i.e., engineering capabilities specifically adapted to the local environment), those capabilities should be appropriately integrated into operations. Interpreters and advisory personnel can often facilitate interoperability, provide

communications links among engineer forces, and share area expertise of HN needs and reactions to joint force engineering projects.

(e) **Infrastructure.** Infrastructure construction issues should be factored into the development of HNS agreements. The joint force engineer and staff, in coordination with the SJA or legal officer and civil-military staff officer, can assist the JFC in identifying facility construction and other issues to address with the HN. These aspects are critical in terms of support to deploying forces and costs of construction to the USG. HNS agreements should include the authority for the JFC and joint force engineer to coordinate directly with the HN for support, acquisition, use of facilities and real estate, and facility modifications necessary to meet applicable UFCs.

(f) **Duties and Taxes.** The SOFA should address the duty and tax status of USG contractors. US contractors are critical for support in joint and multinational operations for equipment maintenance, logistic services, and construction. Special provisions within the SOFA may need to be added to eliminate import and export duties, HN levied corporate taxes, and value-added taxes on goods acquired by or on behalf of the US.

(g) **HN Resources.** Access to the HN labor, equipment, construction materials, infrastructure, and services should be delineated in the HNS agreement. Balance between reducing costs to the US and hyper-inflating the local economy is an essential consideration. In consultation with the CMO officer, the joint force engineer and staff should take measures to avoid exposing HN personnel to possible HN liability, such as environmental management.

(h) **DOD Civilians and Contractor Personnel.** The SOFA (or similar diplomatic agreement permitting US forces in the HN) should address the status afforded to DOD civilians and US contractor personnel. Additionally, the agreement should outline the immigration and employment policies for third country nationals who may be employed by civil augmentation program contractors in support of US forces. If the status of DOD civilians and contractor personnel is not adequately addressed in the agreement, there will be increased risk of disruption to operations.

(2) **Redeployment and Transition from Military Engineers to Contractors and HNS.** Redeployment can be a significant engineer challenge, particularly when terminating overseas contingencies. In planning for redeployment operations, the JFC should consider the priority for redeploying units in order to efficiently close contingency locations or transition them to a new responsible authority (e.g., the HN). Engineers support force redeployment through the preparation of material for retrograde, completion of construction projects, conducting environmental impact analysis, and refurbishment and turnover of property and real estate to the HN. Additionally, engineers terminate leases and facility contracts, construct wash racks and other redeployment facilities, prepare collection points, vehicle and equipment holding areas, and customs inspection points, and coordinate for the safe disposition of hazmat and hazardous waste (HW). Even without follow-on missions, engineers are among the last to leave. As engineer forces begin to redeploy, the CCA and its contractors remain in the OA to complete engineering tasks. Transition planning should be

fully coordinated between the joint force engineer and staff, military engineering forces, the CCA, and the HN. Important engineering planning considerations include the following:

(a) **Identify Projects.** The joint force engineer and staff should identify ongoing projects and maintenance responsibilities to be assigned to the CCA or HN for continuation and/or completion. The CCAs are experienced in using contractors to complete military engineering projects, provide facilities to support redeployment of forces, and conduct HN infrastructure recovery activities.

(b) **Funding Requirements.** Funding requirements for projects will need to be coordinated with the CCA and HN. HN infrastructure projects may be funded by international development bank loans, foreign aid, or the HN's own funds. The CCA may provide technical assistance to the HN as part of the transition. Often, the CCAs are used by USG departments and agencies and others to oversee expenditure of funds provided for HN infrastructure projects.

(c) **Transition of Engineer Tasks to the HN.** Key engineering planning considerations for transition of engineer tasks to the HN include:

1. HN technical capabilities.

2. HN ability to handle the additional workload.

3. HN ability to fund the work.

(d) **Transition of Engineer Tasks to the CCA.** Key engineering planning considerations for transition of engineer tasks to the CCA for contractor execution include the following:

1. CCA management and contract funding.

2. Security of contractor personnel.

3. Status of contractors in the HN after US forces redeploy.

4. CCA relationships in the HN with respect to the GCC and the US ambassador or COM.

5. Ensure proper transfer of relevant information and equipment (i.e., computer/hard copy files, historical documents, project folders, GIS files).

i. **Interagency Support.** Because of the leverage of their wide range of expertise and funding resources, USG departments and agencies can support the JFC's mission objectives and can greatly expand the capabilities of the joint force. This is true whether the response is international in nature or within the US (e.g., during incident response in the US, engineers might provide support in the cleanup, which requires close coordination with USG departments and agencies). Coordination and a clear understanding of the commander's intent are critical when synchronizing operational efforts involving multiple USG

departments and agencies. The JFC will be required to coordinate with USG departments and agencies in order to achieve overall US objectives. Joint force engineers should have an understanding of the capabilities of these agencies and their direct support functions. While USG departments and agencies may increase the resources for a given operation, they may also increase and complicate the coordination efforts. Stability operations are a core US military mission. Since integrated civilian and military efforts are key to successful stability operations, DOD engineer personnel must be prepared to conduct or support stability operations by working closely with US departments and agencies, foreign governments and security forces, global and regional international organizations, US and foreign NGOs, and private sector individuals and for-profit companies. Following are some of the USG departments and agencies which joint force engineers will interface with:

(1) **JIACG.** The JIACG is an interagency staff group that establishes regular, timely, and collaborative working relationships between civilian and military operational planners within a CCMD staff. Composed of USG civilian and military experts accredited to the CCDR and tailored to meet the requirements of a supported CCDR, the JIACG provides the CCDR with the capability to collaborate at the operational level with other USG civilian agencies and departments. JIACGs complement the interagency coordination that takes place at the strategic level through the National Security Council System.

(2) **DOD Agencies.** DOD has a major role in the interagency arena. It interacts with almost every government agency and department and is involved in interagency coordination at the strategic, operational, and tactical levels.

(a) **DLA.** DLA is a logistics combat support agency whose primary role is to provide supplies and services to US military forces worldwide. In addition, DLA provides contract, administrative, technical, and logistic services to the joint force. With respect to engineering support operations, DLA provides the following:

1. Conducts a logistics sustainability analysis of the CCDR's OPLAN.

2. Manages Class IV construction materials, including procurement, distribution, and resupply support.

3. Provider of POL and provides funding and guidance for storage transport, including storage and transport.

4. Manages the reuse of materials.

5. Conducts bulk map and NGA hard-copy geospatial distribution.

6. Establishes capabilities and manages the disposal of HW and personal property.

(b) **NGA.** The NGA provides essential GI&S to the JFC. With respect to engineering support operations, NGA can provide the following:

1. Digital surface models (e.g., DTED and higher resolution terrain elevation data).

2. Feature data (e.g., digital nautical charts, digital aeronautical flight information file, and mission-specific data).

3. Precise positioning (e.g., digital point positioning database, targeting support).

4. Digitized maps and charts (e.g., compressed ARC digitized raster graphics, eCHART).

5. Orthoimagery (e.g., controlled image base).

6. Other standard and nonstandard maps, charts, and specialized geospatial products and services.

(c) **DCMA.** The DCMA is the DOD component that works directly with DOD suppliers to ensure DOD, federal, and allied government supplies and service are provided to meet requirements. The DCMA provides deployable augmentation support for contract administration, quality assurance, and property management services, as those capabilities are requested.

(3) **Other USG Departments and Agencies**

(a) **DOS.** DOS is the lead agency responsible for planning and implementing the foreign policy of the US as directed by the President. DOS is usually the first USG department to respond to international crises, including those that may require significant engineering support. DOS also conducts negotiations and concludes agreements with en route and OA countries, including overflight/access agreements and SOFAs, which can serve to facilitate the deployment and employment of the joint force, including engineering assets. In a foreign country, the US ambassador or COM is responsible to the President for directing, coordinating, and supervising all USG elements in the HN except those under the command of a GCC.

(b) **USAID.** USAID is the lead USG agency that works to end extreme global poverty and enable resilient, democratic societies to realize their potential.

(c) **Office of United States Foreign Disaster Assistance (OFDA).** When disasters strike in foreign countries, the response within USAID is led by the OFDA, which coordinates response to international disasters and is organized under the USAID Bureau for Democracy, Conflict, and Humanitarian Assistance. When a disaster occurs, US representatives to that country determine if there is a need and desire for US assistance. If US assistance is requested, OFDA, the US embassy, and the USAID mission in the affected country determine what OFDA assets are best suited for the specific disaster. Military engineers are often requested in the response teams.

(d) **FEMA.** FEMA is part of the Department of Homeland Security and is the USG's lead agency for coordinating federal EM activities within the US and its territories. The director of FEMA has the authority to establish policies and coordinate civil defense and civil emergency planning, management, and mitigation, including coordination of assistance from other federal executive agencies. FEMA coordinates the activities of the USG, military, and civilian engineering organizations to ensure effective assistance and prevent duplication of effort. FEMA prioritizes the use of engineering resources in support of EM activities.

A more extensive description of the engineer support provided for homeland security is provided in Appendix B, "Defense Support of Civil Authorities."

(e) **Environmental Protection Agency (EPA).** EPA has responsibilities for administration and enforcement of laws related to environmental media (air, water, and land) in the US and its territories. After consulting the joint force SJA, the joint force engineer and staff may need to consult with the EPA regarding environmental compliance issues for operations under the purview of the EPA. See Appendix C, "Environmental Considerations," for an outline of specific environmental considerations and guidance for the JFC and staff when planning and conducting joint operations and exercises.

(f) **Occupational Safety and Health Administration.** The Occupational Safety and Health Administration is part of the US Department of Labor and is charged to assure safe and healthful working conditions for workers in the US and its territories by setting and enforcing standards and by providing training, outreach, education, and assistance. Construction and general industry standards govern fall protection; prevention of trench cave-in, exposure to some infectious diseases, and exposure to harmful chemicals; safety features of machinery and equipment; and other engineer-related activities.

(4) **NGO Coordination.** In addition to USG departments and agencies, the joint force engineer and staff may have to coordinate engineering activities with NGOs. Where long-term problems precede a deepening crisis, these organizations are frequently on-scene before the military. Agreements may be made at the strategic level, but the JFC interfaces and coordinates with these organizations at the operational level. Agreements should be established through negotiation and be in a written memoranda of understanding or terms of reference to ensure understanding and avoid confusion. Agreements may have significant legal implications on using military personnel and equipment and must be negotiated IAW DODD 5530.3, *International Agreements.* In all cases, authority must exist for direct coordination. Once coordinating authority is granted, coordination and negotiations are normally conducted through the joint force's CMOC. NGOs may have unique engineering capabilities that can be leveraged as part of the overall operational effort. One example of great interest to engineers is their ability to conduct HDM. These organizations may also request extensive military engineer support for their activities and programs. It is critical to establish an effective engineer liaison in the CMOC to coordinate and execute engineering support with these organizations.

For further guidance on interagency coordination, refer to JP 3-08, Interorganizational Coordination During Joint Operations, *and JP 3-57,* Civil-Military Operations.

j. **Multinational Support.** The US often participates in multinational operations with other nations within the structure of a coalition or alliance. A coalition is an ad hoc arrangement between two or more nations for common action. An alliance is the result of formal agreement between two or more nations to further the common interests of the members. Multinational operations may include combat and are often conducted during contingency operations. Each multinational operation will create the command structure that will best meet the objectives of the participating nations. The arrangement may include placing US forces under the OPCON of a foreign commander.

(1) **IGOs.** IGOs are usually equipped with the resources and expertise to participate in complex multinational operations, allowing joint force engineering projects to be more thoroughly planned and resourced. A JFC and a joint force engineer and staff will coordinate within the agreed-upon command structure of an MNF to achieve MNF engineering goals.

(2) **Organizational Considerations.** The organization and mechanisms used for C2 within an MNF depend on the structure of the multinational operation. Coalition or alliance forces will require a multinational force commander (MNFC) and may require a MNF engineer and staff to plan and coordinate engineer efforts. In multinational operations, the MNF engineer is responsible for coordinating all engineer operations that affect the MNF. MNF engineers will be responsible for a broad range of operational and tactical level engineer tasks. Control of engineer assets is dependent on the MNF arrangement in theater.

(3) **Responsibilities of the MNF Engineer.** Whatever the specific coordinating organization, it is the responsibility of the MNF engineer and staff to conduct centralized planning and decentralized execution of the engineering effort and to ensure a unified and efficient use of engineering resources for common support of MNF operations. Close cooperation is ensured when the US and its MNF allies preplan engineering activities that collectively support the MNFC's intent. Specific planning considerations for the joint force engineer and staff for multinational engineer plans and operations include:

(a) Identify and prioritize requirements for engineer projects that support MNF operations.

(b) Work with participating nations to obtain engineer capabilities to execute common engineer projects.

(c) Arrange local engineer capabilities, if available.

(d) Prioritize and centrally coordinate the procurement by nations of engineer materials for both common and national specific engineer projects.

(e) Establish funding policies and agreements to finance projects.

(f) Identify standards to be achieved in the construction of facilities.

(g) Task units provided by nations for common infrastructure projects.

(h) Employ engineer LNOs with participating nations and at critical geographic locations.

(i) Develop multinational command relationships and coordination cells that will assist the MNF engineer and JFC in leveraging engineer capabilities throughout the OA.

(4) **JFC Considerations.** Working within an MNF may result in unique challenges for a JFC. The joint force engineer and staff must determine what engineering support can be provided by other participating nations, what engineering support will be required from US forces by the participating nations, and what the overall facility requirements will be for the MNF.

(a) **Engineer Coordination Element.** To assist the MNF engineer, an engineer coordination element may be established. In a US-led multinational operation, this coordination element will normally comprise a staff element within the combined force logistics staff and will usually involve a number of functionally specific joint engineer boards—for example, JFUB, JCMEB, and JEMB. These engineer boards would be augmented with personnel from multinational partners to form combined organizational elements with multinational engineer coordination functions. In NATO doctrine, the central coordinating organization for engineering is called an engineer coordination cell (ECC) and may directly support the force engineer, who is a special staff officer under the MNFC. If joint engineer boards have been established in support of US forces in a NATO operation, they should coordinate closely with the ECC. The theater engineer may also establish regional/component subordinate offices to assist the ECC in coordinating multinational engineering activities.

(b) **Engineering Capabilities.** The engineering capabilities of other MNF nations often differ based on doctrine, organization, training, leader development, equipment, history, and budget. In a US-led multinational operation, the joint force engineer and the engineer staff must consider these differences when assigning missions and conducting operations. For example, several nations have engineers that are experts in mine detection and removal. Others focus on specific missions, such as disaster relief.

1. Missions assigned to MNF partners should be consistent with their capabilities. The joint force engineer and staff should anticipate the requirement to augment those engineering forces.

2. MNF partners may lack an engineering capability. The joint force engineer and engineer staff should plan to provide engineering capabilities, as required.

3. Where participating forces have the capability for advanced construction, those engineering forces can be assigned major projects in support of the overall MNF. Those engineering forces will most likely support their own engineering requirements first.

(c) **Engineering Integration.** The basic challenge in multinational operations is effective integration and employment of all assets toward achievement of a common objective. The objective can be achieved through unity of effort despite disparate

capabilities, equipment, and procedures. The following aspects should be considered in the planning process:

1. To reduce disparities among MNFs, engineering standards should be established once agreed to, and a certification process developed. These standards should include standards of materials as well as training, equipment, and procedures.

2. There are cases where international standardization agreements (ISAs) may already exist. For example, within NATO, the US is party to a number of standard NATO agreements. In addition, the US has signed other ISAs, such as the American, British, Canadian, and Australian Standardization Program (US Army), Air and Space Interoperability Council (US Air Force), and Naval Quadripartite Standardization Program (US Navy), which require implementation as an allied common approach to conducting military engineering. These ISAs are authoritative directives for implementation by US forces and forces of other signatory nations operating as part of an alliance.

3. Standards and agreements are more difficult to establish and implement when operating within a coalition, as these are typically arranged in short timeframes for limited purposes. Usually, there is little time before deployment to establish these standards and agreements.

4. Identified engineering shortfalls should be satisfied by either bilateral or multinational support agreements prior to the deployment of forces. This aspect will require detailed coordination between prospective forces and the MNF.

(d) **Employment of Engineer Assets.** After a determination of the engineering tasks required to achieve the objectives, specific engineering tasks should be assigned to specific elements of the MNF based on an assessment of the capabilities of each nation's forces. If there are several elements that can complete a particular task, consideration should be given to assigning the task in a manner that ensures that all capable elements of the MNF can make a meaningful contribution.

For further guidance on multinational operations, refer to JP 3-16, Multinational Operations.

k. **Foreign Assistance.** In support of disaster relief efforts, the United Nations (UN), DOS, or OFDA within USAID may generate requirements for DOD assistance (e.g., **Operation UNIFIED ASSISTANCE,** 2004-2005 South Asian tsunami relief and recovery efforts). FHA is conducted outside the US and its territories to directly relieve or reduce human suffering, disease, hunger, or privation. While all elements of the joint force are focused on providing immediate FHA to avert the loss of life, the engineering contribution is focused on logistic support, securing an area to allow relief efforts directed by other agencies to proceed, and projects that open LOCs and provide shelter, water, and the infrastructure to relieve human suffering and support life. Engineer rapid response capabilities and the ability of engineers to work with HN forces are especially effective in quickly mitigating human suffering and stabilizing the situation. The joint force engineer and staff must work closely with the servicing legal office and through the CMOC and with representatives of the HN

and US embassy country team to formulate effective engineering support to the disaster relief efforts.

(1) **FHA.** FHA support provided by US forces is generally limited in scope and duration and is intended to supplement or complement efforts of HNs, government agencies, NGOs, and IGOs. US military forces may be the only organization in the OA capable of providing assistance of a large magnitude. US military forces transition FHA support to civilian authorities as soon as possible. Requests for military support, including engineering support, should be initiated and coordinated through the CMOC or appropriate military/civilian authority established for coordination.

For further guidance on HCA and FHA operations, refer to JP 3-29, Foreign Humanitarian Assistance.

(2) **HCA.** HCA programs are separate and distinct programs from FHA, specifically authorized under Title 10, USC, Section 401. HCA are preplanned activities designed to provide assistance to the HN populace, conducted in conjunction with military operations and exercises. They are usually planned in advance and are included in a GCC's security cooperation planning as part of the theater campaign plan. These operations typically fulfill a unit-training requirement (i.e., training and skills development) that incidentally creates humanitarian benefit to the local population. They are usually not in response to disasters, although HCA activities have been executed following disasters at the direction of the GCC. Specific engineer activities for which HCA funds can be used include construction of rudimentary surface transportation systems; water well drilling; construction of basic sanitation facilities; rudimentary construction and repair of public facilities (e.g., schools, medical clinics, community centers); training and skills development of HN personnel; and site surveys and development of construction plans.

Intentionally Blank

APPENDIX A
SERVICE ENGINEER ORGANIZATIONS AND CAPABILITIES

Intentionally Blank

ANNEX A TO APPENDIX A
ARMY ENGINEER ORGANIZATIONS AND CAPABILITIES

1. General

a. Army engineers operate at the strategic, operational, and tactical levels across the range of military operations. Units are organized in a scalable, modular, adaptable manner to support combat, general, and geospatial engineering requirements. Army engineers operate as an integral member of the combined arms team during peace and war to provide a full range of joint engineering capabilities. They execute combat engineering tasks at the tactical and operational levels of warfare in support of combat maneuver forces and provide general and geospatial engineering throughout the entire OA and at all levels of warfare.

b. **Fighting as Engineers and Fighting as Infantry.** Throughout history, combat engineer organizations have been required to fill the role of infantry as a secondary mission. Combat engineer units are well armed and equipped, and capable of executing many of the infantry tasks, although they do have some organizational shortcomings for such missions. These include shortfalls in organic fire support element, communications equipment, and necessary medical personnel. If a combat engineer unit has been designated to fight as infantry it requires the same combined arms support as other maneuver units would receive (fire support, air and missile, or other elements) and potentially the integration of other armor or other maneuver elements into its task organization to accomplish a specific mission. While combat engineers are normally involved in the close fight as engineers, reorganizing engineers to fight as infantry is an operational-level decision that requires corps commander or higher authorization due to the nature and considerations involved with reorganization and the impacts (resourcing, training, etc.) on both the engineer unit and the higher organization. While combat engineer units have the capability to be reorganized to fight as infantry, the JFC should carefully weigh the gain in infantry strength against the loss in combat engineer support. Normally, it is better to have combat engineers fight as engineers since this does not require reorganization and allows the combat engineers to quickly transition back to engineering tasks when conditions permit.

c. **Engineer Reconnaissance Capabilities.** Although the Army has no dedicated engineer reconnaissance units, commanders routinely form mission-tailored engineer reconnaissance teams to collect engineer-specific tactical and technical information. These teams are a critical source of information for engineers and combined arms commanders and staffs, playing an important role in the JIPOE.

