FM 3-34

ENGINEER OPERATIONS

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Engineer Operations

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Preface

Field Manual (FM) 3-34 is the Army's keystone doctrinal publication for the Engineer Regiment. It presents overarching doctrinal guidance and direction for conducting engineer activities and shows how they contribute to full spectrum operations. It provides a common framework and language for engineer support to operations and constitutes the doctrinal foundation for developing the other fundamentals and tactics, techniques, and procedures (TTP) detailed in subordinate doctrinal manuals in the FM 3-34 series. This manual is a key integrating publication that links the doctrine for the Engineer Regiment with Army capstone doctrine and joint doctrine. It focuses on synchronizing and coordinating the diverse range of capabilities in the Engineer Regiment to successfully support the Army and its mission. FM 3-34 provides operational guidance for engineer commanders and trainers at all echelons and forms the foundation for Army Engineer School curricula.

To comprehend the doctrine contained in FM 3-34, readers must first understand the elements of full spectrum operations, operational design, and the elements of combat power as described in FM 3-0 and addressed in FM 2-0, FM 3-13, FM 3-37, FM 4-0, FM 6-0, and FM 6-22. In addition, readers must be familiar with FM 3-07, FM 3-28, and FM 3-90. They must understand how offensive, defensive, and stability or civil support operations complement each other. Readers must also understand the operations process described in FM 5-0, and the terms and symbols in FM 1-02/MCRP5-12A.

This edition of FM 3-34 provides keystone doctrine on engineer support to operations with a chapter for each of the three major sections of the engineer framework and chapters on mission command considerations, engineers in the operations process, and sustainment considerations.

Chapter 1 draws from the right side of the engineer framework in figure 1, page vii, examining the context within which engineer support to operations occurs, focusing on those aspects that are most significant to engineers. It provides an engineer view of the following: the operational environment (OE), the operational and mission variables used to describe the OE, unified action, the continuum of operations, the levels of war, and the Army's operational concept—full spectrum operations. The chapter highlights the requirement to simultaneously support offensive, defensive, and stability or civil support operations.

Chapter 2 addresses the left side of the engineer framework, providing an overview of the Engineer Regiment, its organizational modularity, and its capabilities. It defines and discusses the engineer disciplines (combat, general, and geospatial engineering), highlighting their interdependence.

Chapter 3 addresses the middle portion of the engineer framework, defining the four lines of engineer support and describing their relationships to the engineer disciplines, full spectrum operations, and the warfighting functions. It describes engineer contributions to combat power linked through the lines of engineer support, the capabilities inherent in the engineer disciplines, and the warfighting functions.

Chapter 4 provides mission command considerations for engineer support, to include the use of various functional and multifunctional headquarters, describing how the Engineer Regiment "organizes for combat," and synchronizes engineer support to operations with those of other forces. It discusses engineer force tailoring, task organizing, and mission command of engineer forces.

Chapter 5 describes how engineer support is integrated into the supported commander's overall operation throughout the operations process. It describes engineer planning activities and considerations for preparing, executing, and continuously assessing engineer support.

Chapter 6 discusses sustainment of engineer capabilities. Successful engineer support to operations includes effective incorporation of sustainment support. This chapter describes the integrated sustainment effort required for engineer support to operations.

Appendix A expands on the discussion of the engineer view of unified action in chapter 1. It describes engineer considerations for multinational and interagency operations and for working with nongovernmental organizations (NGO) and in host nations (HNs).

Appendix B supplements the information about operational force engineers in chapter 2. It provides information in a quick reference format about each type of engineer unit, including the unit symbol, mission, typical allocation and other information.

This manual applies to all Army engineer forces. The principal audience for this manual is engineer commanders and staff officers, but all Army leaders will benefit from reading it. Trainers and educators throughout the Army also use this manual, as do combat developers.