2. The Modular Construct

a. The modular construct of the Army engineer force is a complementary and interdependent relationship between four major categories of units (that include the USACE-provided engineering technical and contract support). The four categories include organic engineers and staffs and the engineer force pool (all engineer units not organic to a BCT or embedded in a BCT/HQ staff). The assets in the force pool exist to augment organic BCT engineers and provide echelons above the BCT with necessary engineer capabilities. The pool consists of engineer C2 units, core units, and specialized engineer capabilities. All

categories form a team whose diversity, breadth, and flexibility are among its greatest strengths.

b. **Engineer C2** is the basis for integrating engineer functions, elements, and capabilities. They consist of the TECs, the engineer brigade, and the engineer battalion. Each has a staff that allows the commander to command assorted and various engineer organizations. They each are also capable of C2 of other selected non-engineer units to support missions that require this. **Organic** engineer battalions of the three types of BCTs provide the baseline requirements for combat and very limited selected general engineering capability in focused support of the BCTs. **Core** engineer units consist primarily of tactically/operationally focused combat and general engineering units that may augment the organic forces of the BCTs or be assigned to other supporting operations to include those typically performed under the C2 of the maneuver enhancement brigade at the division or corps levels. All of these units may also perform roles/missions under the C2 of the functionally focused engineer brigade or the TEC. The remaining category of engineer support is the **specialized** engineer capabilities units. These units are technically focused units that (while providing selected support at the tactical level) are focused on providing their specialized engineering capabilities in support of the operational and strategic levels throughout the range of military operations.

For additional details about the capabilities of these units, see FM 3-34, Engineer Operations.

c. **C2 Units.** Engineer C2 is provided by three echelons of engineer units with staffs. These include the TEC, the engineer brigade, and the engineer battalion.

(1) The TEC provides command structure for all assigned or attached Army engineer brigades and other engineer units and missions for the CCDR or JTF commander. When directed it may also provide mission command (or simply C2) for engineers from other Service, MNF, and contract construction engineers. The TEC is focused on operational C2 of engineer operations across all three of the engineer functions and typically serves as the theater or land component engineer.

(a) Tasks performed by the TEC include providing the support for all operational planning for the theater across all of the engineer functions. The TEC synchronizes all engineer planning and support for the CCDR or JTF commander, providing peacetime training and support of military engagement for their supported respective CCDRs. The TEC provides training and reports readiness IAW HQ, Department of the Army standardized mission-essential task list. It plans and operates in close coordination with the senior CCAs in the OA.

(b) Both the TEC and the USACE are capable of rapid deployment of modular deployable staff elements and organizations to support the needs of the operational commander. Together they are capable of providing a wide range of technical engineering expertise and support from USACE, other Service technical laboratories and research centers, and other potential sources of expertise in the civilian community. They are enabled by the global reachback capabilities associated with field force engineering (FFE). TEC

resources are synchronized with the USACE for military engagement and to provide operational FFE capabilities. These capabilities include technical assistance, project planning and design, contract construction, real estate acquisition, infrastructure support, and support to nation-building capacities.

(2) The engineer brigade is one of the Army's functional brigades and is capable of planning, integrating, and directing the execution of engineer missions conducted by up to five mission-tailored engineer battalions and integrating missions across all three of the engineer functions. It may also provide command structure to other non-engineer units focused on the performance of such missions as support of a division deliberate gap (river) crossing.

(a) One or more engineer brigades are required in the division or corps whenever the number of engineer units or the functional nature of engineer missions exceed the C2 capability of the multifunctional maneuver enhancement brigade. Once deployed, engineer brigades become the focal point for apportioning and allocating mission-tailored engineer forces within the OA. The engineer brigade is capable of supporting the JTF commander or component commander (land, air, or maritime) and providing C2 to all Service engineers and contracted engineering within an OA. The engineer brigade has the ability to provide deployable CPs and staffs' expertise to meet engineer-specific C2 as required. With augmentation, it may serve as a joint engineer HQ.

(b) The engineer brigade has the capability to simultaneously provide two deployable CPs. It provides engineer-specific technical planning, design, and quality assurance and quality control during 24-hour operations. The engineer brigade provides training, readiness, and oversight IAW HQ, Department of the Army standardized mission-essential task list for up to five assigned engineer battalions, preparing them for deployment in support of the brigade or other organizations.

(3) The engineer battalion is capable of planning, integrating, and directing the execution of engineer missions conducted by any mix of up to seven assigned engineer companies. They are typically found within the engineer brigade, the maneuver enhancement brigade, or in the BCT. With the exception of those battalions performing specific technical roles (prime power) all engineer battalion HQ are capable of providing C2 for either combat or general engineering missions when they have been task-organized to perform in those roles. Training relationships will make certain battalion HQ more capable in either combat or general engineering roles. For the conduct of construction or EH clearance missions, the battalion will receive design/survey or EH teams from an engineer brigade.

(a) One or more engineer units may support a maneuver enhancement brigade for combat and/or general engineering missions. In this role, or when operating as a part of an engineer brigade, the engineer battalion is typically tasked with either a combat or general engineering focus. The engineer battalion provides training, readiness, and oversight for up to seven assigned engineer companies, preparing them for deployment in support of the battalion or other organizations.

(b) When in support of a BCT, an engineer battalion will provide engineer battle command of engineer operations. The engineer battalion may be organized to perform as a breach force commander when the BCT is conducting a brigade combined arms breach, and during a brigade gap (river) crossing operation the engineer battalion provides the option to function as the crossing site commander.

d. **Organic Engineer Units.** Each of the three types of BCTs has an engineer capability organic to it. These organic combat engineer units provide the minimum combat capability to support BCT operations and may also perform some very limited and selected general engineering tasks. During offensive and defensive operations they will require augmentation by core elements to potentially include an engineer battalion HQ. Other specialized engineer units and equipment may also provide mission-tailored engineer support when their specialized engineer capabilities are required. EOD units may be task-organized from their parent EOD HQ. Organic engineers train with and remain an integral part of their parent BCT. Additionally, engineers are organic within the staffs of all Army command level echelons, providing engineer staff planning functions and integrating geospatial engineering support.

e. **Core Engineer Units.** Core engineer units include both combat and general engineer units (see Figure A-A-1). They are the primary building blocks for the organization of most engineer battalions. These units are used to augment the organic engineer capabilities of BCTs and may be task-organized under engineer battalion HQ to serve under a variety of larger HQ, providing the specific tailored capabilities needed to support any particular mission requirements.

(1) **Combat Engineer Units.** Core combat engineer units are focused on support to combat maneuver organizations at the tactical level and are designed to participate in close combat as necessary. All have the capability of fighting as engineers, or, if required, as infantry. An engineer battalion HQ will typically provide the necessary C2 and staff supervision for attached and assigned units when they are assigned to BCTs, maneuver enhancement brigades, or other organizations. Combat engineer (sapper) units may construct tactical obstacles, defensive positions, and fixed bridges; and repair CPs, LOCs, tactical routes, culverts, fords, and other selected general (horizontal and vertical

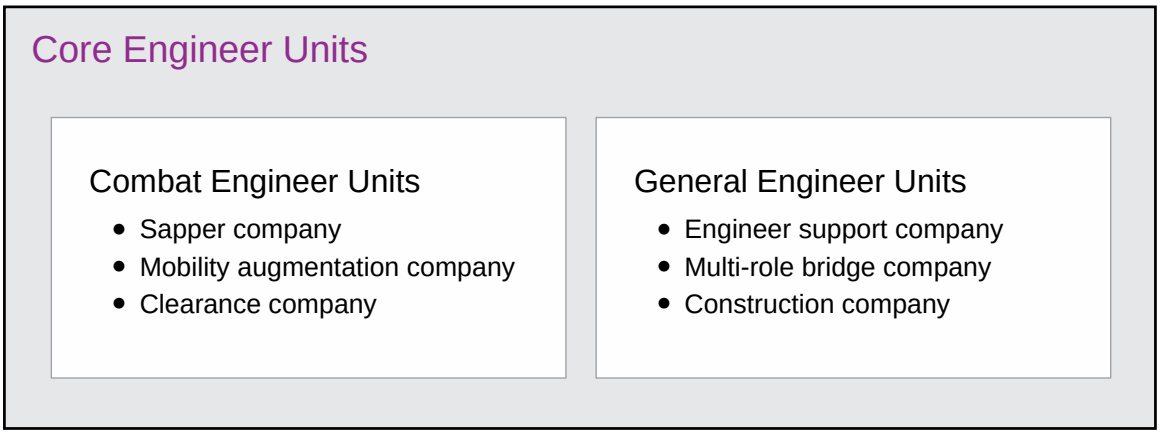


Figure A-A-1. Core Engineer Units

construction-related) engineering tasks. Combat engineer units also provide engineer support for gap (to include river) crossing operations, assist in assaulting fortified positions, and conduct breaching operations. Airborne and air assault capable engineer units also have the unique ability to employ air-droppable rapid runway repair kits in support of forcible entry operations. The more specialized combat engineering capabilities of assault bridging, breaching, and route and area clearance are added to the organic engineer capabilities in BCTs (or to deployed core sapper companies) to allow them to accomplish their broader mission requirements.

(2) **General Engineer Units.** These general engineer units are comprised of bridging, support, and construction capabilities. The horizontal and vertical companies have a construction focus and are capable of constructing, rehabilitating, repairing, maintaining, and modifying landing strips, airfields, CPs, MSRs, supply installations, building structures, bridges, and other related aspects of the infrastructure. These units may also perform repairs and limited reconstruction of railroads or water and sewage facilities. The basic capabilities of these construction units can be expanded significantly. Through the augmentation of specialized personnel and equipment these baseline construction units can provide bituminous mixing and paving, quarrying and crushing, and major horizontal construction projects such as highways, storage facilities, and airfields. Additional augmentation could include pipeline construction or dive support, depending on the type and scope of the construction mission.

f. **Specialized Engineer Capabilities.** The specialized engineer capabilities portion of the force pool provides for general and geospatial engineering capabilities at the operational and strategic levels and for specific augmentation to the tactical level (see Figure A-A-2). Some of these capabilities are among the FFE capabilities provided by the USACE. These key capabilities translate into units that are typically of a lower availability and density than the core engineer units. These smaller more specialized units are designed to typically support larger engineer-related missions/tasks or provide augmentation to selected HQ elements.

(1) **EH Support.** Focused on providing specialized C2 elements and the integration of other EH capabilities.

(2) **Construction Support.** Provides construction support to C2, management, procurement and contract support, greater capabilities for asphalt, concrete, and haul operations. All of these capabilities also have a role in infrastructure support.

(3) **Infrastructure Support.** Engineer prime power units generate electrical power and provide advice and technical assistance on all aspects of electrical power and distribution systems. Prime power units have a limited electrical engineering capability (design and analysis), provide electrical surveys, and operate, maintain, and perform minor repairs to other electrical power production equipment, to include HN fixed plants. Facilities engineering teams assist in real estate acquisition, design, and construction support. The construction of pipelines (primarily the inland petroleum distribution system) is within the scope of the horizontal company's capability with subject matter expertise support.

Specialized Army Engineer Force Pool Capabilities

Explosive Hazards Support	Construction Support	Infrastructure Support	Geospatial Support	USACE-Related Support
EHCC	Survey and design section	Facility engineer detachment		FFE
Explosive hazards team	Construction management section	Prime power detachment	Geospatial planning cell	
EOD[1]	Real estate team	Firefighting team		
Mine dog team	Diver team Asphalt team Concrete team Quarry platoon Well drilling team			
Area clearance platoon				

[1] Army capability is limited in scope for Army engineers and is primarily resident in the EOD specialty of the ordnance branch.

Legend

EHCC	explosive hazards coordination cell	FFE	field force engineering
EOD	explosive ordnance disposal	USACE	US Army Corps of Engineers

Figure A-A-2. Specialized Army Engineer Force Pool Capabilities

(4) **Geospatial Engineering.** Geospatial engineers (GEOINT cells and GPCs) provide terrain and digital imagery analysis and support the integration of other geospatial information to the HQ that they support.

(5) **USACE-Related Support.** USACE support provides for technical and contract engineering support, integrating its organic capabilities with those of other Services, civil engineering, and all other sources of engineering-related reachback support.

(a) Engineering technical and contract support is provided by a variety of supporting organizations and is a category of specialized engineer capability support. The USACE is the Army's major command assigned responsibility to execute Army and DOD MILCON, real estate acquisition, and development of the nation's infrastructure through the civil works program. Other services include wetlands and waterway management and disaster relief operations. USACE is assigned as the primary agency for Emergency Support Function #3 and assists the Department of Homeland Security/FEMA. With its subordinate divisions, districts, laboratories, and centers, USACE provides a broad range of engineering service support to the Military Departments, USG departments and agencies, state governments, and local authorities. The USACE also provides technical assistance and contract support to joint forces deployed worldwide. The USACE operates the US Army Engineer Research and Development Center (ERDC), a comprehensive network of laboratories and centers of expertise, to include the Engineer Waterways Experiment Station, Cold Regions Research and Engineering Laboratory, Construction Engineering Research Laboratory, and the Geospatial Research Laboratory co-located with the Army Geospatial Center.

(b) **FFE.** USACE has expertise at the strategic, operational, and tactical levels in engineer planning and operations and can leverage reachback to technical subject matter experts in districts, divisions, labs and centers of expertise, other Services, and private industry. USACE FFE is a means to access specialized engineer capabilities that can augment JFC planning staffs. Teams can rapidly deploy to meet requirements for engineering assessments and analyses in support of the full array of engineer operations. The two types of forward engineer support teams provide support to primarily general engineering efforts through forward-deployed engineer elements that can communicate with TeleEngineering Toolkits and reach back to technical experts within USACE. Facility engineer teams assist in the reception and staging of troops. Facility engineer teams and facility engineer detachments from the TECs provide a wide variety of services to forward deployed forces in a public works capacity.

1. **Forward Engineering Support Team-Advance.** Its mission is to provide additional planning capability to CCMD and Army Service component command engineer staffs. It can also deploy in support of a JTF with a limited execution capability. Its capabilities include multiple engineer planning and design, real estate acquisition and disposal, and contracting personnel. The forward engineering support team-advance may provide an initial technical infrastructure assessment/survey, technical engineer assistance, contracting support, and real estate acquisition support.

2. **Forward Engineering Support Team-Main.** Its mission is to provide C2 for USACE teams in the OA and sustained USACE engineering execution capability within an OA. This team generally supports a JTF or the land component of a JTF. The forward engineering support team-main provides LNOs and USACE engineering planning modules to supported units, as required. It is a flexible, self-sustaining organization with a mission of providing USACE capabilities through forward presence and reachback for the following primary mission areas: infrastructure engineering planning and design, technical engineering expertise, contract construction, real estate acquisition and disposal, environmental engineering, and geospatial engineering support.

Intentionally Blank

ANNEX B TO APPENDIX A
NAVY ENGINEER ORGANIZATIONS AND CAPABILITIES

1. General

a. Navy engineers provide services across a full range of civil and military operations. Engineering projects, services, and missions are generally handled between two major organizations: NAVFAC and the NCF.

(1) The NCF conducts peacetime, contingency engineering, and expeditionary construction operations in support of Navy, USMC, and joint forces. The NCF provides the JFC with an expeditionary toolkit of scalable and rapidly deployable military engineers who provide contingency construction and limited public works capabilities in support of mission objectives.

(2) NAVFAC manages the Navy and Marine Corps MILCON projects and environmental restoration programs and supports Commander, Navy Installations Command's, shore installation management program. Providing engineering services, acquisition, and technical support to shore facilities and real property are the responsibilities of NAVFAC. NAVFAC also provides support to the joint warfighter. Though not a part of an operating force, CCDRs and component commanders receive support from NAVFAC in three areas:

(a) Execute contract construction funded from the MILCON appropriation.

(b) Provide construction supplemental and contingency contracting capability to plan, design, and execute construction in theater, including architect-engineering services, real estate, environmental compliance, and BOS facility services.

(c) Provide a broad spectrum of technical support capabilities in engineering and scientific disciplines during both deliberate planning and CAP and solve challenging problems related to engineering, infrastructure, and environmental compliance during contingency operations.

b. The NCF is organized, trained, and equipped to construct, maintain, operate, and repair advanced bases and their associated logistic pipelines. The force also provides disaster recovery and relief assistance and performs civic action projects to complement military and other national programs. NCF units are organized for quick and effective response as required by planning assumptions and guidance. Seabee units are trained in force protection operations and in limited defensive combat.

2. Engineer Structure

a. NCGs exercise administrative control (ADCON) and OPCON over NMCBs, UCTs and CBMUs. An NCG has a deployable HQ that can be forward deployed to provide OPCON over multiple NMCBs, UCTs, and/or CBMUs when deployed. As a force provider, NCGs provide ready combat construction forces to fulfill operational requirements of CCDRs and their component commanders for expeditionary construction, support to naval

shore activities and USMC bases and camps, and FHA and disaster recovery operations. NCGs also provide contingency engineer planning in support of CCDR planning efforts.

b. When deployed during peacetime, NCF units are normally transferred to the supported theater Navy component commander under the GCC. During contingencies when NCF units deploy in support of a MAGTF, NCF units are generally transferred to the theater Marine Corps forces component commander. When not directly supporting Navy or Marine Corps forces, Seabee units may be assigned as part of a JTF or assigned to operate with other Service engineers under a special engineering task force.

3. Naval Construction Regiment

a. The NCR is an independent, permanently structured command element (CE) that conducts construction and engineer project management operations. The NCR provides C2 over assigned subordinate engineer and other expeditionary units when deployed to an assigned geographical area. The NCR also implements general engineering policy, guidance, and standards, and conducts limited construction contracting capability when augmented by NAVFAC.

b. **Mission of the NCR.** In addition, NCRs ensure subordinate units assigned to them achieve maximum operational readiness prior to the unit's deployment to a contingency or forward deployment site. Responsibilities include the following tasks:

(1) Exercise TACON and OPCON when delegated.

(2) Provide construction project management oversight for all NCF units in a designated OA.

(3) Perform engineering reconnaissance and assessments.

(4) Manage Class IV stocks.

(5) Provide policy recommendations.

(6) Determine the detailed composition of the engineer force in a designated OA.

(7) Coordinate development of tactical plans for C2, intelligence, maneuver, fires, logistics, and force protection.

(8) Coordinate intelligence support requirements and assessment, guidance, and reports to assigned units.

(9) Plan and coordinate support to CMO.

(10) Plan, conduct, and maintain communications and information systems with various forces.

(11) Coordinate NCR maritime pre-positioning force (MPF) operations.

(12) Provide fiscal oversight and resources to subordinate commands and ensure accountability for the maintenance and management of items for which the command is responsible.

(13) Coordinate the requirements for the receipt and distribution of material resources.

(14) Function as a joint force engineer group functional HQ when designated.

(15) Coordinate NCF embarkation requirements for assigned units.

(16) Provide safety program oversight to assigned units.

(17) Maintain oversight of subordinate units and personnel readiness conditions.

(18) Function as the immediate superior-in-command and the certifying authority for subordinate assigned units. Certify units as they achieve their warfighting capabilities.

4. Naval Construction Groups

a. **Mission.** The NCG provides training, equipment, maintenance, and logistical support to combat-ready active and reserve NCF units in support of the GCCs. NCG support is provided to those units under its ADCON to the level necessary to achieve their assigned Navy mission-essential tasks and to the associated capabilities contained in their required operational capabilities document. The NCG also prepares units for deployments in support of a Navy component commander, JFC, or MAGTF commander.

b. **Responsibilities.** The NCG is organized to accomplish the following functions and tasks:

(1) Provide ADCON over assigned NCF units, both homeport and deployment phases.

(2) Provide oversight of Service operational requirements and coordinate with the cognizant NCR for construction project management oversight.

(3) Execute unit training IAW the gaining NCR.

(4) Provide homeport construction project logistics support.

(5) Provide table of allowance management for subordinate NCF units.

(6) Provide mobilization support of reserve forces to the NCF.

(7) Provide personnel support to subordinate deployed units.

5. Naval Mobile Construction Battalions

a. NMCBs provide responsive military engineering and construction support to Navy, Marine Corps, and other forces in military operations. NMCBs have extensive heavy horizontal and vertical construction capabilities. NMCBs construct and maintain roads and bridging for supply routes; build EAFs and advanced bases; construct or extend airfield pavements; establish ammunition supply points; install, repackage, and redeploy Mabey Johnson bridges and medium girder bridges; construct base facilities and force beddown facilities; and conduct defensive combat activities. Additional functions include repair, maintenance, and construction of shore facilities and LOCs during contingency, emergency, FHA, or DSCA operations. NMCBs also perform specialized construction such as water well drilling, quarry and rock crusher operations, asphalt and concrete placement, and battle damage repair such as ADR. They are able to work and defend themselves, including self-decontamination of organic equipment and personnel at construction sites outside of their base camp and execution of tactical convoys.

b. NMCBs are operationally self-sustainable for up to 60 days, requiring only replenishment of consumables. In times of emergency or disaster, NMCBs conduct FHA/DSCA operations. NMCBs are capable of limited operations in a CBRN environment. They are outfitted with individual protective equipment, limited chemical and radiological detection equipment, and decontamination apparatus capable of decontamination of personnel, facilities, and equipment organic to the unit. Other configurations of the NMCB's manpower and equipment, such as those pre-positioned on the maritime pre-positioning ships, have been tailored to meet various missions. An NMCB can task-organize and deploy away from its main body a number of detachments, details, and teams depending on the operational tasking and theater requirements.

6. Underwater Construction Teams

a. UCTs are specially trained and equipped units that perform underwater engineering, construction, repair, and inspection. UCTs facilitate port-opening operations with underwater surveys, damage repair, and obstacle removal through the use of precision demolitions, as well as detailed beach and port hydrographic and side-scans surveys for MPF or amphibious operations. UCTs conduct battle damage repair and assessments to ocean and waterfront and port facilities and are capable of a light salvage capability.

b. UCTs perform complex inshore and deep ocean underwater construction tasks in any climate, including extreme cold weather environments. They provide ocean bottom surveys for appropriate site selection of underwater facilities. UCTs are capable of diving to and working at 190 feet and rely on self-contained underwater breathing apparatus and surface-supplied-air driving systems. Typical projects include underwater repair of wharves, piers, pipelines, moorings, boat ramps, and underwater utility systems. The unit also supports OPDS operations by sinking, installing/connecting, and maintaining the single anchor let moorings.

c. A UCT is divided into three construction diving detachments and a platoon-sized shore echelon capable of deploying as one unit or separately. Each construction diving

detachment carries its own transportable recompression chamber to support diving operations anywhere in the world. The shore echelon is composed of additional and larger unit equipment for sustained operations. There are two active UCTs, one at Joint Expeditionary Base Little Creek-Fort Story, Virginia, and the other at Naval Base Ventura County, Port Hueneme, California.

7. Construction Battalion Maintenance Units

CBMUs provide initial construction and continuous public works support to the Navy's expeditionary medical facilities deployed in support of a contingency. The CBMU can provide follow-on public works operations to maintain and repair existing advanced base shore facilities or facilities constructed by NMCBs during contingency operations. The unit is capable of equipping, manning, and maintaining water production as well as steam and electrical power generation and distribution systems for advanced base facilities of up to 5,000 personnel. A CBMU performs battle damage repairs to base camps, power, sewage, POL, and water systems. A CBMU also operates and maintains automotive and construction equipment including materials handling equipment. There are two active CBMUs, one on each coast of the US, headquartered in San Diego, California, and Joint Expeditionary Base Little Creek-Fort Story, Virginia.

8. Amphibious Construction Battalion

PHIBCBs are organized under the two NBGs, Atlantic and Pacific. The NBGs provide an administrative element and CE from which personnel and equipment are formed in tactical elements and made available to appropriate commanders to support beach and waterfront operations, especially amphibious and MPF off-load operations. The PHIBCBs provide logistics over-the-shore movement (ship-to-shore or shore-to-shore) and construction support to amphibious forces. PHIBCBs are part of the naval support element and report to the NBG, which is responsible for in-stream offload of ships in support of amphibious operations or the pier-side offload of a maritime pre-positioning squadron in a permissive environment. Primary tasking of PHIBCBs is to provide ship-to-shore transportation of fuel, materials, and equipment in support of amphibious operations. Transport is accomplished primarily by means of assembling improved Navy lighterage system (INLS) powered and non-powered causeway sections into causeway ferries. Additional tasks include operating INLS causeways, installing and operating OPDS and assault bulk liquid transfer systems, and meeting the salvage requirements of the NBG. PHIBCBs construct elevated causeways and INLS floating causeway piers, erect 1,300-person expeditionary camps, and provide camp public works support, perimeter defense, and other beach improvement construction support.

9. General Engineering Support to the Marine Corps

The NCF provides general engineering support to reinforce and augment the general engineering capability of the Marine Corps. The normal employment of the NCF is as a major subordinate element within the MAGTF to maximize engineering capabilities available to the MAGTF commander. NCFs are an essential support element to any size MAGTF and routinely deploy and exercise with Marine Corps units. The NCF constructs

and maintains base facilities, repairs battle damaged facilities, accomplishes disaster recovery efforts and FHA construction projects, and conducts limited defensive operations as required by the operating environment.

10. Engineering Technical and Contract Support

a. Engineering technical and contract support is provided by a variety of supporting organizations. NAVFAC provides engineering planning, design engineering, project management, environmental engineering support, construction contracting, and operations and maintenance for shore-based and ocean facilities. In particular, NAVFAC has mobile utilities support equipment (MUSE) teams, which provide temporary or short-term utility support. Typical MUSE team missions include support for MILCON and special projects, pier-side naval vessel support, emergency response to natural disasters (e.g., typhoon damage recovery), and contingency operations. The officer in charge of construction (OICC) is an organizational element within NAVFAC that's established primarily for large temporary construction programs lasting 3 to 7 years. Their responsibilities range from design and acquisition to post-award construction oversight. The resident officer in charge of construction (ROICC) is another element traditionally responsible for only acquisition and post-award construction oversight particularly in support of non-Navy commands, such as Marine Corps and Air Force. During contingencies, the OICC and ROICC organizations can either expand or be established to support contingency construction requirements.

b. NAVFAC is designated as a CCA by DOD. It administers the Navy's GCCMAC and GCSMAC program. One method of execution is through the use of NAVFAC's contingency OICC team. It's capable of performing contingency engineering and acquisition services in any operational environment. Its mission is to provide technically competent engineering and mobilization-ready personnel to rapidly deliver NAVFAC products and services in support of NAVFAC mission requirements for contingency operations including surge and operational support for:

(1) CCDR engineer requirements across the range of military operations.

(2) Homeland defense.

(3) Natural disasters.

(4) Other contingency/expeditionary support. Another method is to employ contingency engineering response teams (CERTs). CERTs are temporary task-organized detachments formed to support specific missions, normally in response to emergent requirements and contingencies such as natural disaster or man-made event. Their mission is to provide responsive, technical engineer expertise, and assistance support for emergency response to natural disasters, such as typhoon damage recovery, and contingency operations.

c. The Naval Facilities Engineering and Expeditionary Warfare Center (EXWC) provides a variety of technical and scientific expertise in facilities engineering, technology, and specialized products and services on a worldwide basis. The EXWC provides specialized engineering and technical expertise and serves as a research consultant to military forces.

For additional information on the naval civil engineering refer to Navy Warfare Publication (NWP) 4-04, Naval Civil Engineering*; NWP 3-10,* Navy Expeditionary Combat Command Forces*; Navy Tactics, Techniques, and Procedures (NTTP) 4-04.2,* Naval Construction Force Operations*; NTTP 4-04.3,* Naval Contingency Engineering Operations; *and Navy Tactical Reference Publication (NTRP) 4-04.2.1,* Doctrinal Reference for the Naval Construction Force.

Intentionally Blank

ANNEX C TO APPENDIX A
AIR FORCE ENGINEER ORGANIZATIONS AND CAPABILITIES

1. General

Air Force civil engineers provide engineering support throughout all phases of military operations, including air base opening; establishing operating locations; receiving and bedding down forces; and sustaining, transitioning, and closing operating locations. Air Force civil engineer units focus primarily on general engineering and installations support activities that provide basing for beddown of forces, aircraft, and Air Force weapon systems. They are highly trained and equipped to rapidly mobilize and establish air bases to enable projection of air, space, and cyberspace power across the globe and throughout all phases of military operations. Air Force civil engineers are primarily organized as Prime BEEF and RED HORSE units to support contingencies. Engineering reconnaissance capability is also imbedded in the contingency response wings to perform airfield site assessments and JTF-port opening support.

2. Organization and Command

Air Force engineer forces are assigned to CCMDs through the Service component. The CCDR exercises command authority over Air Force civil engineers through the COMAFFOR. During deployments, engineers remain under OPCON of the COMAFFOR. Although RED HORSE units are considered theater assets not assigned or attached to any wing structure, OPCON for these forces also remain with the COMAFFOR. Air Force engineers deploy as part of an AETF or as detached units supporting limited missions or taskings. Air Force engineer forces are organized into tailorable packages called UTCs that can be tailored to meet specific mission requirements. These UTCs can be tasked in any combination to provide the full range of support needed to achieve the CCDR's objectives. Expeditionary prime base engineer emergency force squadrons (EPBSs) are organized in a hub-and-spoke configuration and report directly to an expeditionary Prime BEEF group commander or expeditionary civil engineer group commander if a RED HORSE squadron(s) is also attached. With the hub-and-spoke construct, each EPBS has leadership and planning functional hubs located at an airfield and work elements at spoke locations as required. Security for convoy operations between the hub and the spoke location(s) are provided by Army forces and potentially by RED HORSE forces. Work at the spoke location(s) will not be conducted by Air Force civil engineer forces unless adequate security is provided. The hub-and-spoke construct provides unity of command, and theater-wide integration of Air Force engineer forces and allows effective use of limited resources. EPBS capabilities include base master planning, programming, technical design, contract development and oversight, light troop construction/repair of expeditionary bases, facilities, utilities, and force beddown. Excluded from this mission set are routine facility modification, maintenance, and operations that are the responsibility of the designated BOS-I.

3. Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer Capabilities

a. RED HORSE units are self-sustaining heavy construction forces that contain organic logistical support, such as vehicle maintenance, communications, food service, supply, medical support, and special construction capabilities. This organic support allows the units to operate independently for extended periods of time. These units execute heavy horizontal and vertical construction projects; site development; construction and repair of runways, taxiways, aprons, roads, and revetments; heavy earthwork; construction and repair of facilities and infrastructure; and water purification. RED HORSE capabilities include all of the functions of Prime BEEF teams but are more focused on providing a heavy construction capability including the specialized engineering capabilities of water well drilling, small-scale explosive demolition, quarry operations, concrete/asphalt batch plant operations, concrete/asphalt paving, materials testing, large expedient facility erection, and the installation of specialized assets such as aircraft shelters, dome shelters, clamshells, and expanded shelters.

b. RED HORSE teams are capable of being deployed in a hub-and-spoke operation. This hub-and-spoke concept centers on primary and secondary beddown echelons which support specialized construction teams tailored to individual project requirements. The concept is to deploy the entire squadron to a single AOR along with the appropriate equipment and vehicles. As the COMAFFOR establishes work requirements and priorities, the squadron will deploy teams to accomplish projects. RED HORSE typically reports to a numbered air force in peacetime. During wartime, they are utilized as a theater asset reporting directly to the COMAFFOR.

4. Prime Base Engineer Emergency Force Capabilities

a. Prime BEEF teams consist of total force military personnel assigned to home-station civil engineer organizations. While they are similar to RED HORSE, Prime BEEF teams have less capacity/force structure. During contingencies, engineers transition to an expeditionary mode capable of rapidly responding worldwide, providing the full range of engineering support and emergency services to establish, sustain, and recover bases for employing Air Force weapon systems and supporting joint forces or MNFs. Prime BEEF capabilities include engineer reconnaissance related to terrain, airfield, and site surveys; infrastructure; bare base construction; concrete and asphalt paving; utility system installation and maintenance; installation GI&S; ADR; fire protection/crash rescue; EOD operations; and EM. Prime BEEF UTCs are rapidly deployable via airlift with team kits to support initial beddown taskings.

b. Prime BEEF teams can be formed into an expeditionary civil engineer squadron to sustain bases as they transition from contingency bases with initial standards of construction to more enduring bases with temporary or permanent infrastructure. The expeditionary civil engineer squadron would provide installations support, consisting of activities necessary for effective real property life-cycle management and installation services (e.g., planning, providing installation assets, operating and maintaining utilities systems and infrastructure, environmental management, energy conservation, recapitalization, disposal, economic

adjustment activities). This capability focuses on managing real property facilities and infrastructure on US or enduring and non-enduring bases in foreign theaters of operations while providing protection, safety, security, and sustainability for personnel and mission critical assets. Sustainment supplies and project materials can be procured from pre-positioned stockpiles, war readiness materiel depots, or contract sources.

c. Prime BEEF core competencies are expeditionary engineering and emergency services. Expeditionary engineering consists of those capabilities Prime BEEF teams provide to establish, sustain, and recover bases, while emergency services includes fire emergency services (FES), EOD, and EM activities.

(1) **Expeditionary Engineering**

(a) Air Force expeditionary engineering capability consists of civil engineer activities to establish, sustain, and recover airfields, and conduct force beddown operations, infrastructure maintenance, and base sustainment activities. It focuses on operating and/or maintaining aircraft arresting systems, airfield lighting, heavy equipment, airfield surfaces, roads, and temporary, semi-permanent, or permanent facilities and includes the specialized capabilities of operating/maintaining aircraft arresting systems and power generation and distribution systems. Teams perform light horizontal and vertical construction; provide pest management and environmental services; provide overall base master planning, design, and contract support, to include specialized augmentation at echelons above wing level; and conduct base recovery after attack, to include ADR and repairs to facilities and infrastructure systems.

(b) A specialized Air Force expeditionary engineering capability inherent in Prime BEEF is offered by the civil engineer maintenance, inspection, and repair team (CEMIRT). CEMIRT consists of experts in electronic industrial controls, electrical/electronic equipment, system integrators, and electrical systems that provide remote monitoring and control of core utility equipment and systems, such as dispersed emergency backup generator sets, water/wastewater systems, and electrical distribution equipment. CEMIRT provides intermediate and depot-level repair support on power generation, electrical distribution, and aircraft arresting systems and technical support for heating, ventilation, and air conditioning systems.

(c) Another specialized Air Force expeditionary engineering capability inherent in Prime BEEF is offered by APE teams. APE teams conduct structural evaluations of airfields around the world. APE teams perform routine and emergency evaluations using an array of lab and field equipment and state-of-the-art modeling software to help evaluate the strength and viability of airfields and determine the types of aircraft and number of takeoffs and landings the airfields can support.

(d) Other examples of specialized Air Force expeditionary engineering capabilities available through Prime BEEF are engineering C2, base master planning, project programming and design, construction project/contract management, and construction quality assurance. These capabilities are available at the wing/base level, but can be used to support higher echelons (i.e., major command, numbered air force, or JTF levels). These

specialized engineering capabilities are provided by established Prime BEEF staff augmentation team (S-Team) force packages, or tailored Prime BEEF force packages to meet the mission requirement. Established S-Team force packages include:

1. Civil engineer S-Teams made up of 10 professionally registered engineering officers plus two senior enlisted personnel.

2. Fire protection S-Teams made up of three senior enlisted firefighters.

(e) The Air Force also has the 49th Material Maintenance Group that provides technical expertise, oversight for planning and training for deployed Prime BEEF, RED HORSE or joint equivalent on base expeditionary airfield resources (BEAR) assets. BEAR is a key AEF enabler supporting the beddown of deployed personnel and aircraft at austere locations where little or no infrastructure exists and provides direct mission support including personnel, flight line, and infrastructure.

(2) **Emergency Services.** Air Force emergency services include FES, EOD, and EM activities. These activities protect the base from intentional or unintentional damage, minimize loss of life, and protect property and the environment.

(a) FES provides incident management, fire prevention, and protection to minimize loss to lives, property, and the environment occurring throughout all phases of military operations. Included are fire suppression, hazard mitigation, rescue, mitigation or containment of releases of hazmat, and emergency medical responses. FES is capabilities-based, tailored to specific missions and geographic locations, and based upon environmental and threat conditions for different locations. During contingencies, firefighters are the primary installation emergency response team, responsible for supporting the commander's requirement to launch and recover sorties. When Air Force firefighters are deployed in support of major operations where Air Force beddown and sustainment support is unavailable, the supported command, Service, or agency must provide logistical sustainment requirements.

(b) EOD provides the capability to mitigate or defeat the hazards presented by enemy or friendly employment of explosive ordnance, to include IEDs, explosive remnants of war, UXO, weapons of mass destruction, and incendiary material. The Air Force provides distinctive EOD expertise to protect the mission, resources, and the environment in airfield operations, ground combat, homeland operations, DSCA, and worldwide contingencies. EOD is a high-demand capability that can be employed alone or as part of an Air Force, joint, interagency, or MNF to support CCDR objectives. Air Force EOD forces are primarily postured to support air base operations, with primary missions to support sortie generation and force protection by eliminating explosive threats to airfield operations. Priority employment is in support of base security zones and EOD missions outside of the base security zone in support of air operations or land operations enabling freedom of maneuver. An important EOD mission, independent of air operations, is weapons technical intelligence (WTI). WTI includes investigating explosive events in order to capture bomb emplacers, identify bomb builders, and unravel extremist networks. EOD plays a pivotal role during WTI in the safe handling of military, commercial, and homemade explosives; assessing

weapons and devices; and preserving forensic evidence from rendered safe devices, post-blast scenes, and cache discoveries. EOD provides a critical capability to rapidly disseminate and share critical threat information and targeting opportunities.

(c) EM personnel provide theater and in-garrison EM, CBRN, passive defense and response expertise working within the air operations center, JTF, or in-garrison emergency operations center. The primary mission of the Air Force EM program is to save lives; minimize the loss or degradation of resources; and continue, sustain, and restore operational capability in an all hazards physical threat environment. EM personnel are responsible for coordination of incident management efforts, establishing a COP for the commander and CBRN passive defense and response activities such as detection, identification, sampling, quantification (for operational impact), and management of CBRN threats hazards, hazard prediction and plotting, CBRN warning and reporting, and decontamination capabilities for personnel, equipment, aircraft, facilities, and terrain. Additionally, EM personnel integrate counter-CBRN, force protection, critical infrastructure protection, antiterrorism, and medical requirements as they relate to all hazards incident response and recovery operations.

(3) **GI&S.** Geospatial engineering capabilities provide terrain, geographic, line-of-sight, BEAR base beddown and aircraft parking analysis; terrain visualization; general, baseline, expeditionary, and precision surveys; general and special purpose map products; and data management of the built and natural infrastructure.

Intentionally Blank

ANNEX D TO APPENDIX A
MARINE CORPS ENGINEER ORGANIZATIONS AND CAPABILITIES

1. General

The MAGTF is the Marine Corps' principal organization for all missions across the range of military operations. MAGTFs are balanced, combined arms forces consisting of four organic elements: CE, ACE, GCE, and LCE. MAGTFs range in size from a MEF, MEB, MEU, to a special purpose MAGTF. A MEF has a Marine division as the GCE, a MAW as the ACE, and a Marine logistics group as the LCE. A MEB has a regiment as the GCE, a Marine aircraft group (MAG) as the ACE, and a combat logistics regiment as the LCE. A MEU has a battalion as the GCE, a squadron as the ACE, and a combat logistics battalion as the LCE. The element sizes that make up a special purpose MAGTF vary according to mission. Depending on mission assigned, NCFs may augment MAGTFs of MEF and MEB size. When this occurs, the NCF forms a separate (or 5th) element of the MAGTF. Engineers are organic to each of the four elements of a MAGTF. See Figure A-D-1.

2. Engineers in the Command Element

Engineers within the CE provide advice and guidance to the MAGTF commander and coordinate the overall engineer efforts of the MAGTF. CE engineers work closely with

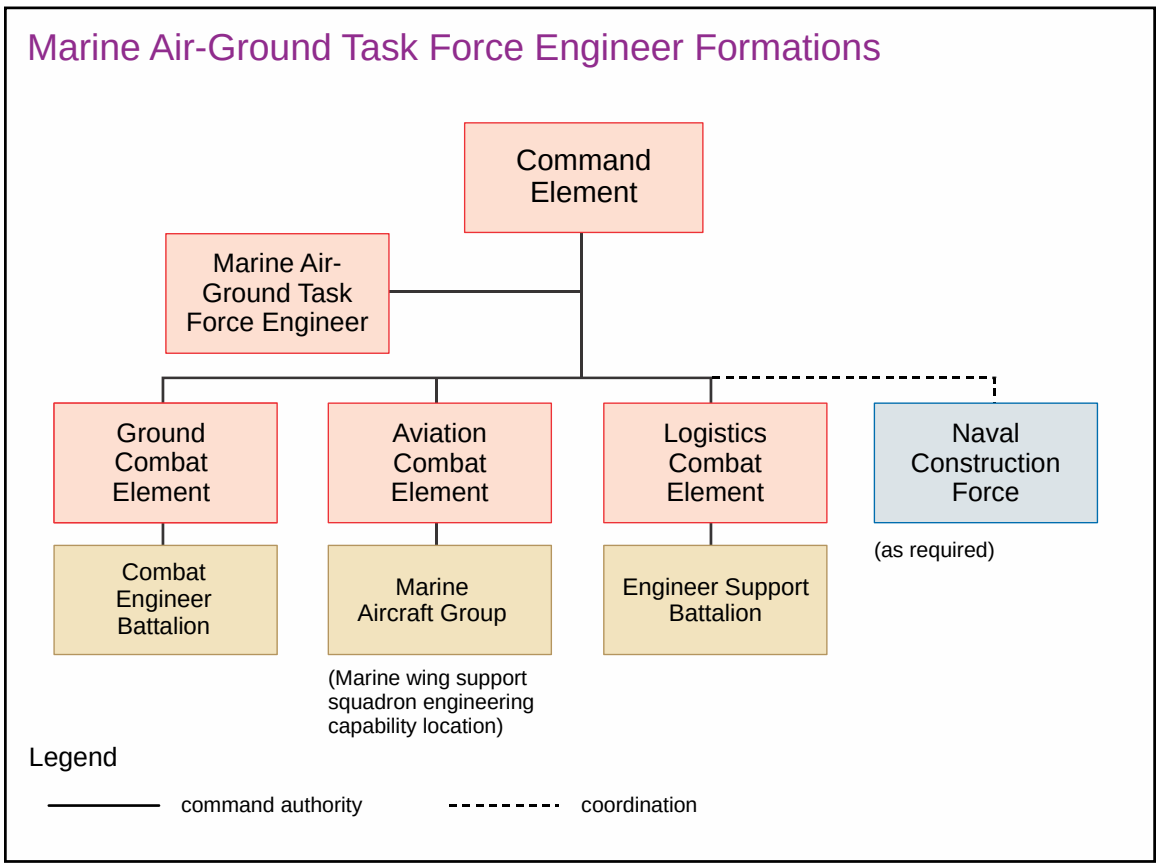


Figure A-D-1. Marine Air-Ground Task Force Engineer Formations

other staff sections to integrate engineer considerations and requirements into all phases of planning and execution.