Terms that have joint or Army definitions are identified in both the glossary and the text. *Glossary references*: The glossary lists most terms used in FM 3-34 that have joint or Army definitions. Terms for which FM 3-34 is the proponent field manual (the authority) are indicated with an asterisk in the glossary. *Text references*: Definitions for which FM 3-34 is the proponent field manual are printed in boldface in the text. These terms and their definitions will be incorporated into the next revision of FM 1-02. For other definitions in the text, the term is italicized and the number of the proponent FM follows the definition.

FM 3-34 applies to the Active Army, the Army National Guard (ARNG)/Army National Guard of the United States, and the United States Army Reserve (USAR) unless otherwise stated.

The proponent for this publication is the United States Army Training and Doctrine Command. Send comments and recommendations on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Commandant, United States Army Engineer School, ATTN: ATZT-CDC, 320 MANSCEN Loop, Suite 270, Fort Leonard Wood, Missouri 65473-8929. Submit an electronic DA Form 2028 or comments and recommendations in the DA Form 2028 format by e-mail to <leon.cdidcodddengdoc@conus.army.mil>.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

Introduction

The Engineer Regiment exists to provide freedom of action to ground forces and to loosen these forces from the grips of the enemy and all aspects of the terrain. This was true in 16 June 1775, when the Continental Congress organized an Army with a chief engineer and two assistants, and it remains true today, 235 years later in this 22nd edition of this keystone document. This manual provides a body of thought that explains *how* (not what) *to think* about how to use the capabilities of the Engineer Regiment to provide freedom of action and shape civil conditions in support of the Army and its missions.

This version of FM 3-34 introduces an updated doctrinal framework (see figure 1) that provides the intellectual underpinnings for the Engineer Regiment and better articulates its purpose and activities. It describes how engineers combine the skills and organizations of the three interrelated engineer disciplines (combat, general, and geospatial engineering) to provide support that helps ground force commanders assure mobility of the force, enhance protection of the force, enable logistics, and develop infrastructure among afflicted populations and nations.