3. Engineers in the Aviation Combat Element

A MWSS is organic to each MAG. Each MWSS is composed of an HQ company, airfield operations company, engineer company, and motor transport company. The MWSS provides the following AGS functions: internal airfield communications; EAF services; aircraft rescue and firefighting; aircraft and ground refueling; EOD; essential engineer services; intrabase motor transport; field messing; medical; CBRN defense; security; air base commandant functions to include air base ground defense; and organic and support unit personnel training. These functions allow the ACE to project its assets ashore and generate sorties at a rate beyond that capable from sea-based platforms. AGS is compatible with Navy aircraft and can support and accommodate Army rotary-wing aircraft and most Air Force aircraft. The three main categories of engineer services provided by the engineer company of the MWSS are general engineering services, utilities, and material handling and heavy equipment services. The engineer company provides a host of general engineering services necessary to support the ACE during operations. They include engineer reconnaissance; construction and maintenance of mission-essential base camp requirements to include power generation and water purification; technical and equipment assistance for erection and construction of prefabricated structures; development, improvement, and maintenance of airfield and air base drainage systems; camouflage expertise; technical expertise in assessing bomb damage and providing the personnel and equipment necessary to perform ADR; limited mine detection capability; limited combat engineer services; construction, improvement, and maintenance of vertical/takeoff and landing and vertical/short takeoff and landing facilities; soils engineering; and soil stabilization and dust mitigation. The MWSS is capable of site preparation and installation of AM-2 matting, only limited by the available amount of matting. The MWSS can be reinforced by MAGTF ESBs or NCF as necessary to perform missions requiring additional general engineering support.

4. Engineers in the Ground Combat Element

A CEB is organic to the Marine division. The CEB mission is to enhance the mobility, countermobility, and survivability of the division through combat and limited general engineering support. CEB tasks include engineer reconnaissance; emplacing obstacle systems; breaching operations; mine/countermine; demolitions; limited combat road and trail construction and maintenance; temporary vertical and horizontal construction; and provision of provisional infantry. A CEB contains an HQ and service company, an engineer support company, a mobility assault company (MAC), and can include as many as four combat engineer companies depending on mission requirements. The composition of the 4th CEB (Marine Corps Reserve) does not include a MAC. The MAC provides motorized bridging, mechanized breaching, and mobile route reconnaissance and clearance capabilities that enhance the mobility of the Marine division.

5. Engineers in the Logistics Combat Element

The ESB is organic to the Marine logistics group. The ESB provides general support to the MAGTF by providing combat engineering and limited general engineering, bulk liquid (fuel and water), and utility support. ESB tasks include standard and non-standard bridging; mine/countermine; demolitions; EOD; handling, storing, and dispensing bulk fuel and water; water purification; engineer reconnaissance and survey; construction and maintenance of base camps to include survivability; horizontal and vertical construction; laundry and shower services; mobile electric power; refrigeration; expedient road construction, repair, and maintenance; drafting and surveying; obstacle emplacement; breaching operations; and EAF construction. The ESB can reinforce either the MWSS or CEB to support specific requirements that exceed organic ACE or GCE engineer capabilities. The ESB works in concert with the NCF to provide comprehensive engineer support to the MAGTF. The ESB is composed of an HQ and service company, engineer support company, bridge company, EOD company, bulk fuel company, and two or three combat engineer companies. When the tactical situation dictates, the LCE can task-organize a portion of its engineer assets to mass capabilities against a general engineering project being performed by a combat logistics battalion that is directly supporting a ground combat unit.

6. Seabee Support to the Marine Air-Ground Task Force

The Navy typically provides a NMCB from the NCF to enhance the MAGTF through complementary, not duplicative, general engineering support. NMCB tasks include construction of pre-engineered buildings, bunkers, towers, ammunition supply points, concrete and masonry buildings; surveying and drafting; materials testing; well drilling operations; rapid runway repair; bulk liquid distribution and storage; forward arming and refueling point sites; water purification; horizontal construction such as paved and unpaved roads; MSR maintenance; EAFs; asphalt and concrete runways; parking areas; beach improvements; and installation of both standard and nonstandard bridging.

For additional information on Marine Corps engineering, refer to Marine Corps Warfighting Publication (MCWP) 3-17, Engineer Operations; *and MCWP 3-21.1,* Aviation Ground Support.

Intentionally Blank

ANNEX E TO APPENDIX A
MATRIX OF SERVICE ENGINEER CAPABILITIES

The intent of Figure A-E-1 is to provide the JFC, engineers, and planners an overview of engineering capabilities by Service. The resulting matrix is based on the Universal Joint Task List and Service task lists. "P" designates that the Service has an element that organically has the ability to perform the function (i.e., it is a specified task within the mission set of the unit). "S" designates a limited ability to accomplish the task (i.e., it is an implied or secondary task the unit is not fully equipped or trained to accomplish). "N" designates that the Service lacks the capability for the task. The matrix does not reflect capacities nor provide a standard for applying engineer capability against joint operations. The JFC and planners should consult with the staff/joint force engineer to address capacity and interoperability.

Matrix of Service Engineer Capabilities

	Army	Marines	Navy	Air Force
Gap Crossing				
Assault	P	P	N	N
Tactical	P	P	P	N
LOC/Fixed	P	P	P	P
Develop and Maintain Facilities (1)				
Design Modification	P	N	P	P
Real Estate (2)	P	N	P	P
Construct	P	S	P	P
Fire Safety (3)	P	S	S	P
Environmental (4)	P	S	P	P
Maintain	P	S	P	P
End State and Disposition (5)	P	N	P	P
Establish LOCs (6)				
Construct	P	P	P	P
Maintain	P	P	P	P
Global Access Engineering				
Technical Reconnaissance	P	P	P	P
Assess/Predict (7)	P	P	P	P
Mitigate (8)	P	P (Air Field Only)	P	P (Air Field Only)
Repair and Restore Infrastructure (9)				
Real Estate (10)	P	N	P	P
Restore/Reconstruct	P	N	P	P
Natural Resource Development (11)	P	N	P	P
Harden Key Infrastructure and Facilities				
Reinforce/Construct	P	P	P	P
Mitigate	P	P	P	P
Master Facility Design (12)				
Assess (13)	P	N	P	P
Site Selection	P	N	P	P
Design	P	N	P	P
Quality Control/Quality Assurance	S	N	P	P
Defeat Explosive Hazards				
Assess (14)	P	P	N	P
Locate (15)	P	P	N	P
Neutralize	P	P	N	P
Clearance	P	P	P (Repair and Improve Route Only)	P
Remnant of War	P	P	N	P
Enhance Mobility				
Tactical Reconnaissance (16)	P	P	P	N
Breach	P	P	S	N
Clear/Improve	P	P	P	S
Combat Road/Trail	P	P	P	S
Rotary-Wing and Small Unmanned Aircraft Systems (17)	P	P	P	S

Figure A-E-1. Matrix of Service Engineer Capabilities

Matrix of Service Engineer Capabilities (cont.)

	Army	Marines	Navy	Air Force
Deny Movement and Maneuver				
Lethal	P	P	S	N
Nonlethal	P	P	P	P
Enhance Survivability				
Platform Fighting Position (18)	P	P	P	S
Individual Position (19)	P	P	P	S
Emplace Camouflage (20)	P	P	P	P
Utilize Geospatial Data				
Analyze	P	N	S	P
Refine/Update	P	N	S	P
Foundation/Visualization Products	P	N	S	P
Visualize (21)	P	P	S	P
Provide Mobility Assessment				
Track and Plot	P	P	S	P
Visualize (22)	P	P	S	P
Fight as Infantry	S	S	S	N

NOTES:
1. Focused on facilities/infrastructure supporting the force.
2. Includes acquiring title/control of real estate.
3. Includes prevention, suppression, search, and rescue.
4. Focused on environmental baseline studies, damage response, and cleanup.
5. Includes transfer, reconfiguration, and demolition of facilities and infrastructure.
6. Spans ports/waterways, airfield/base, road/rail, intermodal/storage, and pipeline facilities.
7. Focus on conditions, limitations, threats, and options (both location and LOC/route).
8. Clear, open, repair LOC nodes such as sea or aerial port.
9. Focused on facilities/infrastructure supporting host nation/others.
10. Focused on rights of way and entry.
11. Focused on identification and planning for natural resources.
12. Focused on integrating land use, material forecasts, and construction requirements to facilitate developing infrastructure and facilities.
13. Focused on mission needs, land use, and end states.
14. Focused on identifying trends, danger zones, and alternatives.
15. Focused on locating and identifying explosive threats and devices as well as components. Includes use of canines, robotic and unmanned systems, and special search.
16. Focused on conditions, limitations, threats, and options (both obstacle and tactical routes).
17. Focused on forward airstrip and forward arming and refueling points.
18. Focused on protecting equipment and systems from enemy effects. Includes both digging positions and reinforcement/construction of above surface positions.
19. Focused on construction and improvement of bunkers, strong points, above surface/urban positions, and the survivability of command and control centers.
20. Focused on enabling protection, concealment, or deception by employing natural or artificial materials to hide or alter signatures.
21. Focused on understanding the operational environment and its impacts.
22. Focused on understanding movement and maneuver by depicting theater entry points and mobility corridors.

Legend

LOC line of communications

N Not a capability: Designates that the Service lacks the capability for the task.

P Primary capability: Designates that the Service has an element that organically has the ability to perform the function (i.e., it is a specified task within the mission set of the unit).

S Secondary capability: Designates a limited ability to accomplish the task (i.e., it is an implied or secondary task the unit is not fully equipped or trained to accomplish).

Figure A-E-1. Matrix of Service Engineer Capabilities (cont.)

Intentionally Blank

APPENDIX B
DEFENSE SUPPORT OF CIVIL AUTHORITIES

1. General

DSCA refers to DOD support to US civil authorities for domestic emergencies, law enforcement support and other domestic activities, or from qualifying entities for special events.

2. Defense Support of Civil Authorities

a. In an emergency situation, such as managing the consequences of a terrorist attack or natural disaster, DOD may receive requests for assistance to provide additional capacity or unique capabilities in support of state and local governments. DOD has the capability to provide self-deploying, self-sustaining forces with a wide variety of skills and equipment, including engineer forces, which can play a major role in DSCA.

b. DSCA often consists of catastrophic emergencies such as natural or man-made disasters. Emergency response is managed locally. However, if the disaster is large enough in scope to exceed local and state resources and the state or local authority requests federal assistance, the federal government becomes involved. If federal support is required, it is managed under authority of the Secretary of Homeland Security using the National Response Framework (NRF). DSCA falls into several categories. While the military can be called upon to provide support in any of these categories, the most common DSCA categories that can potentially employ engineer forces include:

(1) **National Security Special Events.** SecDef may also designate special events to receive military support. Examples include the Olympic Games or support to the UN General Assembly.

(2) **Disasters and Declared Emergencies.** DOD support to a disaster or emergency involves a response to requests for assistance during domestic incidents in support of the NRF primary or coordinating agencies. Engineers would potentially deploy in response to:

(a) **Natural Disasters.** Natural disasters include, but are not limited to, severe weather, earthquakes, and wildfires. Engineers can expect to respond with equipment assets to remove rubble and debris. Engineers 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 and assessments, construction planning, management and inspection, emergency contracting, and emergency repair of wastewater and solid waste facilities.

(b) **Man-Made Disasters.** Examples of man-made disasters include oil spills, terrorist acts, or a CBRN incident. These events can produce catastrophic loss of life,

destruction of property, or irreparable damage to the environment. Support to domestic CBRN incidents is a major support requirement for military forces and may be an extensive 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.

(3) **Support to Civilian Law Enforcement Agencies.** Military support to civilian law enforcement is carried out in strict compliance with the Constitution. Military forces performing in this role will normally work in support of a primary agency (e.g., Department of Homeland Security or Department of Justice/Federal Bureau of Investigation). Depending on the circumstances, and with SecDef approval, units providing this support may be armed. When armed, forces will adhere to the standing RUF unless SecDef has approved mission-specific RUF. Examples of support include general engineer missions to support counterdrug operations, maritime security, and general support (e.g., training and equipment loans). Support to law enforcement agencies may also include maps, geospatial services, and manpower support.

(4) **Support of Civil Disturbance Operations.** The President is authorized by the Constitution and US statutes to employ the Armed Forces of the United States to suppress insurrections, rebellions, and riots and provide federal supplemental assistance to the states to maintain law and order (Insurrection Act, Title 10, USC, Sections 331-335). Responsibility for the coordination of the federal response for civil disturbances rests with the Attorney General. Any DOD forces employed in civil disturbance operations shall remain under military authority at all times.

3. Organization and Coordination of Missions

DOD engineer forces may serve in a supporting role to a primary agency in support of civil authorities. Deployed DOD forces remain under the C2 of the JFC at all times. Engineer forces may operate under the following scenarios:

a. **Immediate Response.** Local military commanders or responsible DOD officials may respond immediately to a request from local or state governments to an emergency that has imminent serious conditions and if time does not permit approval from higher authority, to save lives, prevent human suffering, or mitigate great property damage, but may not be a Presidential declared emergency. Engineer assets on military installations may be directed to respond in support of public fire, search and rescue services, and public works. DOD support for local environmental operations can begin immediately within the authority delegated to installation commanders. Per DODD 3025.18, *Defense Support of Civil Authorities (DSCA),* the commander's authority is limited to the initial 72 hours of an emergency.

b. **Support to a Primary Agency or as Part of a JTF.** Requests for assistance follow the NRF procedures. A JTF may be established with engineering support under a joint force engineer, or supporting engineer forces may be assigned to an existing JTF under the supported commander (i.e., JTF-Civil Support, JTF-Alaska, JTF-National Capital Region, or JTF-North).

4. Engineer Planning Considerations

a. General engineering planning for DSCA is focused on taking actions to save lives and property, assisting in stabilizing a disaster area, and assisting state or federal agencies where needed. Typical engineer units include the NMCBs, Air Force Prime BEEF and RED HORSE units, Army construction engineering battalions, and battalion, reinforced company, or detachment-sized task-organized Marine Corps units. Specialized units may include capabilities for bridging, water well drilling, power generation, and water purification.

b. DOD planning for general engineering response action should include the following:

(1) Emergency infrastructure repairs (e.g., emergency public facilities and debris/road clearing operations).

(2) Damage assessment and technical assistance.

(3) Possible requirement for military tactical bridging assets.

(4) Base camp support to deployed forces (temporary base camp construction) and possible requirement to provide emergency shelter for disaster victims.

(5) Need for individual protective equipment or personal protective equipment for operating in a contaminated environment due to CBRN contamination or other environmentally threatening event.

(6) Use of geospatial products to include imagery of the disaster area (e.g., inundation zones, flood zones).

(7) Transition from military engineering forces to USACE- or primary agency-contracted capabilities (ensure a clear end state is identified).

c. Unique planning considerations for joint engineer operations in the homeland:

(1) Incident awareness assessment.

(2) FEMA approach to the infrastructure and assessment survey model (Figure IV-6).

(3) National Guard role in engineering support in the homeland.

(4) USACE role in emergency support functions.

For additional information, see JP 3-27, Homeland Defense; *JP 3-40,* Countering Weapons of Mass Destruction; *and JP 3-41,* Chemical, Biological, Radiological, and Nuclear Consequence Management, *as appropriate; and JP 3-28,* Defense Support of Civil Authorities, *for discussion of the National Incident Management System and the NRF.*

Intentionally Blank

APPENDIX C
ENVIRONMENTAL CONSIDERATIONS

1. General

While complete protection of the environment will not always be possible due to its competition with other risks that the commander must assess, planning must carefully and continuously address the full range of environmental considerations in joint operations. This appendix describes many of the roles and responsibilities for integration of environmental considerations. It presents environmental requirements that a commander normally addresses in both domestic and foreign training and operations, although many of the environmental compliance requirements do not apply outside the US. The aim of this appendix is to make environmental considerations a constant part of a commander's training, planning, and operations while at the same time using established procedures and capabilities to implement that integration for the commander. Environmental considerations include the spectrum of environmental-related media, resources, programs, or effects that may impact, or are affected by, the training, planning, and execution of military operations. Factors include, but are not limited to environmental compliance, pollution prevention and conservation, protection of flora and fauna, protection of historical and cultural sites to include their relationship to CMO, and the health of personnel.

For a more in-depth discussion of environmental considerations, refer to the multi-Service manual, FM 3-34.5/MCRP 4-11B, Environmental Considerations.

2. Environmental Roles and Responsibilities

a. **CCDR and Subordinate JFC.** JFCs are responsible for integration of environmental considerations during training, planning, and the conduct of operations. JFCs demonstrate proactive environmental leadership during all phases of joint operations across the range of military operations. JFCs instill an environmental ethic in subordinate commands and promote awareness of environmental considerations throughout the joint force. JFCs identify specific organizational responsibilities and specific joint force environmental requirements. These responsibilities should have clearly defined goals, strategies, and measures of success. JFCs should comply with US laws and regulations, country-specific environmental FGSs, the DOD OEBGD (for permanent installations only, does not apply to operational or training deployments), relevant and binding international agreements, GCC directives, and environmental consideration annexes. The goal of compliance is to minimize potential adverse impacts on human health and the environment while maximizing readiness and operational effectiveness. Although the engineer is the staff proponent for integration of environmental considerations, all members of the staff have a role in integrating environmental considerations and many must include guidance for these considerations in their respective CJCSM 3130.03, *Adaptive Planning and Execution (APEX) Planning Formats and Guidance,* annexes/appendices as outlined in Figure C-1.

Adaptive Planning and Execution Annexes and Appendices with Significant Environmental Considerations

JOPES Location	Proponent Staff	Principal Staff and Special Capabilities	Comments
Annex A	J-3 (Operations)	All, primarily engineer, surgeon, and civil affairs	Ensure elements to perform critical environmental missions are included in the task organization, especially engineer, medical, and civil affairs. Time-phased force and deployment data sequence may be critical to perform missions in a timely fashion.
Annex B, Appendix 1	J-2 (Intelligence)	All, primarily engineer, surgeon, and civil affairs	Environmental priority intelligence requirement may include information on planned base camps and other sites.
Annex B, Appendix 4	J-2 (Intelligence)	Fire support element, engineer, civil affairs, staff judge advocate	Cultural considerations and the environmental effects of specific targeting must be addressed.
Annex B, Appendix 7	Engineer	J-2 (Intelligence), J-3 (Operations), J-4 (Logistics), any staff requiring geospatial information to support planning	Geospatial information for base camps and other similar sites needs to be identified in this appendix. Geospatial information is important in identifying past environmental contamination and other health and safety threats and in identifying sensitive cultural and natural resources for protection.
Annex C, Appendix 2	Chemical Officer	Staff judge advocate, surgeon	Use of riot control agents and herbicides requires integration of environmental considerations.
Annex C, Appendix 8	Engineer	Chemical officer, explosive ordnance disposal	Clearing of hazards for air base operability may have environmental considerations.
Annex C, Appendix 13	Engineer	Explosive ordnance disposal, chemical officer	Clearing of unexploded ordnance for base camps and other similar sites may be necessary.
Annex D, Appendix 1	J-4 (Logistics)	Engineer, surgeon	Petroleum, oils, and lubricants always have significant embedded environmental considerations.
Annex D, Appendix 2	J-4 (Logistics)	Engineer, surgeon	Water sampling, well site selection and preparation contain environmental considerations.
Annex D, Appendix 6	Engineer	J-4 (Logistics), civil affairs, surgeon, staff judge advocate	The engineering support plan must integrate environmental considerations.
Annex E, Appendix 4	Staff judge advocate	J-3 (Operations), J-4 (Logistics), fire support element, engineer	This includes those considerations associated with the environmental laws.
Annex F	Public Affairs Officer	Civil affairs, staff judge advocate, surgeon, engineer	Environmental considerations will be of concern for the public affairs officer.

Figure C-1. Adaptive Planning and Execution Annexes and Appendices with Significant Environmental Considerations

Adaptive Planning and Execution Annexes and Appendices with Significant Environmental Considerations (cont.)

JOPES Location	Proponent Staff	Principal Staff and Special Capabilities	Comments
Annex G	Civil Affairs	Engineer, surgeon, staff judge advocate	Civil affairs covers the spectrum of environmental considerations, although it has a special focus on civil considerations.
Annex H	METOC Officer Engineer	J-2 (Intelligence), J-3 (Operations), J-4 (Logistics), any staff requiring information on how to obtain current and forecast METOC information	Provide environmental sensing support to planning, employment of riot control agents and herbicides, and other environmental considerations.
Annex L	Surgeon	J-4 (Logistics), staff judge advocate, surgeon	Civil affairs, engineering, legal, medical implications, J-2 and other intelligence activities, and may involve all members of the joint environmental management board.
Annex Q			Numerous places throughout with environmental considerations embedded besides Appendices 6 and 10.