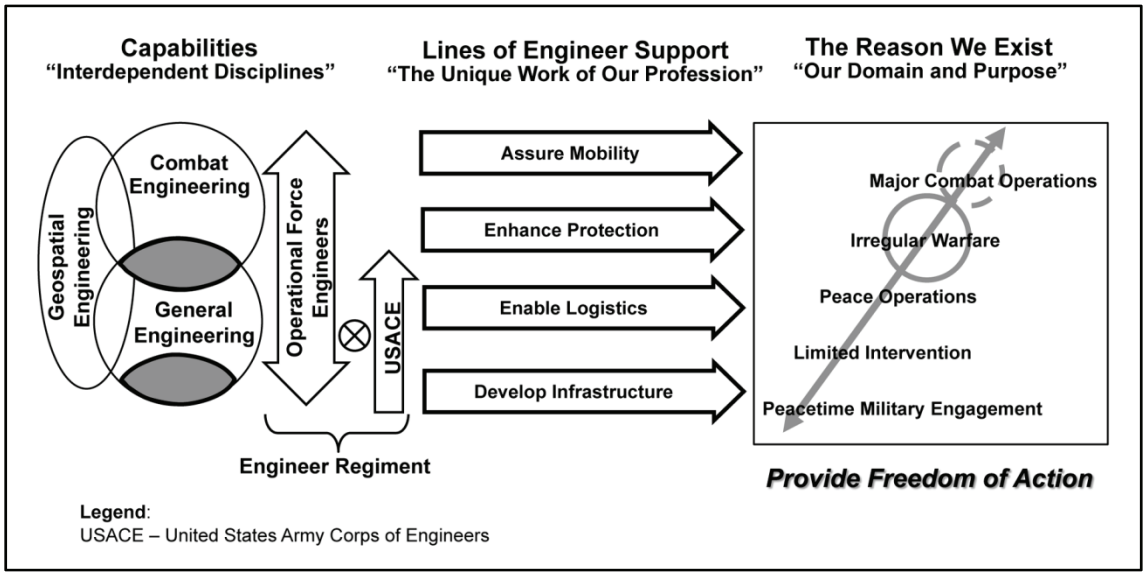

Figure 1. Engineer framework

The development of this framework was driven by several factors, including the—

- Addition of stability operations as a core mission for the United States (U.S.) military. Throughout much of the Army's history in the 20th century, its focus has often been on major combat operations. Today, however, the focus has shifted toward irregular warfare with an increased emphasis on shaping civil conditions. As a result, the Engineer Regiment finds itself supporting simultaneous combinations of offensive, defensive, and stability or civil support operations.
- Recognition that it is no longer sufficient to describe engineer operations only in terms of mobility, countermobility, and survivability. Such a construct, by itself, is inadequate for describing how engineers combine their diverse capabilities to help solve the problems faced by commanders and staffs in full spectrum operations. To address this shortcoming, this framework introduces four lines of engineer support to further align tasks according to their purpose for a specific operation.
- Need for the various disciplines (formerly known as functions) of the Engineer Regiment to be more interdependent and the recognition that these disciplines are areas of broad expertise within

military engineering. They drive training, leader development, personnel management and organizational design.

- Recognition that improving the interdependence between operational force engineers and the U.S. Army Corps of Engineers (USACE) provides greater synergy within the Engineer Regiment and enhanced support to the Army, joint forces, and governmental agencies.
- Imperative to foster adaptive leaders with the cognitive skills to make transitions and who can think in "combinations." The engineer leaders of today must be comfortable clearing improvised explosive devices (IEDs), fighting to gain and maintain a stronghold within an urban center, and then immediately integrating the full range of general engineering capabilities to establish a combat outpost using existing structures and set about the work of improving essential services to the surrounding populace to build trust and squash local support for insurgent combatants. Today's commander requires an engineer who is better equipped mentally to handle a broader array of engineering challenges, both simultaneously and sequentially.

The doctrinal engineer foundations provided in this manual, together with related engineer doctrine, will support the actions and decisions of engineer commanders at all levels. But, like FM 3-0, the manual is not meant to be a substitute for thought and initiative among engineer leaders. No matter how robust the doctrine or how advanced the new engineer capabilities and systems, it is the engineer Soldier that must understand the OE, recognize shortfalls, and adapt to the situation on the ground. It is the adaptable and professional engineer Soldiers and civilians of the Regiment that are most important to our future and that must be able to successfully perform their basic skills and accomplish the mission, with or without the assistance of technology.

In addition, this manual has been affected by recent changes in FM 3-0 and by maturation of the terms "field force engineering" and "assured mobility." It also includes the addition, modification, and rescission of several Army terms. (See table 1 which list changes to terms for which FM 3-34 is the proponent FM.)

Table 1. FM 3-34 term changes

New Army Terms		
combat engineering[1]	general engineering[1]	lines of engineer support
engineer disciplines[2]		
[1] Adds a second definition (Army only) to an existing joint term.	[2] Replaces engineer functions in Army doctrine.	
Modified Army Definitions		
assured mobility[1]	geospatial engineering	survivability operations
countermobility operations	geospatial information[2]	terrain reinforcement
field force engineering	mobility operations[1]	
[1] FM 3-90.4/MCWP 3-17.8 is now the proponent.	[2] ATTP 3-34.80 is now the proponent.	
Rescinded Army Definitions		
engineer coordinator	Engineer Regiment	tele-engineering
engineer functions[1]	terrain reinforcement	
[1] Replaced by engineer disciplines. Army doctrine will not use this term; joint doctrine will continue to use this term.		
Legend: ATTP – Army Tactics, Techniques, and Procedures FM – field manual MCWP – Marine Corps warfighting publication		

Chapter 1
The Operational Context

Understanding the operational context is essential if engineers are to achieve their purpose—providing freedom of action. Engineers must understand the OE because it fundamentally affects their activities and outcomes. The recent shift in focus from major combat operations to irregular warfare highlights the importance of understanding the entire continuum of operations (see figure 1, page viii). Understanding the Army's operational concept—full spectrum operations—is critical to effective engineer support to those operations. This chapter examines the context within which engineer support to operations occurs, focusing on those aspects that are most significant to engineers.