Legend

J-2 intelligence directorate of a joint staff
J-3 operations directorate of a joint staff
J-4 logistics directorate of a joint staff
JOPES Joint Operation Planning and Execution System
METOC meteorological and oceanographic

Figure C-1. Adaptive Planning and Execution Annexes and Appendices with Significant Environmental Considerations (cont.)

b. **CCMD and Subordinate Joint Force Engineer.** The joint force engineer (as the staff proponent for the integration of environmental considerations) is responsible for providing guidance to the JFC on environmental considerations in planning and executing joint operations. The staff engineer advises the commander and staff (in conjunction with the SJA, surgeon, and others) on environmental issues. Working with other staff officers, the engineer determines the impact of operations on the environment, and the corresponding effect of the environment on Service members and integrates environmental considerations into the decision-making process. The engineer may function as the chairman of the JEMB and is the integrator for the writing, publishing, and updating of annex L (Environmental Considerations). The engineer works primarily with the J-4 and the surgeon in performing site assessments for installations, facilities, contingency locations, and other sites. The engineer and the SJA advise the commander on the necessity for environmental impact analysis to meet HN, Title 32, CFR, Part 187, or OPORD/OPLAN requirements. All EBSs are coordinated through the engineer and with the surgeon to synchronize the performance of an EHSA whenever possible at the time it is completed. The engineer is also responsible for advising the J-2 on significant environmental factors and ensuring that these impacts are integrated into the JIPOE process. As a member of the targeting cell, the engineer integrates

environmental considerations into the process of target nomination, incorporating legal/CA expertise as appropriate. Coordination for geospatial products and potential EOD support for the clearing of contingency locations (or other locations) is done through the engineer.

c. **CCMD and Subordinate Joint Force SJA.** The CCMD and subordinate joint force SJA advise the commander and staff on legal matters, including legal advice relating to environmental laws, regulations, treaties, relevant international conventions, and the law of war concerning collateral damage to the environment. The SJA also interprets existing SOFAs and may assist in the drafting of additional agreements, supplements, and amendments to the SOFA. The SJA provides legal advice on environmental impacts analysis requirements and receives and processes civilian claims resulting from environmental damage. The SJA provides legal advice to the commander on how to deal with important HN historic and cultural sites and environmentally sensitive natural areas. The SJA assists other members of the joint force staff and DOD agencies in negotiating transit agreements in advance of the actual deployment, to permit the transit of regulated (hazardous) wastes for disposal in an environmentally sound manner. The SJA provides legal advice on EBS requirements, participates in the development of any EBS exemptions as they may apply, and processes claims resulting from environmental damage. The SJA helps other staff officers to understand the legal aspects involved in their respective specialties and areas of concern for environmental considerations as they develop their respective annexes. Prior to operations, environmental lawyers assist in the planning process by providing legal advice concerning environmental reviews and environmental requirements in the area of operations and by reviewing plans to ensure they address environmental law and policy agreements. The environmental plan should address certification of local water sources, waste management, hazardous material management, protection of flora and fauna, archeological and historic preservation, the base field spill plan, and policies and responsibilities to protect the environment. Environmental lawyers should advise commanders to help ensure that an environmental survey is completed to provide a baseline against which later claims for damage may be assessed. SJAs coordinate with the organization's environmental team and CA section as well as with the DOS country team and local environmental legal authorities.

d. **CCMD and Subordinate Joint Force Surgeon.** The CCDR and subordinate joint force surgeon are responsible for regional health matters and services (e.g., preventive medicine and occupational health) to the joint force. Priorities include water vulnerability assessment support, sanitation, waste disposal (e.g., hazardous and infectious waste), health risk assessment, environmental health sampling and surveillance, and vector control to protect human health and welfare within the OA. The surgeon advises on the health threat, including environmental, endemic, and epidemic diseases. The surgeon also has direct access to environmental, preventive medicine, and public health services. The surgeon provides health risk assessment guidance (e.g., contingency locations selection) to support the commander's risk management decision-making process. The surgeon relates environmental hazards to the environmental health of service members. The commander and the unit staff may call on the surgeon to assist in determining the public health implications of damage to critical environmental resources. The surgeon is responsible for planning and ensuring the implementation of EHSAs, whenever possible, in conjunction with EBSs, of contingency locations and similar sites.

e. **Joint Force Public Affairs Officer (PAO).** The joint force PAO coordinates with appropriate staff and commanders to plan and accomplish public affairs efforts in support of mission objectives. Public perceptions of environmental threats may be more significant to mission accomplishment than the threat itself. In this role, the PAO coordinates with the plans directorate and CA personnel to ensure the commander has taken all appropriate cultural and environmental considerations into account. Communication activities should be fully integrated in command operational planning and execution processes, so that there is consistency in intent or effect between command actions and information disseminated about those actions. The PAO advises the commander and staff on methods of conveying information to and responding to information from the public. When deployed overseas, the PAO coordinates with appropriate staff and commanders to plan and execute public affairs efforts in support of mission objectives. In the US, various environmental laws require public involvement. The PAO identifies and prepares plans for meeting these requirements. The joint force PAO coordinates with appropriate staff and commanders to plan and accomplish public relations efforts in support of mission objectives. Special attention should be given to potentially sensitive environmental issues associated with a joint operation. The joint force PAO will be a significant participant in public outreach efforts and should participate in development of and be aware of assigned responsibilities in environmentally related OPLANs.

For additional information on other joint force PAO responsibilities, refer to JP 3-61, Public Affairs.

f. **Joint Force J-4.** As the principal staff officer for coordinating the logistic integration of supply, maintenance, and services for the command, the joint force J-4 oversees many functions with potential for generating HW. The J-4 also establishes procedures for reducing and controlling hazmat. The J-4 recommends command policies for solid waste and hazmat/HW disposal. The J-4 is responsible for all aspects of hazmat and regulated HW management to include minimizing use, storage, transportation, disposition, and return to home station of excess materials. In this capacity, the J-4 will coordinate closely with DLA early and throughout the operation. The J-4 also recommends command policies for pollution prevention and, in coordination with the J-3, oversees the preparation of spill prevention and response plans. The J-4 coordinates the SJA and other appropriate staff officers to ensure that current environmental considerations (such as water or soil contamination), epidemiological surveys, and disease risk assessments have been completed, are sustained, and comply with legal requirements. The J-4 ensures that the data has been recorded for future review and potential remediation consideration.

g. **Joint Force J-3.** The J-3 is the principal staff officer for all matters concerning training, operations, and plans. It is the J-3's responsibility to ensure that any significant collateral environmental damage caused by command-directed operations is understood and approved by the commander during the decision-making process. Geopolitical concerns that include architectural and cultural issues, and force health protection issues, must be integrated into OPLANs/OPORDs and concept plans. The J-3 establishes and supervises the command training programs to include environmental skill and awareness training that supports the unit mission. The J-3 also ensures that the unit protects and maintains training areas. As the overall ground manager and planner of troop movements, bivouacking, and

quartering, the J-3 understands and considers environmental vulnerabilities and the associated force health protection during operations. Placement of contingency locations and other such sites is of critical concern to the J-3, and some environmental considerations may be as important as the considerations of force protection. The J-3 may assign special missions to tactical units to secure and safeguard critical environmental resources, such as wastewater treatment plants in urban areas, in order to mitigate risks to and from the environment or cultural locations such as museums/sacred sites. When appropriate, the J-3 prepares counterterrorism and security plans to combat possible environmental sabotage. The J-3 exercises coordination staff responsibility over the staff engineer (if it is not a separate staff element) in the preparation and implementation of an EBS for each base camp or similar site. The J-3 ensures that the data has been recorded for future review and potential remediation consideration.

h. **Joint Force J-2.** As the staff officer responsible for conducting JIPOE and defining and characterizing the OA, the J-2 is responsible for incorporating significant environmental factors and integrating intelligence requirements associated with environmental considerations. The staff engineer, surgeon, SJA, J-4, and other staff elements generally provide these environmental factors. Environmental considerations will generate IRs and some of those (to include intelligence on contingency locations) may even become priority intelligence requirements during the planning process to ensure that Service members are not placed in hazardous sites.

i. **JEMB.** A JEMB may be established by the CCDR or subordinate JFC for a joint operation in order to integrate the environmental protection efforts of all participating components under a single authority and to ensure unity of effort for environmental protection activities. The JEMB can be chaired by the CCDR, deputy commander, chief of staff, or subordinate joint force engineer, and includes representatives from each Service component and joint force staff representatives as necessary (e.g., legal, occupational health, preventive medicine, intelligence, safety, comptroller, planning, operations, and logistics). The JEMB should participate in the operation planning process by ensuring that baseline environmental surveys are conducted and updated when appropriate and by identifying exemptions and management requirements to the JFC. The JEMB assists the JFC in establishing the joint force environmental policies, practices, procedures, and priorities and providing oversight of environmental protection standards and compliance. Establishment of a dedicated and appropriately staffed environmental engineering staff that is supported with expertise from other joint force staff members (e.g., legal and medical) may obviate the need for a JEMB in smaller operations. It may be appropriate to create this board early in the planning process to support mission analysis. It may also be necessary/desirable to maintain it on a permanent basis to support sustainment of operations. The JEMB can be used to assist the commander with environmentally related risk management.

j. **Unit Commanders.** Unit commanders are responsible for complying with the applicable environmental requirements and guidance established by the JFC in the OPLAN or OPORD. Unit commanders should keep the JFC and staff informed of conditions that may result in noncompliance with the requirements or guidance associated with environmental considerations. That certain environmental considerations may not be able to be implemented during one portion of an operation or in one part of an OA does not justify

failure to implement them at other times and locations within an OA. Operational necessity should never become a blanket excuse for excluding environmental considerations and protection of the environment.

k. **Unit-Level Points of Contact.** Unit commanders should appoint and train a unit-level point of contact for communication of environmental information with the joint force engineer and/or JEMB, as required. The unit level point of contact should be the unit commander's advisor on environmental considerations and perform these functions in a fashion similar to that of a unit safety officer. The environmental point of contact should be knowledgeable in both preventing adverse environmental impacts and responding to environmental incidents.

l. **Other DOD Environmental Structures, Governmental Agencies, or NGOs.** During operations, such as those involving responses to disasters or support to civilian governmental agencies (e.g., cleanup of major oil or hazardous substance spills), the JFC may have to work with other DOD or governmental agencies or NGOs to ensure successful completion of the operation. Where appropriate, these representatives should be a part of the environmental planning process. The JFC may also consider their participation as ad hoc members of the JEMB.

3. Environmental Requirements

In general, environmental requirements can be divided into overseas requirements and requirements applicable in the US and its territories, although some US environmental requirements may have extraterritorial application. For example, the National Historic Preservation Act (Title 16, USC, Section 470[b][1-6]) requires federal undertakings outside the United States to avoid or mitigate adverse effects on properties included on either the World Heritage List or a foreign nation's equivalent of the national Register of Historic Places. The joint force SJA should be consulted to determine extraterritorial applicability and to confirm the applicability of other environmental requirements.

a. **Requirements Applicable within the US.** All joint operations within the US and its territories and possessions generally are required to be conducted in compliance with applicable federal, state, and local environmental laws and regulations and under the planning authorities of US Northern Command and US Pacific Command. A number of federal statutes establish environmental requirements that may impact joint operations. The President may exempt federal activities from compliance with some environmental requirements for up to a year at a time if an exemption would be in the paramount interests of the US. Absent a war or other exigent circumstances, however, it is highly unlikely that Presidential exemptions will be granted excusing federal facilities from complying with federal, state, or local environmental requirements. Many US environmental laws allow for national security exemptions for specified activities, but only upon action by the President. These exemptions are rarely granted and should be coordinated up the chain of command before they are relied upon. Legal counsel should always be consulted to determine applicable requirements.

b. **Requirements Applicable in Overseas Areas.** Joint operations in areas outside US territory will be conducted IAW US law, applicable treaties, conventions, international agreements (to include basing agreements), unified CCMD directives, annex L (Environmental Considerations) of the OPLAN or OPORD, and other environmental requirements or command guidance that apply to the operation. In the absence of definitive environmental guidance within applicable international agreements, JFCs should establish guidance in the OPLAN and/or OPORD that will protect force health, limit adverse public health impacts, consider the US liability, and be consistent with mission goals. In addition to requirements contained in international agreements, the following references provide guidance and requirements that may impact joint operations beyond US territory and, as appropriate and applicable, should be considered in developing annex L (Environmental Considerations) to an OPLAN or OPORD. Annex L should be viewed as a living document to be updated with changes in mission, operational maturity, and improved intelligence and information regarding the environment. The OEBGD may be a valuable source and reference document for the development of environmental standards for joint operations.

(1) **Title 32, CFR, Part 187.** This part provides policy and procedures to enable DOD officials to be informed and take account of environmental considerations when authorizing or approving certain major federal actions that do significant harm to the environment of places outside the US. It provides definitions of key terms, policy, responsibilities, and IRs.

(2) **DODI 4715.05,** ***Environmental Compliance at Installations Outside the United States.*** This instruction establishes environmental compliance standards for protection of human health and the environment at DOD installations in foreign countries and provides for designation of a DOD lead environmental component (LEC). In coordination with the CJCS and the Under Secretary of Defense for Policy, the Under Secretary of Defense for Acquisition, Technology, and Logistics designates a LEC for specific countries and geographic locations outside the US IAW DODI 4715.05. DODI 4715.05 requires development and maintenance of an OEBGD. DODI 4715.05 does not apply to off-installation operational and training deployments. IAW DODI 4715.05, the DOD LEC uses the OEBGD to establish the FGS unless the OEBGD is less protective than an applicable HN environmental standard or a standard under an applicable international agreement. However, the OEBGD may be a valuable source and reference document for development of additional environmental standards for joint operations.

(3) **DODI 4715.08,** ***Remediation of Environmental Contamination Outside the United States*****.** This instruction implements policy, assigns responsibilities, and prescribes procedures for remediation of environmental contamination on DOD installations outside the US. DODI 4715.08 does not specifically apply to operations connected with actual or threatened hostilities, security assistance programs, peacekeeping missions, or relief operations. However, it may provide valuable information that could be used in operational planning.

(4) **Air Force Handbook 10-222, Volume 4,** ***Environmental Considerations for Overseas Contingency Operations*****.** This handbook presents practices that can minimize adverse impacts to human health and the environment and facilitate compliance during

contingency operations. These strategies are designed to reduce or eliminate negative impact on mission accomplishment caused by health hazards and regulatory noncompliance. It outlines these strategies for exercises, deployments, and contingency operations at overseas DOD installations, and at overseas non-DOD installations.

(5) **FM 3-34.5/MCRP 4-11B, *Environmental Considerations.*** This manual provides guidance for applying environmental considerations during planning, training, and the conduct of contingency operations.

(6) **NWP 4-11, *Environmental Protection*.** This publication provides environmental doctrine to commanders for use as a foundation for their plans to accomplish objectives while achieving environmental protection. It provides guidance on the development of a maritime focused annex L (Environmental Considerations) to an OPLAN or OPORD.

c. **HN Agreements and SOFAs.** These are bilateral or multilateral agreements that affect the conduct of military operations within HNs, and joint forces are required to comply with these agreements unless otherwise directed by higher level authority.

d. **OEBGD and Environmental FGSs.** The OEBGD specifies criteria and management practices for environmental compliance at DOD installations at overseas locations. It is designed to protect human health and the environment and reflects generally accepted environmental standards applicable to DOD installations, facilities, and actions in the US. It also incorporates requirements of US law that apply to DOD installations and activities outside the US and its territories. Designated DOD LECs (see DODI 4715.05, *Environmental Compliance at Installations Outside the United States*) use the OEBGD to develop and update country-specific FGSs for all DOD components. To develop and update the FGS, the DOD LECs compare OEBGD standards with the requirements of applicable international agreements (e.g., SOFAs) and certain local, regional, and national HN standards. The DOD LECs normally incorporate in the FGSs those standards that provide more protection to human health and the environment. The OEBGD applies in countries where no FGSs have been established. Neither FGSs nor the OEGBD apply to the operations of US military vessels, the operations of US military aircraft, or to off-installation operational and training deployments. The FGSs or the OEBGD in countries where no FGSs exist apply to support functions for US military vessels and aircraft. Although the OEBGD and FGSs are not applicable to the operation of US military vessels, the operations of US military aircraft, or to off-installation operational and training deployments, they provide valuable information for environmental planning and can aid the conduct of joint operations.

e. **International Regulations, Treaties, and Conventions.** An increasing number of environmental international regulations, treaties, and conventions apply to joint military operations. For example, management and processing of HW for disposal overseas may be affected by the Basel Convention, an international agreement governing the transboundary shipment and disposal of HW. Another international convention that may impact a joint operation is the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention), which precludes the dumping at sea of wastes generated ashore. The International Convention for the Prevention of Pollution from

Ships will affect maritime operations. The JFC should consult the joint force SJA regarding these requirements and their potential impact on operations.

f. **Law of War.** The law of war is derived from treaties and international agreements to which the US is a party and applicable customary international law. It establishes certain limits on the means and methods of warfare that could impact upon general engineer operations. It may be lawful under the law of war to cause collateral damage to the environment during an attack on a legitimate military target. However, the commander has an affirmative obligation to avoid unnecessary damage to the environment to the extent that it is practical to do so consistent with mission accomplishment. To that end and as far as military requirements dictate, methods and means of attack should be employed with due regard to the protection and preservation of the natural environment. Destruction of the environment not required by military necessity and carried out wantonly is prohibited. Advice should be sought from the joint force SJA as to the application of the law of war.

4. Environmental Planning

a. **Need for Environmental Planning.** By considering environmental issues early in the planning process, the JFC may continue to achieve operational objectives while minimizing the impact on human health and the environment. Failure to consider the environmental impacts of all activities may adversely affect the operation. Potential effects include delaying operation commencement, limited future use of exercise or HN areas, and adverse public opinion, potentially impacting the success of an operation. Commanders should make environmental considerations an integral part of the mission planning and operational decision-making process. In joint operations, it is important that all Services implement these requirements in a consistent manner. JFCs develop, publish, and update environmental policies and procedures in annex L (Environmental Considerations) to the OPLAN or OPORD that will minimize the impact of environmental health effects on an operation and the operational effects on the environment. By early assessment of environmental considerations, commanders may become aware of the potential environmental effects or impacts of mission accomplishment while alternatives still exist to address mitigating actions. By planning early, the JFC and joint force staff will be aware of the environmental requirements, and will be able to plan more efficiently and act accordingly. Furthermore, careful and visible attention to environmental considerations in the conduct of a military operation can assist in shaping a positive image both internationally and domestically.

b. **Elements of Environmental Planning.** The joint force staff should plan the operation to achieve mission objectives while minimizing environmental impact and observing environmental requirements. Although not all of the following elements will be applicable to all operations (e.g., some, such as identification of alternatives to obtaining objectives, are not required for operations overseas), they may prove helpful in the planning process.

(1) Identification of operational objectives and the activities that are proposed to obtain these objectives, including logistics and identification of hazmat that may be used.

(2) Identification of potential alternative means of obtaining operational objectives. Alternatives may include new technologies or systems that minimize impacts on the environment.

(3) Identification of the environmental requirements applicable to the OA.

(4) Identification of adverse environmental health and environmental impacts that may result from conducting the operation.

(5) Establishment of formal relationships and coordination with other disciplines that have roles in environmental planning and operations (e.g., medical, legal, intelligence, CA).

(6) Identification of possible environmental contingencies that may occur during the operation, such as accidental spills.

(7) Determination of how an environmental contingency would affect the environment in the OA and how it could be prevented or mitigated should it occur.

(8) Determination of the environmental and operational risk associated with the operation. If risks are unacceptable, identify alternatives that will mitigate associated risks.

(9) Early coordination with applicable agencies to negotiate applicable agreements to allow for the unimpeded transit of hazmat or HW by military and contracted assets for environmentally sound treatment or disposal IAW international agreements.

(10) Determination of contractor status, to include privileges, liabilities, and immunities in support of the operation.

(11) Identification of organic environmental resources and reachback capabilities.

c. **Key Environmental Planning Factors.** JFCs should consider environmental and force health protection during each phase of an operation. In planning and conducting joint operations, regardless of geographic location, commanders should give appropriate consideration to the following:

(1) Legal requirements and constraints.

(2) Cultural, historic, and religious factors.

(3) Environmentally sensitive ecosystems to include endangered or threatened species and marine mammals.

(4) Potential preexisting environmental health risks to the force.

(5) Potential environmental terrorism against the force.

(6) Targeting considerations to avoid damage to cultural, historic, or religious sites.

(7) Site selection for base camps and other facilities.

(8) Camp closure and site remediation.

(9) Management of hazmat and POL and disposal of HW.

(10) Spill prevention, containment, and response.

(11) Transportation, storage, and disposal of medical and infectious waste.

(12) Water and wastewater management.

(13) Integrated solid waste management planning, to include pollution prevention and recycling efforts to reduce waste generation and the proper disposal of remaining solid waste to minimize harmful impacts to human health and the environment.

(14) Potential remediation of contaminated areas.

(15) Environmental requirements pertaining to sensitive site exploitation and associated liabilities of operations.

(16) Environmental controls pertaining to construction operations.

(17) Noise abatement.

(18) Air emissions.

d. **Environmental Risk Management.** Environmental risk management is the process to assess, detect, and control the environmental risk arising from operational actions and balancing environmental risk with mission benefits and gains. Knowledge of the environmental factors is key to planning and decision making. With this knowledge, leaders can promote operational success, quantify environmental risks, detect problem areas, reduce the possibility of injury or death to military personnel and affected civilian populations, reduce property damage, and ensure that operations are consistent with environmental requirements. The JFC should integrate environmental risk management into the overall planning of operations in the same fashion as other risks. For additional information on environmental risk management see FM 3-34.5/MCRP 4-11B, *Environmental Considerations*.

5. Environmental Contingencies

a. **Oil and Hazardous Substance Spills.** The laws, regulations, and policies that control oil and hazardous substances protect water, soil, and air from harmful levels of contamination. Joint forces should ensure that they minimize environmental contamination from oil and hazardous substances. JFCs should complete an oil and hazardous substance spill contingency plan for an operation as part of annex L (Environmental Considerations) to an OPLAN or OPORD prior to commencing joint operations. Spill contingency plans should address prevention procedures and practices, spill reporting, initial control and

recovery actions, cleanup actions, and C2 responsibilities. The plans should also address the availability and location of equipment (to include personal protective equipment) for control and cleanup, safety and health of personnel, and training.

b. **Environmental Noncompliance.** During an operation, environmental noncompliance or delay in assessment may occur due to machinery and equipment breakdown or malfunction, enemy actions, or the inadvertent or willful disregard or violation of environmental requirements by force or contractor personnel. Failure to take prompt and appropriate action may endanger human health and safety and exacerbate the consequences of the incident, e.g., increased cost to remediate, negative press, adverse diplomatic consequences, diverting JTF resources. Annex L (Environmental Considerations) to an OPLAN or OPORD should address such environmental contingencies, including reporting requirements.