THE OPERATIONAL ENVIRONMENT

1-1. As discussed in FM 3-0, a complex framework of environmental factors shape the nature of military operations and affect their outcomes. This requires a broad understanding of the strategic and operational environment and their relevance to each mission. Army forces use operational variables to understand and analyze the broad environment in which they are conducting operations. They use mission variables to focus analysis on specific elements of the environment that apply to their mission. This is true not only for Army operations in general, but also for engineer support to operations. An understanding of the OE underpins the commander's ability to make decisions.

UNDERSTANDING THE OPERATIONAL ENVIRONMENT

1-2. Joint doctrine defines the *operational environment* as a composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander (Joint Publication [JP] 3-0). The OE encompasses physical areas and factors (including geography, weather, infrastructure, and population), the information environment (including adversary, friendly, and neutral forces), and other variables relevant to a specific operation.

1-3. Understanding the OE is essential to the successful execution of operations and is one of the fundamentals of the design methodology described in FM 5-0. To gain this understanding, commanders will normally consult with specialists in each area. Engineers are one of the specialists available to add breadth and depth to the overall understanding of the OE. See JP 3-34 for additional discussion of operational engineering at the joint level.

1-4. An engineer view of the OE is in addition to the common understanding being gained through the application of analytical tools by other specialists and leaders. The engineer view shares a common general understanding of the OE, while adding a degree of focus on those aspects within the purview of an engineering background (see figure 1-1, page 1-2). Guided by the common general understanding, the engineer view seeks to identify potential challenges and opportunities associated with variables of the OE. Within each critical variable of the framework being employed, the engineer view shares a common level of understanding while seeking the added specialty view.

OPERATIONAL AND MISSION VARIABLES

1-5. Army doctrine describes an OE in terms of the following eight operational variables: political, military, economic, social, information, infrastructure, physical environment, and time (PMESII-PT). The following examples are provided to show the added focus sought within each of the operational variables by the engineer view of the OE. The examples are not meant to restate the more complete treatment of the

variable in general terms provided in FM 3-0 or to be an all inclusive treatment of the engineer aspects within each of the variables.

- **Political**. Understanding the political circumstances within an OE will help the commander recognize key actors and visualize their explicit and implicit aims and their capabilities to achieve their goals. The engineer view might add challenges associated with political circumstances permitting or denying access to key ports of entry or critical sustainment facilities. Opportunities in the form of alternative access routes might be added. The engineer and others may be impacted by the effect of laws, agreements, or positions of multinational partners such as restrictions on shipment of hazardous materials across borders or a host of similar political considerations that can affect engineer planning and operations.
- **Military**. The military variable explores the military capabilities of all relevant actors in a given OE. The engineer view might add the challenges associated with an adversary's capability to employ explosive hazards (EHs) or other obstacles as well as the capability to challenge traditional survivability standards. Opportunities in the form of existing military installations and other infrastructure would be added. The engineer view includes a necessarily robust and growing understanding of engineer capabilities in a joint, interagency, and multinational context within this variable of the OE. Additional discussion of the military variable and engineer capabilities are discussed in chapter 2.
- **Economic**. The economic variable encompasses individual behaviors and aggregate phenomena related to the production, distribution, and consumption of resources. The engineer view might add challenges associated with the production or availability of key materials and resources. Opportunities in the form of potential for new or improved production facilities might be added.
- **Social**. The social variable describes the cultural, religious, ethnic makeup, and social cleavages within an OE. The engineer view might add challenges associated with specific cultural or religious buildings or installations. Opportunities in the form of potential to provide for culturally related building requirements might be a consideration.
- **Information**. This variable describes the nature, scope, characteristics, and effects of individuals, organizations, and systems that collect, process, disseminate, or act on information. Engineers assist the commander in using information engagement to shape the operational environment through their capability to improve infrastructure and services for the population. The engineer must consider how construction projects, especially in stability operations, will support informational themes consistent with friendly military goals and actions. The engineer view might also add challenges associated with deficiencies in the supporting architecture or nodes. Information flow may be affected by the available infrastructure to include power considerations.
- **Infrastructure**. Infrastructure comprises the basic facilities, services, and installations needed for the functioning of a community or society. The engineer view might add challenges associated with specific deficiencies in the basic infrastructure. Opportunities in the form of improvements to existing infrastructure and specific new projects might be added. The engineer view provides for a detailed understanding of infrastructure by subcategories in the context of combat operations, as well as both stability and civil support operations, and this topic is discussed in detail throughout this manual, FM 3-34.170/MCRP 3-17.4 and FM 3-34.400. **Physical environment**. The defining factors are urban settings (supersurface, surface, and subsurface features), and other types of complex terrain, weather, topography, hydrology, and environmental conditions. An enemy may try to counteract U.S. military advantages by operating in urban or other complex terrain requiring greater engineer effort to provide freedom of action. The engineer view might add challenges associated with natural and man-made obstacles. Insights into environmental considerations are also a concern (see FM 3-34.5/MCRP 4-11B). Opportunities in the form of existing routes, installations, and resources might be added. The **e**ngineer view supports a broad understanding of the physical environment through geospatial engineering, which is discussed in detail in chapter 2 of this FM, Army Tactics, Techniques, and Procedures (ATTP) 3-34.80, and JP 2-03.
- **Time**. The variable of time influences military operations within an OE in terms of the decision cycles, operational tempo, and planning horizons. The duration of an operation may influence engineer operations in terms of whether to pursue temporary or enduring solutions for facilities