Intentionally Blank

APPENDIX D
CONTRACT CONSTRUCTION AGENTS

1. General

a. The DOD construction agents are the USACE, NAVFAC, or other approved DOD activity such as AFCEC (see DODD 4270.5, *Military Construction*). These organizations and their contractors are a powerful force multiplier, allowing military engineers to concentrate on engineering missions in high-threat areas. USACE and NAVFAC also provide the JFC with a significant engineering capability to be leveraged in joint operations. USACE and NAVFAC are the principal organizations to plan, design, construct, and acquire (lease or buy) facilities and obtain the use of real estate through HN agreements or leases. AFCEC also has the authority to design and construct projects to support joint and Air Force requirements. Inherent in their mission support capabilities is a planning and engineering capability for theater advanced base and infrastructure development. These organizations also maintain in-depth expertise in engineering research and development.

b. **Responsibilities.** The responsibilities of the DOD construction agents include the design, award, and management of construction contracts for projects associated with the peacetime MILCON program. Overseas, USACE, NAVFAC, and the Air Force are assigned specific geographical areas under DODD 4270.5, *Military Construction* (see Figure D-1). Related to these responsibilities is the leasing of real estate.

c. **Construction Contracting in Contingencies.** The CCDR may also use USACE, NAVFAC, and where approved, AFCEC as contingency CCAs for design, award, and management of construction contracts in support of military operations. For geographical areas where there is no designated DOD construction agent, the CCDR will usually designate a CCA for support in a contingency. USACE and NAVFAC also provide facilities planning, contract administration, and technical engineering support to JFCs (e.g., advanced base master planning, geospatial engineering, force protection engineering, environmental engineering, and cold-weather mobility). AFCEC provides planning, contract administration, and technical engineering support to JFCs and critical oversight and execution support to Air Force contingency MILCON programs overseas.

2. United States Army Corps of Engineers

a. **USACE is the Army activity assigned responsibility to execute the following Army and DOD mission areas:**

(1) Engineering and design.

(2) Contract construction.

(3) Real estate acquisition.

(4) Technical assistance.

(5) Geospatial engineering support.

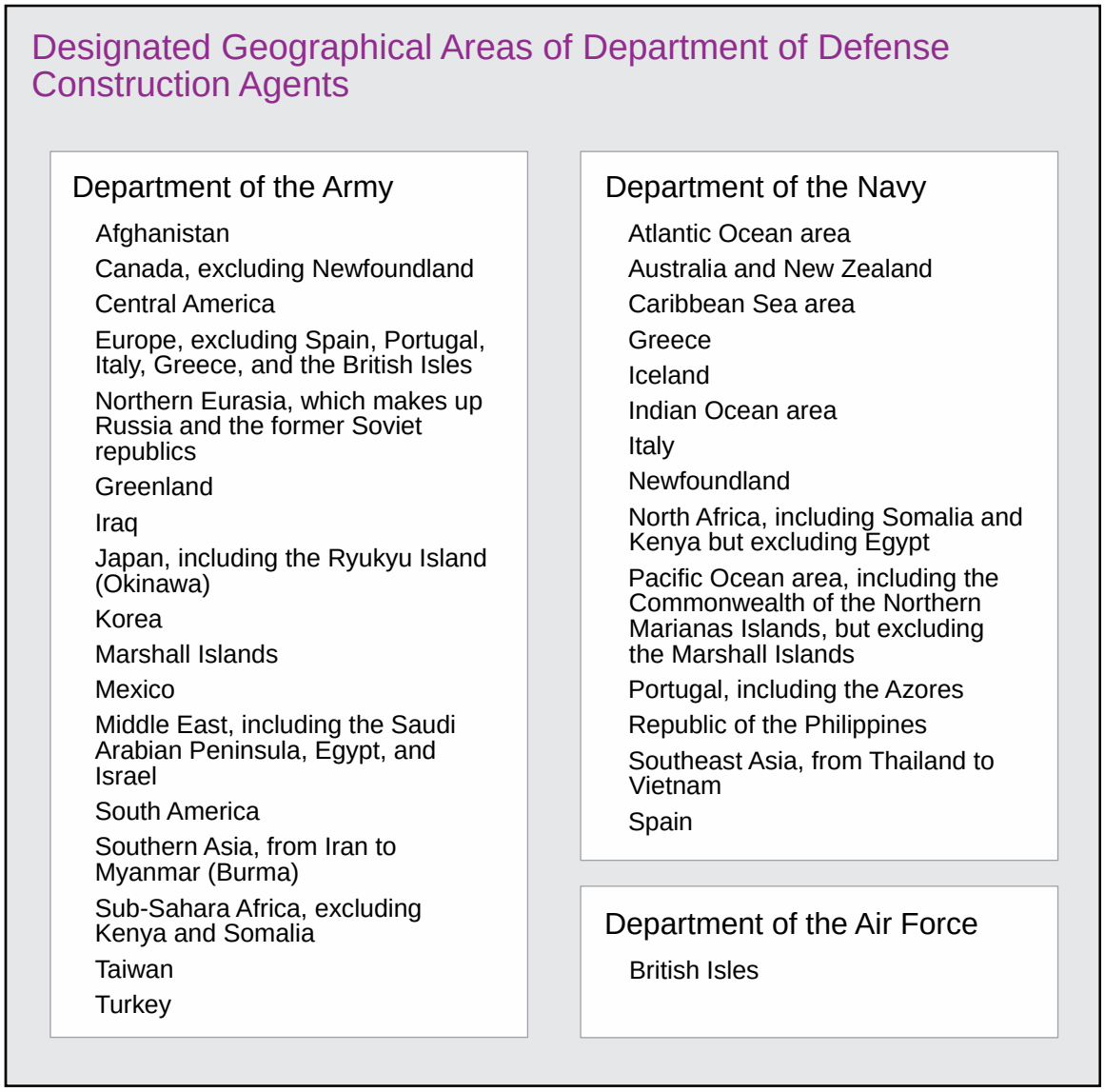


Figure D-1. Designated Geographical Areas of Department of Defense Construction Agents

(6) The Army's civil works program.

b. **Organization.** USACE's subordinate commands are organized geographically and functionally. There are three major organizational structures.

(1) **Divisions.** The division is the major subordinate C2 organization for USACE. The division commander provides executive direction to and management of the subordinate district commands. The division's orientation is regional and provides broad interface with regional interests and management of division-wide programs.

(2) **Districts.** The district command is the operating arm of the division. All USACE districts in the US have civil works responsibilities. In the US, their boundaries are

delineated along major watershed basins and their work lines are set on state boundaries. In addition, some of the districts also have military execution responsibilities. The districts maintain in-house core capabilities in planning, engineering, construction, operations, project management, and contract administration.

(3) **Laboratories.** The ERDC is the USACE's distributed research and development command headquartered in Vicksburg, Mississippi. ERDC consists of the following seven unique laboratories:

(a) Coastal and Hydraulics Laboratory, Vicksburg, Mississippi.

(b) Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire.

(c) Construction Engineering Research Laboratory, Champaign, Illinois.

(d) Environmental Laboratory, Vicksburg, Mississippi.

(e) Geotechnical and Structures Laboratory, Vicksburg, Mississippi.

(f) Information Technology Laboratory, Vicksburg, Mississippi.

(g) Army Geospatial Center and their laboratories, Alexandria, Virginia.

c. **Military Support.** USACE designs and constructs military facilities and supports military installations worldwide. The military engineering expertise of the USACE is focused on the engineering required to plan, design, and construct military facilities, and the environmental engineering necessary to execute DOD installation environmental restoration projects. USACE maintains specialized expertise in its laboratories and centers for cold weather engineering, remote sensing and imagery, force protection design, airfield design, weapons effects (e.g., support for operational targeting—assess the target, recommend appropriate weapon systems, and attack profile), terrain analysis for mobility and countermobility, geospatial engineering, security systems engineering, environmental management, and environmental engineering. USACE's 249th Engineer Battalion (Prime Power) can conduct power assessments and install generators to provide emergency power.

d. **Contingency Operations Support.** USACE provides support to CCDRs and subordinate JFCs through assigned LNOs. LNOs are responsible for assisting the CCDRs in the development of requirements and the integration of engineering capabilities for missions assigned. LNOs will communicate requirements to supporting USACE divisions for execution.

3. Naval Facilities Engineering Command

a. **NAVFAC Mission.** NAVFAC is the Navy's shore facilities systems command with Navy acquisition executive and head of contracting agency authority for facility planning, design, construction, services, utilities, facilities maintenance (public works), environmental and real estate. NAVFAC manages the Department of the Navy shore facilities life cycle

and acquires and manages capabilities for the Navy's expeditionary combat forces, provides contingency engineering response, and enables Department of the Navy energy security and environmental stewardship. It is an Echelon II systems command reporting to the Chief of Naval Operations.

(1) **NAVFAC Business Lines.** NAVFAC delivers its services through five business lines and the Expeditionary Programs Office. The business lines are:

(a) Capital improvements.

(b) Environmental.

(c) Asset management.

(d) Public works.

(e) Contingency engineering.

(2) **NAVFAC Organization.** NAVFAC is commanded by a US Navy Civil Engineer Corps rear admiral who is also designated as the Chief of Civil Engineers. NAVFAC's global component command organization is comprised of two subordinate HQ commands (NAVFAC Atlantic and NAVFAC Pacific) and 10 facilities engineering commands (FECs).

b. **NAVFAC Atlantic and Pacific.** NAVFAC Atlantic and Pacific are Echelon III commands headquartered on the east and west coasts (see Figure D-2). They oversee NAVFAC products and services within their respective OA and exercise C2 over NAVFAC Echelon IV commands within their OA. They also provide centralized production of specialized engineering services beyond the organic capability of the regional commands at the Echelon IV level. Both commands provided contingency engineering support, and each is designated by DOD as a CCA for the Navy's global contingency construction contract (GCCC) and global contingency service contract (GCSC) program.

c. **Naval FECs.** FECs are located around the globe and are Echelon IV commands aligned to each Navy region. FECs are the single provider of all NAVFAC products and services for Navy and Marine Corps clients in their geographic OA/region. FEC commanding officers receive operational direction and are assigned additional duty to the Navy regional commander. FECs are ADCON to the respective NAVFAC Atlantic or Pacific Command. They play a significant role in contingency operations through globally dispersed subordinate organizations such as OICC, ROICCs, and public works department facilities engineering and architecture department. They are capable of providing construction contract support and real estate support, and they also manage the Navy's GCCC and GCSC contract programs after award.

d. **NAVFAC Specialty Centers**

Echelon IV/Fleet/Navy Crane Center/Global Contingency Construction Alignment

Geographic Combatant Commander	Naval Component Commander	Navy Operational Forces	Navy Regions	NAVFAC Component Commands
CDR, US Pacific Command (CDRUSPACOM)	COMUSPACFLT (MOC) (JFMCC-PACIFIC)	CDR, Third Fleet (MOC) CDR, Seventh Fleet (MOC)		NAVFACPAC
			CNR Hawaii	FEC Hawaii
			CNR Marianas	FEC Marianas
			CNR Japan	FEC Far East
			CNR Korea	
			NRAC Singapore	
CDR, US Northern Command (CDRUSNORTHCOM)	NAVNORTH (Tailored MOC)	Not Assigned		NAVFACLANT
			CDR NDW	FEC Washington
			CNR Mid-Atlantic	FEC Mid-Atlantic
			CNR Southeast	FEC Southeast
			CNR Southwest	FEC Southwest
			CNR Northwest	FEC Northwest
CDR, US European Command	COMUSNAVEUR	CDR, Sixth Fleet (COMSIXTHFLT) (MOC) (JFMCC-EUROPE)	CNR Europe/ Southwest Asia	NAVFACLANT FEC Europe/ Southwest Asia
CDR, US Central Command	COMUSNAVCENTCOM	CDR, Fifth Fleet (MOC) (JFMCC-CENTRAL)		
CDR, US Southern Command	COMUSNAVSO (Tailored MOC)	CDR, Fourth Fleet (MOC)		NAVFACLANT FEC Southeast
CDR, US Africa Command	US Naval Forces Africa; fleet level command: Task Force 80.	COMSIXTHFLT (MOC)		NAVFACLANT FEC Europe/ Southwest Asia

Legend

CDR	commander	FEC	facilities engineering command
CNR	commander, Navy region	GCC	geographic combatant commander
COMUSFLTFORCOM	Commander, United States Fleet Forces Command	JFMCC	joint force maritime component command
		MOC	maritime operations center
COMUSNAVCENTCOM	Commander, United States Naval Forces Central Command	NAVFAC	Naval Facilities Engineering Command
		NAVFACLANT	Naval Facilities Engineering Command Atlantic
COMUSNAVEUR	Commander, United States Naval Forces Europe	NAVFACPAC	Naval Facilities Engineering Command Pacific
COMUSNAVSO	Commander, United States Naval Forces Southern Command	NCC	Navy component commander
		NDW	Naval District Washington
COMUSPACFLT	Commander, United States Pacific Fleet	NRAC	Naval Research Advisory Committee

Figure D-2. Echelon IV/Fleet/Navy Crane Center/Global Contingency Construction Alignment

(1) **EXWC.** The EXWC command is located in Port Hueneme, California. The EXWC provides specialized engineering and technical expertise and serves as a research consultant to operational forces. The EXWC also provides overarching asset management and expeditionary logistics support, and is responsible for life-cycle management of the equipment, materials, and training required to enable the readiness of the NCF and other expeditionary units. EXWC support includes:

(a) Contingency engineering.

(b) Amphibious and expeditionary systems.

(c) Logistics C2.

(d) Explosive safety and blast mitigation.

(e) Ordnance facilities.

(f) Utilities and energy.

(g) Environmental engineering.

(h) Ocean engineering.

(i) Shore facilities engineering.

(j) Force protection services.

(k) Management and maintenance of the Seabee table of allowance.

(l) Communication and information technology development.

(m) Management of pre-positioned war reserve material and stock for the NCF.

(n) Primary procurement of the Navy's inventory of automotive and construction equipment.

(o) Management of the MUSE program.

(p) Sealift support.

(2) **Navy Crane Center.** The Navy Crane Center mission is to establish and maintain a safe and effective weight handling program for the Navy's shore activities worldwide. It also provides engineering acquisition, technical support, training, and evaluation services for the safe operation of NCF crane assets.

(3) **NAVFAC Support of Contingency Operations.** NAVFAC is capable of providing a forward element dedicated to support the CCMD or JTF for contingency operations. NAVFAC has elements designed to provide deployed facilities engineering and construction contracting capabilities. Linked to the rest of the global interdependent

NAVFAC organization, by way of reachback, these elements are capable of delivering the complete range of NAVFAC products and services to support contingency operations in most threat environments worldwide. The following organizational elements directly support component commanders for planning and execution of contingency operations:

(a) The CERT assesses damaged facilities and environmental disasters and implements repairs and response to restore essential operational requirements in support of a contingency response mission. CERTs are ad hoc task-organized teams to meet the needs of specific situations and are staffed with subject matter experts as required by the mission. The most common operational environment for a CERT is within DOD installations after a significant natural or man-made disaster. CERTs may respond to events outside DOD installations worldwide on a case-by-case basis. CERTs may also individually augment staffs to assist with management of funding and execution of design, construction, leasing, and other engineering functions during a contingency mission. CERTs support the Chief of Naval Operations's EM plan, Commander, Navy Installations Command's command EM programs, and any other contingency missions tasked to NAVFAC.

(b) Navy Reserve NAVFAC Contingency Engineering Unit is a Reserve Component unit that provides facilities engineering, facilities construction and facility services acquisition and acquisition management, real estate acquisition support, and CERT capability. The Contingency Engineering Unit provides the Navy and USMC component commander and GCC/JFC with engineering and facility acquisition support deploying as a task-organized detachment or individual augmentee.

Refer to NTTP 4-04.3, Naval Contingency Engineering Operations, *for further information on NAVFAC support to contingency engineer operations.*

4. Air Force Civil Engineer Center

AFCEC is headquartered at Joint Base San Antonio-Lackland. It is a primary subordinate unit, assigned to Air Force Materiel Command and attached to the Air Force Installation and Mission Support Center, responsible for providing responsive, flexible full-spectrum installation engineering services. AFCEC missions include facility investment planning, design and construction, operations support, real property management, readiness, energy support, environmental compliance and restoration, and audit assertions, acquisition, and program management. The unit conducts its operations worldwide.

a. AFCEC Technical Division provides technical expertise, develops environmental restoration execution strategies, and finds the most effective technical and contractual approaches.

b. AFCEC Capital Investment Management Division houses the MILCON program management office (PMO) and has oversight over the Atlantic and Pacific regional management offices. The MILCON PMO manages all capital improvement work, including design and construction of MILCON and military housing projects.

c. AFCEC Environmental Restoration Division is the PMO responsible for the Air Force environmental restoration program

d. AFCEC Contingency Construction Division provides critical oversight and execution support to Air Force and CCMD contingency MILCON programs overseas.

e. Regional environmental offices serve as advocates for the Air Force before the local, state, regional, and federal authorities that legislate and enforce environmental regulations and laws. These offices also represent DOD and the Air Force as regional environmental coordinators in the EPA regions.

APPENDIX E
CONSTRUCTION AUTHORITIES AND FUNDING

1. Introduction

a. This appendix is intended as a basic introduction to contingency authorities and funding. However, the information in this appendix is subject to change due to changes in legislation, policy, or regulation. The reader should consult with legal and resource management personnel for the latest definitive guidance.

(1) Figure E-1 provides a general view of the funding and potential command relationships that engineers might encounter in a given theater. Every element in the figure has an engineer cell. If there is no theater HQ, the JTF engineer will coordinate with the component engineers on BOS-I and construction projects. The CCMD engineer receives construction project requests from the components and advocates for them to the Office of the Secretary of Defense for eventual approval by Congress. The theater or JTF engineer may also have a direct line to the CCMD engineer due to the C2 relationship established in the theater. However, construction projects still require support of the components, since the component commands receive the money from DOD. Figure E-1 is not meant to be authoritative but rather illustrative. This is merely an example of the relationships that the engineers must maintain in order to ensure accurate and efficient project approval.

(2) The special operations task force will have Title 10, USC, requirements that are funded by the theater, whether through the JTF or the theater HQ.

b. It is especially important that engineers understand contingency authorities and the associated funding. These are the tools that set the conditions for success during contingency operations and provide the basis for legal spending to fund DOD personnel and activities in support of contingency operations. Contingency operations comprise a very large portion of the operations conducted by joint forces.

2. Types of Authorizations and Sources of Funding

a. Services are generally authorized to use annual O&M funds for minor construction projects costing not more than $1 million (Title 10, USC, Section 2805, Unspecified Minor Construction). During combat or designated contingency operations, O&M may be used to fund construction projects exceeding these thresholds under certain circumstances with appropriate authorization and authorities. The JFC consults with the SJA before making a determination to use O&M in such a case.

b. Several broad authorities have been established under Title 10, USC, that enable the JFC to carry out contingency construction, including procuring materials for construction by military forces and the funding of civilian contracts. Figures E-2 and E-3 depict decision trees for the contingency construction funding options.

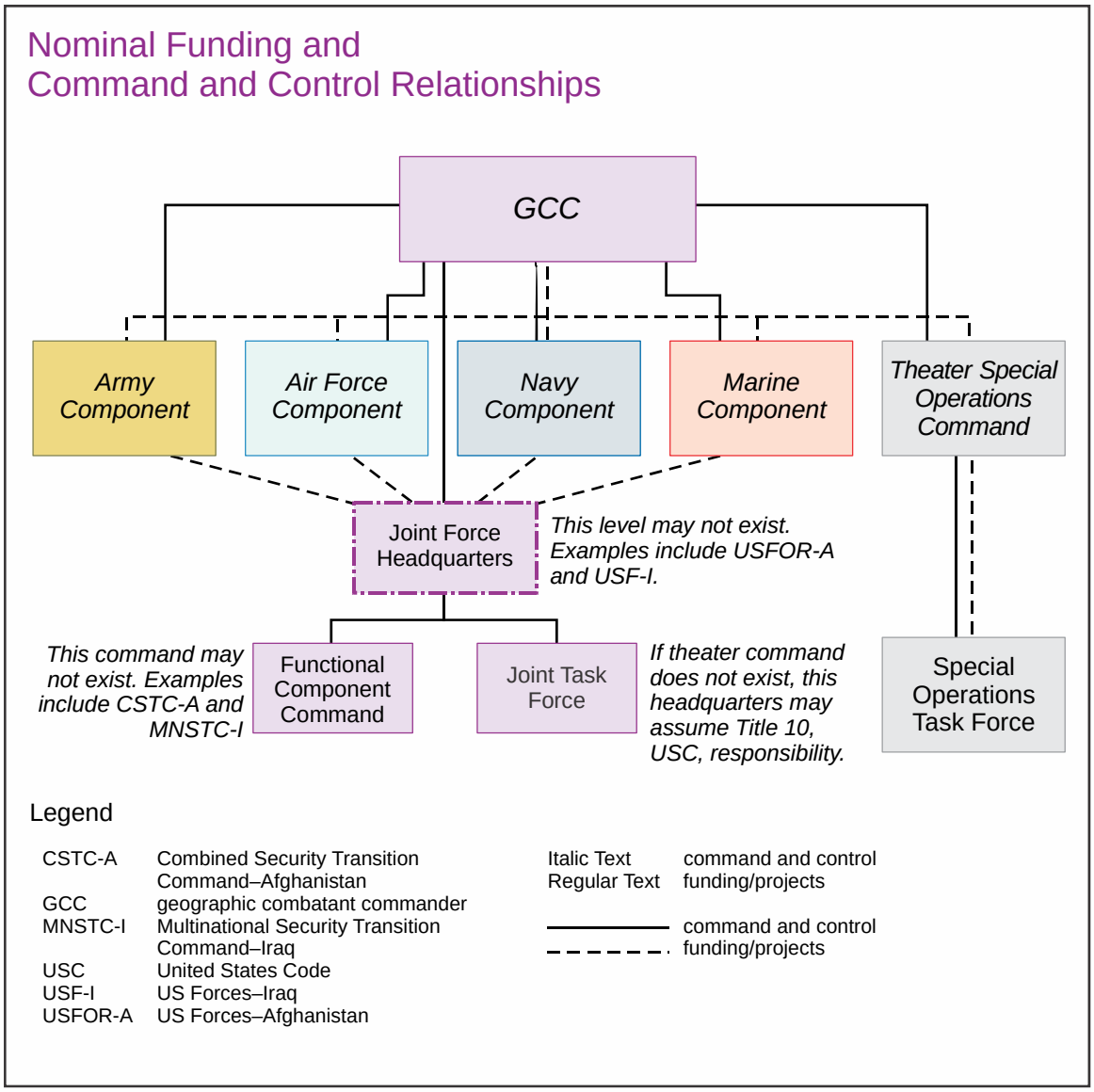


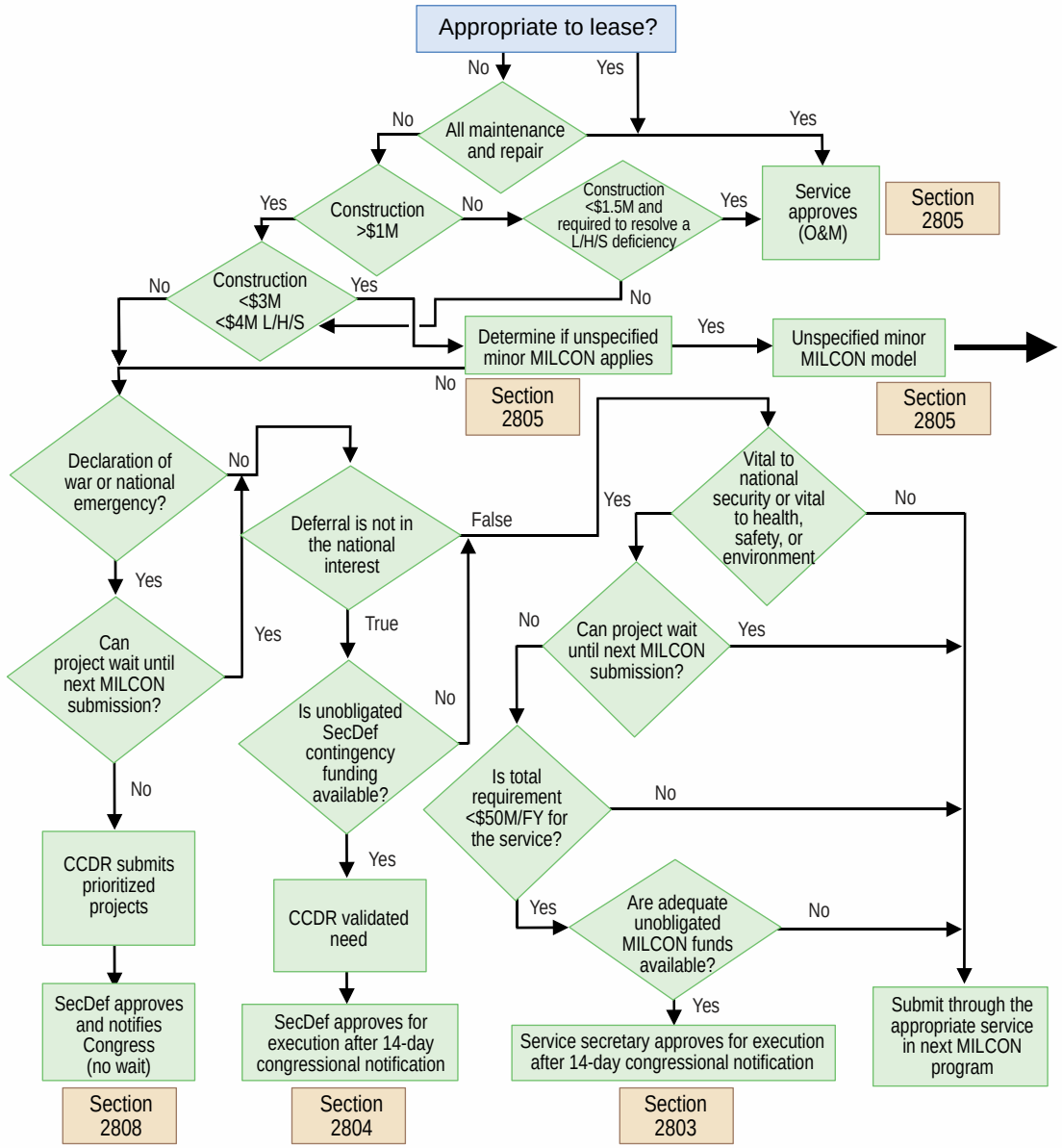
Figure E-1. Nominal Funding and Command and Control Relationships

(1) Title 10, USC, Section 2803, Emergency Construction, authorizes each Service to use $50 million per year of appropriated but not obligated MILCON funds for projects that cannot wait for the normal MILCON submission procedures. Projects must comply with a 21-day congressional notice and wait period before proceeding (7 days for electronic notification [Title 10, USC, Section 480]). Generally, a previously congressionally approved project must be canceled to free the $50 million.

(2) Title 10, USC, Section 2804, Contingency Construction, authorizes SecDef a specific MILCON line item amount for contingency construction projects that cannot wait for the normal MILCON program submission process. A project must comply with a 14-day congressional notice and wait period before proceeding (7 days for electronic notification [Title 10, USC, Section 480]). Generally, funding for this section is limited to less than $10 million per year.

Contingency Construction Funding Model

(Dollar Amounts Depicted Are Subject to Legislative Change)



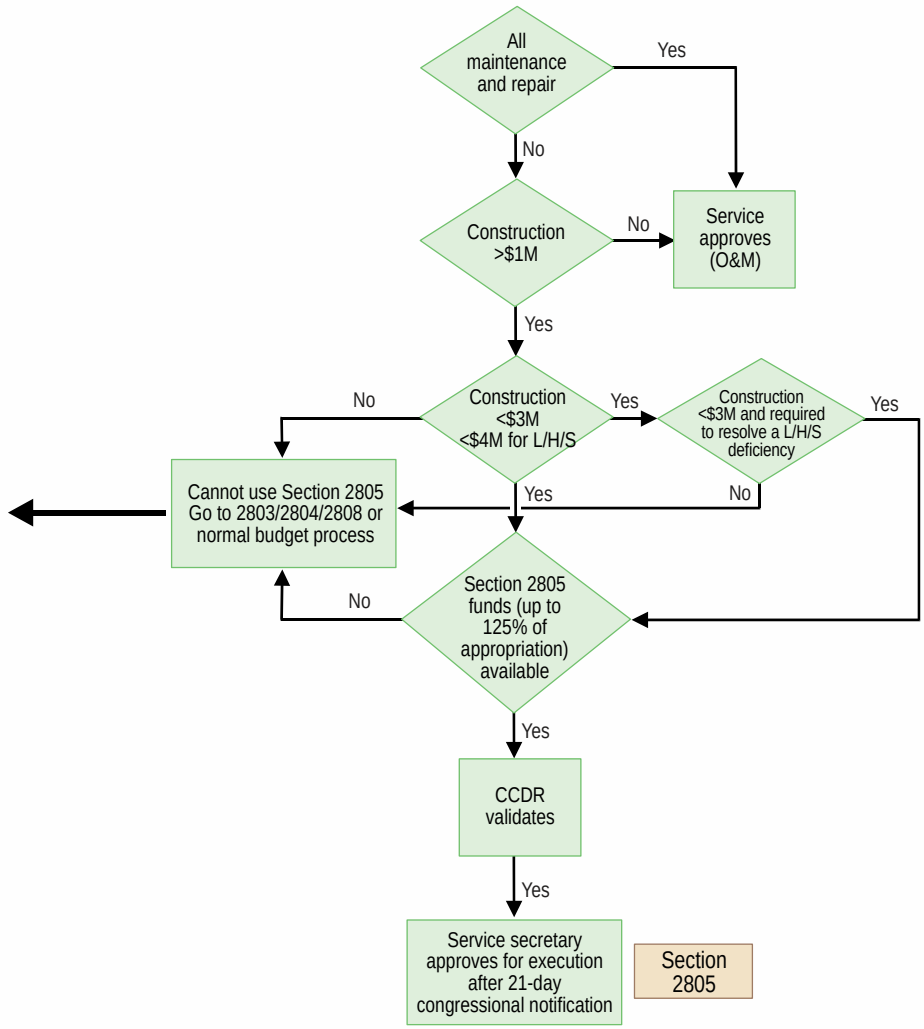
Legend

CCDR	combatant commander	MILCON	military construction
FY	fiscal year	O&M	operation and maintenance
L/H/S	life, health, safety	SecDef	Secretary of Defense
M	million		

Figure E-2. Contingency Construction Funding Model

Contingency Construction Funding Model (Unspecified Minor)

(Dollar Amounts Depicted Are Subject to Legislative Change)



Legend

CCDR	combatant commander	M	million
L/H/S	life, health, safety	O&M	operation and maintenance

Figure E-3. Contingency Construction Funding Model (Unspecified Minor)

(3) Title 10, USC, Section 2805, Unspecified Minor Construction, includes the following authorities:

(a) The authority for each Military Department Secretary to use O&M funds for projects less than $1 million.

(b) The authority for each Service to carry out unspecified minor MILCON projects. Projects must be less than $3 million each or $4 million to correct a life, health, or

safety condition. Projects greater than $1 million require a congressional notice and wait period before proceeding.

(4) Title 10, USC, Section 2808, Construction Authority in the Event of a Declaration of War or National Emergency, authorizes SecDef to undertake MILCON projects that are necessary to support the use of the armed forces for the war or national emergency within the total amount of funds that have been appropriated for MILCON that have not been obligated. Congress must be notified of each project, but there is no wait requirement before the project may begin.

(5) Title 10, USC, Section 2811, Repair of Facilities, authorizes SecDef and Military Department secretaries to use available O&M funds to carry out repair of facilities. Repair projects over $7.5 million require congressional notification.

(6) CCDRs do not need specific authority to request projects under Title 10, USC, Sections 2803 and 2804. To gain approval for a project under either authority, it is necessary to provide the appropriate Service secretary or SecDef with a justification of need, estimated costs, and source of funding.

(7) Title 10, USC, Section 166a, Combatant Commander Initiative Fund (CCIF), authorizes the use of funds for CCMDs to react to unexpected contingencies and opportunities. CJCSI 7401.01, *Combatant Commander Initiative Fund (CCIF),* describes the use of funds and how they can be used for HCA, to include urgent and unanticipated humanitarian relief and reconstruction assistance. Requests for use of CCIF funds should be carefully evaluated to ensure they comply with the intent of CCIF prior to submission.

c. **Other Authorities and Sources of Funding.** Other authorities may be used for executing MILCON projects in support of a JFC. Following are some of them.

(1) Title 10, USC, Section 2350j, Burden Sharing Contributions by Designated Countries and Regional Organizations, authorizes SecDef, after consultation with the Secretary of State, to accept burden sharing cash contributions from any country or regional organization designated for certain purposes of the DOD, including MILCON. SecDef, and Military Department secretaries with approval from SecDef, may carry out MILCON, subject to the 21-day congressional notice and wait requirement (14 days for electronic notification [Title 10, USC, Section 4801]), except in cases of declared war or national emergency. For additional information, see *DOD Financial Management Regulation* (DOD 7000.14-R), Volume 12, Chapter 24.

(2) Title 22, USC, Section 2357, Furnishing of Services and Commodities. Subject to Presidential approval, this section of the USC may provide for DOD restoration of HN civil infrastructure. This provision of law allows any USG department or agency to provide goods and services to friendly countries and NGOs on an advance-of-funds or reimbursable basis.

(3) Title 22, USC, Section 2769, Foreign Military Construction Sales. HN military facilities may be restored under the foreign military sales provisions of this authority.

(4) Title 31, USC, Section 1535, Agency Agreements. This section allows USG departments and agencies to support each other, provided that the supported agency has the funds and authority to do the work requested.

(5) Title 10, USC, Section 401, Humanitarian and Civic Assistance Provided in Conjunction with Military Operations. In HCA facilities projects, the JFC and joint force engineers may work with HN government agencies to repair or improve infrastructure and public facilities. These authorized and funded projects are designed to provide assistance to the HN populace in conjunction with a military operation or exercise. The operation or exercise is usually planned well in advance and is not usually planned in response to disasters, although HCA activities have been executed following disasters. Specific engineer activities for which HCA funds can be used include the construction of rudimentary surface transportation systems, well drilling, construction of basic sanitation facilities, and rudimentary construction and repair of facilities.

(6) Title 22, USC, Section 2292, General Provisions for International Disaster Assistance. In disaster operations, the UN and the DOS OFDA may generate funded requirements for DOD assistance. FHA programs focus on the use of DOD excess property, emergency transportation support, disaster relief, or other support to alleviate urgent needs resulting from a disaster or catastrophe in a host country. While other elements of the joint force are focused on immediate FHA, general engineering planning may focus on projects that provide immediate shelter for dislocated civilians. The joint force engineers must work in a close relationship with the representatives of the HN and US country team.

(7) Title 22, USC, Section 2318, Special Authority to Drawdown Defense Articles and Services. Drawdown authority is a means to respond to unforeseen military emergencies or humanitarian relief situations. There are annual limitations on the value of articles and services that may be drawn down in any fiscal year.

(8) DODD 5100.46, Foreign Disaster Relief (FDR). Normally, DOD components may participate in foreign disaster relief operations only after DOS makes a determination that such relief shall be provided. This directive does not prohibit, however, a military commander at the immediate scene of a foreign disaster from undertaking disaster relief operations without prior approval of the US ambassador or COM when the emergency time is of the essence and when humanitarian considerations make it advisable to do so.

APPENDIX F
REFERENCES

The development of JP 3-34 is based upon the following primary references.

1. General Publications

a. Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their Disposal.

b. EO 12088, *Federal Compliance with Pollution Control Standards.*

c. EO 12114, *Environmental Effects Abroad of Major Federal Actions.*

d. National Environmental Policy Act.

e. NRF.

f. Title 10, USC.

g. Title 22, USC.

h. Title 31, USC.

i. Title 32, CFR, Part 187.

2. Department of Defense Publications

a. DODD 3000.10, *Contingency Basing Outside the United States.*

b. DODD 3025.18, *Defense Support of Civil Authorities (DSCA).*

c. DODD 4180.01, *DOD Energy Policy*.

d. DODD 4270.5, *Military Construction.*

e. DODD 5100.01, *Functions of the Department of Defense and Its Major Components.*

f. DODD 5100.46, *Foreign Disaster Relief (FDR).*

g. DODD 5530.3, *International Agreements.*

h. DODI 3000.05, *Stability Operations.*

i. DODI 4165.03, *DOD Real Property Categorization.*

j. DODI 4715.05, *Environmental Compliance at Installations Outside the United States.*

k. DODI 4715.08, *Remediation of Environmental Contamination Outside the United States.*

l. DOD 4715.05-G, *Overseas Environmental Baseline Guidance Document.*

m. UFC 1-201-01, *Non-Permanent DOD Facilities in Support of Military Operations.*

n. UFC 1-201-02, *Assessment of Existing Facilities for Use in Military Operations.*

3. Chairman of the Joint Chiefs of Staff Publications

a. CJCSI 1301.01E, *Joint Individual Augmentation Procedures*.

b. CJCSI 3901.01D, *Requirements for Geospatial Information and Services.*

c. CJCSM 3122.01A, *Joint Operation Planning and Execution System (JOPES), Volume I, Planning, Policies, and Procedures.*

d. CJCSM 3130.03, *Adaptive Planning and Execution (APEX) Planning Formats and Guidance.*

e. JP 2-01.3, *Joint Intelligence Preparation of the Operational Environment*.

f. JP 2-03, *Geospatial Intelligence in Joint Operations.*

g. JP 3-0, *Joint Operations.*

h. JP 3-02, *Amphibious Operations.*

i. JP 3-06, *Joint Urban Operations*.

j. JP 3-07, *Stability Operations.*

k. JP 3-07.2, *Antiterrorism.*

l. JP 3.07.3, *Peace Operations.*

m. JP 3-08, *Interorganizational Coordination During Joint Operations.*

n. JP 3-10, *Joint Security Operations in Theater*.

o. JP 3-11, *Operations in Chemical, Biological, Radiological, and Nuclear Environments.*

p. JP 3-13.4, *Military Deception.*

q. JP 3-15, *Barriers, Obstacles, and Mine Warfare for Joint Operations.*

r. JP 3-15.1, *Counter-Improvised Explosive Device Operations*.

s. JP 3-16, *Multinational Operations.*

t. JP 3-18, *Joint Forcible Entry Operations.*

u. JP 3-27, *Homeland Defense.*

v. JP 3-28, *Defense Support of Civil Authorities.*

w. JP 3-29, *Foreign Humanitarian Assistance.*

x. JP 3-30, *Command and Control of Joint Air Operations.*

y. JP 3-31, *Command and Control for Joint Land Operations.*

z. JP 3-33, *Joint Task Force Headquarters.*

aa. JP 3-35, *Deployment and Redeployment Operations.*

bb. JP 3-40, *Countering Weapons of Mass Destruction.*

cc. JP 3-41, *Chemical, Biological, Radiological, and Nuclear Consequence Management.*

dd. JP 3-57, *Civil-Military Operations.*

ee. JP 3-60, *Joint Targeting.*

ff. JP 3-61, *Public Affairs.*

gg. JP 4-0, *Joint Logistics.*

hh. JP 4-01.6, *Joint Logistics Over-the-Shore.*

ii. JP 4-10, *Operational Contract Support.*

jj. JP 5-0, *Joint Planning.*

kk. JP 6-0, *Joint Communications System.*

4. Service Publications

a. Air Force Doctrine Annex (AFDA) 3-0, *Operations and Planning.*

b. AFDA 3-34, *Engineer Operations.*

c. AFDA 4-0, *Combat Support.*

d. Air Force Handbook 10-222, Volume 4, *Environmental Considerations for Overseas Contingency Operations.*

e. Air Force Instruction 10-404, *Base Support and Expeditionary (BAS&E) Planning.*

f. Army Tactics, Techniques, and Procedures (ATTP) 3-90.4/MCWP 3-17.8, *Combined Arms Mobility Operations.*

g. ATTP 4-32.2/MCRP 3-17.2B/NTTP 3-02.4.1/Air Force Tactics, Techniques, and Procedures 3-2.12, *UXO Multi-Service Procedures for Unexploded Ordnance.*

h. ATTP 4-32.16/MCRP 3-17.2C/NTTP 3-02.5/Air Force Tactics, Techniques, and Procedures 3-2.32, EOD Multi-Service Tactics, Techniques, and Procedures for Explosive Ordnance Disposal.

i. ATP 3-34.80 *Geospatial Engineering.*

j. ATP 3-37.10/MCRP 3-17.7N, *Base Camps.*

k. ATP 3-37.34 *Survivability Operations.*

l. ATP 4-92, *Contracting Support to Unified Land Operations.*

m. FM 3-34, *Engineer Operations.*

n. FM 3-34.210, *Explosive Hazards Operations.*

o. FM 3-34.400, *General Engineering*.

p. FM 3-34.5/MCRP 4-11B, *Environmental Considerations*.

q. FM 3-34.170/MCWP 3-17.4, *Engineer Reconnaissance.*

r. MCWP 3-17, *Engineering Operations.*

s. MCWP 3-17.2, *MAGTF Explosive Ordnance Disposal.*

t. MCWP 3-21.1, *Aviation Ground Support.*

u. NTRP 4-04.2.1, *Doctrinal Reference for the Naval Construction Force.*

v. NTRP 4-04.2.13/TM 3-34.469/Air Force Manual 32-1072, *Water-Well Drilling Operations.*

w. NTTP 4-04.1/MCWP 4-11.5, *Seabee Operations in the MAGTF*.

x. NTTP 4-04.2, *Naval Construction Force Operations.*

y. NTTP 4-04.3, *Naval Contingency Engineering Operations.*

z. NWP 4-04, *Naval Civil Engineering Operations*.

aa. NWP 3-10, *Navy Expeditionary Combat Command Forces*.

bb. NWP 4-11, *Environmental Protection.*

cc. TM 3-34.56/Marine Corps Interim Publication 4-11.01, *Waste Management for Deployed Forces.*

Intentionally Blank

APPENDIX G
ADMINISTRATIVE INSTRUCTIONS

1. User Comments

Users in the field are highly encouraged to submit comments on this publication to: Joint Staff J-7, Deputy Director, Joint Education and Doctrine, ATTN: Joint Doctrine Analysis Division, 116 Lake View Parkway, Suffolk, VA 23435-2697. These comments should address content (accuracy, usefulness, consistency, and organization), writing, and appearance.

2. Authorship

The lead agent for this publication is the US Army. The Joint Staff doctrine sponsor for this publication is the Director for Logistics (J-4).

3. Supersession

This publication supersedes JP 3-34, *Joint Engineer Operations,* 30 June 2011.

4. Change Recommendations

a. Recommendations for urgent changes to this publication should be submitted:

TO: JOINT STAFF WASHINGTON DC//J7-JED//

b. Routine changes should be submitted electronically to the Deputy Director, Joint Education and Doctrine, ATTN: Joint Doctrine Analysis Division, 116 Lake View Parkway, Suffolk, VA 23435-2697, and info the lead agent and the Director for Joint Force Development, J-7/JED.

c. When a Joint Staff directorate submits a proposal to the CJCS that would change source document information reflected in this publication, that directorate will include a proposed change to this publication as an enclosure to its proposal. The Services and other organizations are requested to notify the Joint Staff J-7 when changes to source documents reflected in this publication are initiated.

5. Distribution of Publications

Local reproduction is authorized and access to unclassified publications is unrestricted. However, access to and reproduction authorization for classified JPs must be IAW DOD Manual 5200.01, Volume 1, *DOD Information Security Program: Overview, Classification, and Declassification,* and DOD Manual 5200.01, Volume 3, *DOD Information Security Program: Protection of Classified Information*.

6. Distribution of Electronic Publications

a. Joint Staff J-7 will not print copies of JPs for distribution. Electronic versions are available on JDEIS Joint Electronic Library Plus (JEL+) at https://jdeis.js.mil/jdeis/index.jsp (NIPRNET) and http://jdeis.js.smil.mil/jdeis/index.jsp (SIPRNET), and on the JEL at http://www.dtic.mil/doctrine (NIPRNET).

b. Only approved JPs are releasable outside the combatant commands, Services, and Joint Staff. Defense attachés may request classified JPs by sending written requests to Defense Intelligence Agency (DIA), ATTN: Defense Foreign Liaison Office, Rm 2A668, Washington, DC 20340.

c. JEL CD-ROM. Upon request of a joint doctrine development community member, the Joint Staff J-7 will produce and deliver one CD-ROM with current JPs. This JEL CD-ROM will be updated not less than semi-annually and when received can be locally reproduced for use within the combatant commands, Services, and combat support agencies.

GLOSSARY

PART I – ABBREVIATIONS AND ACRONYMS

ACE	aviation combat element (USMC)
ADC	area damage control
ADCON	administrative control
ADR	airfield damage repair
AEF	air expeditionary force
AETF	air expeditionary task force
AFCAP	Air Force contract augmentation program
AFCEC	Air Force Civil Engineer Center
AFDA	Air Force doctrine annex
AGS	aviation ground support
AOR	area of responsibility
APE	airfield pavement evaluation
APOD	aerial port of debarkation
ATP	Army techniques publication
ATTP	Army tactics, techniques, and procedures
BCT	brigade combat team
BEAR	base expeditionary airfield resources
BOS	base operating support
BOS-I	base operating support-integrator
C2	command and control
CA	civil affairs
CAP	crisis action planning
CBMU	construction battalion maintenance unit
CBRN	chemical, biological, radiological, and nuclear
CCA	contract construction agent
CCD	camouflage, concealment, and deception
CCDR	combatant commander
CCIF	Combatant Commander Initiative Fund
CCMD	combatant command
CEB	combat engineer battalion
CEMIRT	civil engineer maintenance, inspection, and repair team
CERT	contingency engineering response team
CFR	Code of Federal Regulations
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff instruction
CJCSM	Chairman of the Joint Chiefs of Staff manual
CMCB	civil-military coordination board
CMO	civil-military operations
CMOC	civil-military operations center
COA	course of action
COM	chief of mission

COMAFFOR	commander, Air Force forces
CONOPS	concept of operations
COP	common operational picture
CP	command post
CSS	combat service support
DCMA	Defense Contract Management Agency
DLA	Defense Logistics Agency
DOD	Department of Defense
DODD	Department of Defense directive
DODI	Department of Defense instruction
DOS	Department of State
DSCA	defense support of civil authorities
DTED	digital terrain elevation data
EAF	expeditionary airfield
EBS	environmental baseline survey
ECC	engineer coordination cell
EH	explosive hazard
EHCC	explosive hazards coordination cell
EHSA	environmental health site assessment
EM	emergency management
EO	executive order
EOD	explosive ordnance disposal
EPA	Environmental Protection Agency
EPBS	expeditionary prime base engineer emergency force squadron
ERDC	Engineer Research and Development Center
ESB	engineer support battalion
ESP	engineer support plan
ET	electronics technician
FCC	functional combatant commander
FEC	facilities engineering command
FEMA	Federal Emergency Management Agency (DHS)
FES	fire emergency services
FFE	field force engineering
FGS	final governing standard
FHA	foreign humanitarian assistance
FM	field manual (Army)
GCC	geographic combatant commander
GCCC	global contingency construction contract
GCCMAC	Global Contingency Construction Multiple Award Contract (Navy)
GCCS	Global Command and Control System

GCE	ground combat element (USMC)
GCSC	global contingency service contract
GCSMAC	Global Contingency Services Multiple Award Contract (Navy)
GCSS	Global Combat Support System
GCSS-J	Global Combat Support System-Joint
GEOINT	geospatial intelligence
GI&S	geospatial information and services
GIS	geographic information system
GPC	geospatial planning cell
HCA	humanitarian and civic assistance
HDM	humanitarian demining
HF	high frequency
HN	host nation
HNS	host-nation support
HQ	headquarters
HW	hazardous waste
IAW	in accordance with
IED	improvised explosive device
IGO	intergovernmental organization
INLS	improved Navy lighterage system
IR	information requirement
ISA	international standardization agreement
ISB	intermediate staging base
IT	information system technician
J-2	intelligence directorate of a joint staff
J-3	operations directorate of a joint staff
J-4	logistics directorate of a joint staff
JCMEB	joint civil-military engineering board
JECC	Joint Enabling Capabilities Command (USTRANSCOM)
JEMB	joint environmental management board
JEPES	Joint Engineer Planning and Execution System
JFC	joint force commander
JFUB	joint facilities utilization board
JIACG	joint interagency coordination group
JIPOE	joint intelligence preparation of the operational environment
JLOTS	joint logistics over-the-shore
JMD	joint manning document
JOA	joint operations area
JOC	joint operations center
JOPES	Joint Operation Planning and Execution System
JOPP	joint operation planning process

JP	joint publication
JRRB	joint requirements review board
JRSOI	joint reception, staging, onward movement, and integration
JTCB	joint targeting coordination board
JTF	joint task force
LCE	logistics combat element (USMC)
LEC	lead environmental component
LNO	liaison officer
LOC	line of communications
LOGCAP	logistics civil augmentation program (Army)
LZ	landing zone
MAC	mobility assault company
MAG	Marine aircraft group
MAGTF	Marine air-ground task force
MAW	Marine aircraft wing
MCRP	Marine Corps reference publication
MCWP	Marine Corps warfighting publication
MEB	Marine expeditionary brigade
MEF	Marine expeditionary force
MEU	Marine expeditionary unit
MILCON	military construction
MNF	multinational force
MNFC	multinational force commander
MPF	maritime pre-positioning force
MSR	main supply route
MUSE	mobile utilities support equipment
MWSD	Marine wing support detachment
MWSS	Marine wing support squadron
NATO	North Atlantic Treaty Organization
NAVFAC	Naval Facilities Engineering Command
NAVFAC EXWC	Naval Facilities Engineering and Expeditionary Warfare Center
NBG	naval beach group
NCF	naval construction force
NCG	naval construction group
NCR	naval construction regiment
NGA	National Geospatial-Intelligence Agency
NGO	nongovernmental organization
NIPRNET	Nonsecure Internet Protocol Router Network
NMCB	naval mobile construction battalion
NRF	National Response Framework

NTRP	Navy tactical reference publication
NTTP	Navy tactics, techniques, and procedures
NWP	Navy warfare publication
O&M	operation and maintenance
OA	operational area
OEBGD	Overseas Environmental Baseline Guidance Document
OFDA	Office of United States Foreign Disaster Assistance (USAID)
OICC	officer in charge of construction
OPCON	operational control
OPDS	offshore petroleum discharge system (USN)
OPLAN	operation plan
OPORD	operation order
PAO	public affairs officer
PHIBCB	amphibious construction battalion
PMO	program management office
POD	port of debarkation
POL	petroleum, oils, and lubricants
Prime BEEF	prime base engineer emergency force
RCEM	regional contingency engineering management
RED HORSE	rapid engineer deployable heavy operational repair squadron engineer
ROICC	resident officer in charge of construction
RSOI	reception, staging, onward movement, and integration
RUF	rules for the use of force
SAA	senior airfield authority
SATCOM	satellite communications
SecDef	Secretary of Defense
SHF	super-high frequency
SIPRNET	SECRET Internet Protocol Router Network
SJA	staff judge advocate
SOFA	status-of-forces agreement
SPOD	seaport of debarkation
S-Team	staff augmentation team
TACON	tactical control
TCEM	theater contingency engineering management
TDN	tactical data network
TEC	theater engineer command
TM	technical manual
TPFDD	time-phased force and deployment data
TTP	tactics, techniques, and procedures

UCT	underwater construction team
UFC	Unified Facilities Criteria
UHF	ultrahigh frequency
UN	United Nations
USACE	United States Army Corps of Engineers
USAID	United States Agency for International Development
USC	United States Code
USG	United States Government
USMC	United States Marine Corps
USTRANSCOM	United States Transportation Command
UTC	unit type code
UXO	unexploded ordnance
VHF	very high frequency
WTI	weapons technical intelligence

PART II – TERMS AND DEFINITIONS

advanced base. None. (Approved for removal from JP 1-02.)

apron. A defined area on an airfield intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance. (JP 1-02. SOURCE: JP 3-34)

base development. The acquisition, development, expansion, improvement, construction and/or replacement of the facilities and resources of a location to support forces. (Approved for replacement of "base development [less force beddown]" in JP 1-02.)

building system. A structure assembled from manufactured components designed to provide a specific building configuration. (Approved for replacement of "building systems" and its definition in JP 1-02.)

combat engineering. Engineering capabilities and activities that directly support the maneuver of land combat forces that require close and integrated support. (Approved for incorporation into JP 1-02.)

common servicing. Functions performed by one Service in support of another for which reimbursement is not required. (JP 1-02. SOURCE: JP 3-34)

contingency engineering management organization. An organization formed by the combatant commander, or subordinate commander to augment their staffs with additional Service engineering expertise for planning and construction management. (Approved for incorporation into JP 1-02.)

countermobility operations. The construction of obstacles and emplacement of minefields to delay, disrupt, and destroy the enemy by reinforcement of the terrain. (JP 1-02. SOURCE: JP 3-34)

crash rescue and fire suppression. None. (Approved for removal from JP 1-02.)

Department of Defense construction agent. United States Army Corps of Engineers, Naval Facilities Engineering Command, or other such approved Department of Defense activity, that is assigned design or execution responsibilities associated with military construction programs, facilities support, or civil engineering support to the combatant commanders in contingency operations. (Approved for incorporation into JP 1-02.)

emergency repair. The least amount of immediate repair to damaged facilities necessary for the facilities to support the mission. (JP 1-02. SOURCE: JP 3-34)

engineer support plan. An appendix to the logistics annex or separate annex of an operation plan that identifies the minimum essential engineering services and construction requirements required to support the commitment of military forces. Also called **ESP.** (JP 1-02. SOURCE: JP 3-34)

environmental baseline survey. A multi-disciplinary site survey conducted prior to or in the initial stage of an operational deployment. Also called **EBS.** (Approved for incorporation into JP 1-02.)

environmental considerations. The spectrum of environmental media, resources, or programs that may affect the planning and execution of military operations. (JP 1-02. SOURCE: JP 3-34)

exercise. A military maneuver or simulated wartime operation involving planning, preparation, and execution that is carried out for the purpose of training and evaluation. (JP 1-02. SOURCE: JP 3-34)

explosive ordnance. All munitions containing explosives, nuclear fission or fusion materials, and biological and chemical agents. (JP 1-02. SOURCE: JP 3-34)

facility. A real property entity consisting of one or more of the following: a building, a structure, a utility system, pavement, and underlying land. (JP 1-02. SOURCE: JP 3-34)

facility substitutes. Items such as tents and prepackaged structures requisitioned through the supply system that may be used to substitute for constructed facilities. (JP 1-02. SOURCE: JP 3-34)

F-hour. None. (Approved for removal from JP 1-02.)

final governing standards. A comprehensive set of country-specific substantive environmental provisions, typically technical limitations on effluent, discharges, etc., or a specific management practice. Also called **FGSs.** (Approved for incorporation into JP 1-02.)

force beddown. The provision of expedient facilities for troop support to provide a platform for the projection of force. (JP 1-02. SOURCE: JP 3-34)

forward aviation combat engineering. A mobility operation in which engineers perform tasks in support of forward aviation ground facilities. Also called **FACE.** (JP 1-02. SOURCE: JP 3-34)

general engineering. Those engineering capabilities and activities, other than combat engineering, that provide infrastructure and modify, maintain, or protect the physical environment. Also called **GE.** (Approved for incorporation into JP 1-02.)

geospatial engineering. Those engineering capabilities and activities that contribute to a clear understanding of the physical environment by providing geospatial information and services to commanders and staffs. (JP 1-02. SOURCE: JP 3-34)

hardstand. None. (Approved for removal from JP 1-02.)

joint facilities utilization board. A joint board that evaluates and reconciles component requests for real estate, use of existing facilities, inter-Service support, and construction to ensure compliance with Joint Civil-Military Engineering Board priorities. Also called **JFUB.** (JP 1- 02. SOURCE: JP 3-34)

military construction. Any construction, alteration, development, conversion, or extension of any kind carried out with respect to a military installation. Also called **MILCON.** (JP 1-02. SOURCE: JP 3-34)

mobile mine. None. (Approved for removal from JP 1-02.)

naval construction force. The combined construction units of the Navy that are part of the operating forces and represent the Navy's capability for advanced base construction. Also called **NCF.** (JP 1-02. SOURCE: JP 3-34)

operation and maintenance. Maintenance and repair of real property, operation of utilities, and provision of other services such as refuse collection and disposal, entomology, snow removal, and ice alleviation. Also called **O&M.** (JP 1-02. SOURCE: JP 3-34)

Overseas Environmental Baseline Guidance Document. A set of objective criteria and management practices developed by the Department of Defense to protect human health and the environment. Also called **OEBGD.** (JP 1-02. SOURCE: JP 3-34)

Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer. None. (Approved for removal from JP 1-02.)

real property. Lands, buildings, structures, utilities systems, improvements, and appurtenances, thereto that includes equipment attached to and made part of buildings and structures, but not movable equipment. (JP 1-02. SOURCE: JP 3-34)

recovery. 1. In air (aviation) operations, that phase of a mission that involves the return of an aircraft to a land base or platform afloat. (JP 3-52) 2. The retrieval of a mine from the location where emplaced. (JP 3-15) 3. In personnel recovery, actions taken to physically gain custody of isolated personnel and return them to friendly control. (JP 3-50) 4. Actions taken to extricate damaged or disabled equipment for return to friendly control or repair at another location. (JP 1-02. SOURCE: JP 3-34)

restricted area. 1. An area (land, sea, or air) in which there are special restrictive measures employed to prevent or minimize interference between friendly forces. 2. An area under military jurisdiction in which special security measures are employed to prevent unauthorized entry. (Approved for incorporation into JP 1-02 with JP 3-34 as the source JP.)

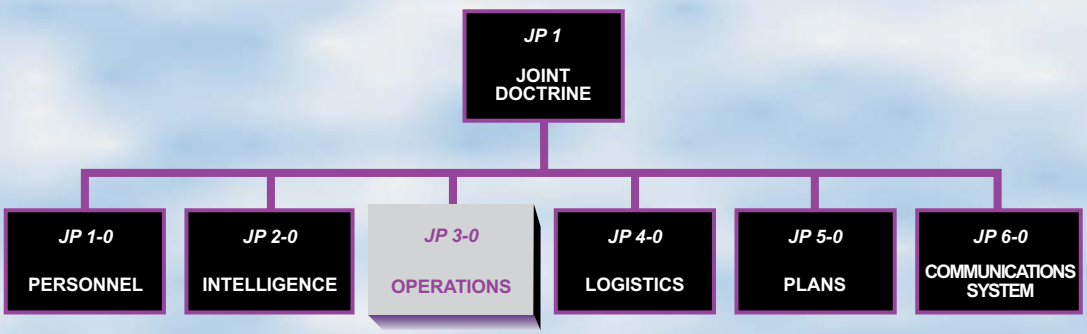
route classification. None. (Approved for removal from JP 1-02.)

survivability. All aspects of protecting personnel, weapons, and supplies while simultaneously deceiving the enemy. (JP 1-02. SOURCE: JP 3-34)

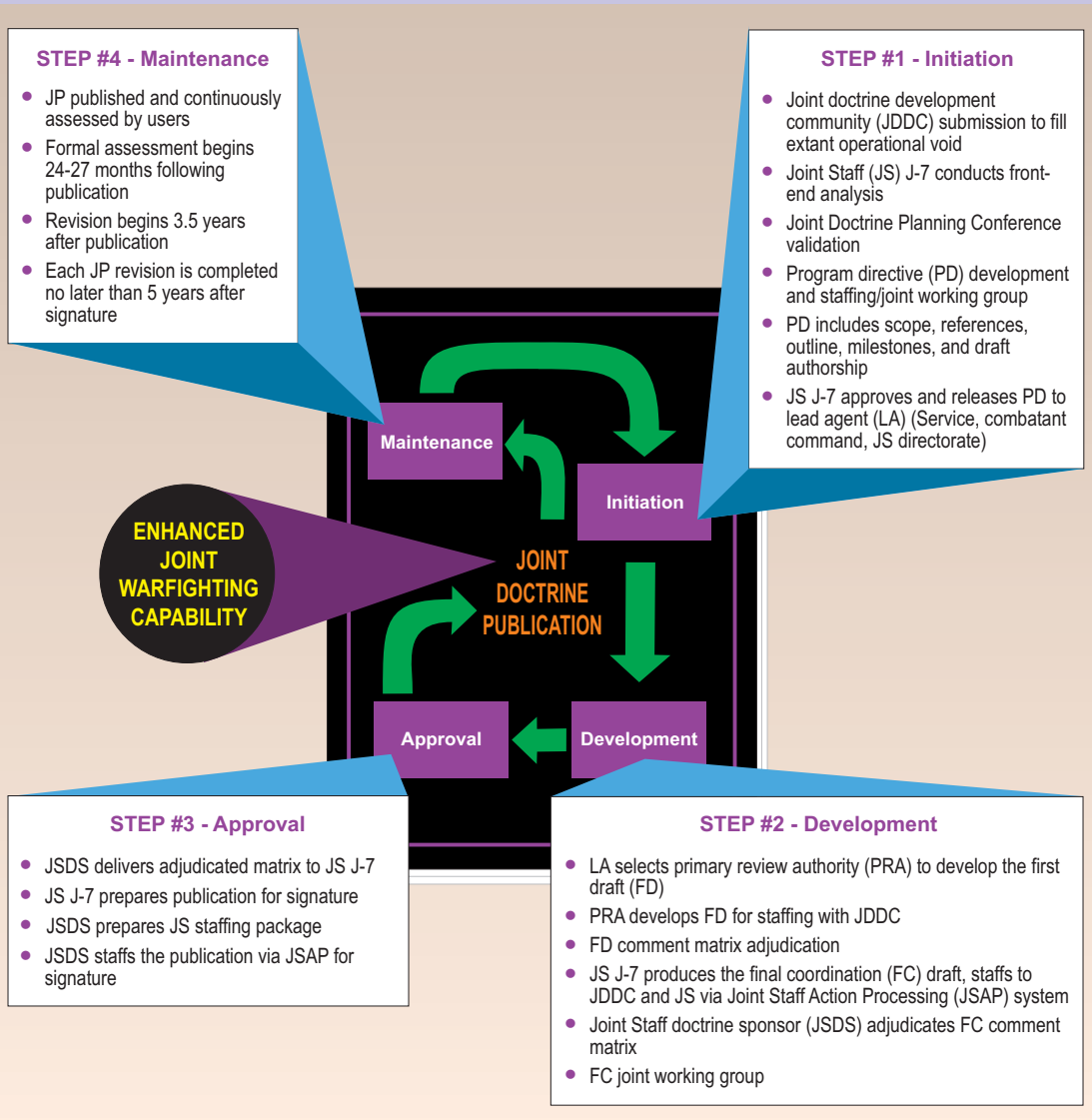
underwater demolition. The destruction or neutralization of underwater obstacles that is normally accomplished by underwater demolition teams. (JP 1-02. SOURCE: JP 3-34)

underwater demolition team. A group of officers and enlisted specially trained and equipped to accomplish the destruction or neutralization of underwater obstacles and associated tasks. Also called **UDT.** (JP 1-02. SOURCE: JP 3-34)

JOINT DOCTRINE PUBLICATIONS HIERARCHY



All joint publications are organized into a comprehensive hierarchy as shown in the chart above. **Joint Publication (JP) 3-34** is in the **Operations** series of joint doctrine publications. The diagram below illustrates an overview of the development process:




JOINT
CHIEFS OF STAFF