and infrastructure. The methods and standards engineers use will often be markedly different, depending on whether the construction is contingent or is intended to have an enduring presence. The engineer view might add challenges associated with completing required construction projects on time and opportunities to accelerate priority projects.

1-6. Engineers review the OE using operational variables to add to the shared common understanding by identifying potential challenges and opportunities within the operation before and during mission execution. The resulting understanding of the OE (an engineer view of the OE) does not and is not intended to be limited to considerations within the OE that may result in engineer functional missions. The resulting engineer view of the OE is instead organized by lines of engineer support and linked to the common overall understanding through the warfighting functions. (See chapter 3 for discussion about lines of engineer support.)

1-7. The engineer view of the OE is synchronized to support combined arms using the warfighting functions to create combat power as described in FM 3-0. Chapter 3 provides a more detailed discussion of the application of engineer capabilities through the warfighting functions to synchronize support to combined arms operations.

MISSION VARIABLES

1-8. While an analysis of the OE using the operational variables (PMESII-PT) improves situational understanding (SU) at all levels, when commanders receive a mission they require a mission analysis focused on their specific situation. The Army uses the mission variables of mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC) as the categories of relevant information used for mission analysis. Similar to the analysis of the OE using the operational variables, the engineer uses the mission variables to seek the shared common understanding from an engineer perspective.

1-9. The following are some examples of the engineer perspective for each of the mission variables:

- **Mission**. Commanders analyze a mission in terms of specified tasks, implied tasks, and the commander's intent (two echelons up) to determine their essential tasks. Engineers conduct the same analysis, with added focus on the engineer requirements, to determine the essential tasks for engineers. Early identification of the essential tasks for engineer support enables the maneuver commander to request engineer augmentation early on in the planning process.
- **Enemy**. The engineer view of the enemy concentrates on enemy tactics, equipment, and capabilities that could threaten friendly operations. This may include an analysis of other factors within the AO or area of interest (AI) that could have an impact on mission success.
- **Terrain and weather**. As the terrain visualization experts, engineers analyze terrain (man-made and natural) to determine the effects on friendly and enemy operations. Engineers analyze terrain using the five military aspects of terrain (observation and fields of fire, avenues of approach, key terrain, obstacles, and cover and concealment [OAKOC]). Engineers integrate geospatial products to help commanders and staffs visualize aspects of the terrain to support decisionmaking.
- **Troops and support available**. Engineers consider the number, type, capabilities, and condition of available engineer troops and support (joint, multinational, and interagency forces). Chapter 2 provides a more complete discussion of engineer capabilities.
- **Time available**. Engineers must understand the time required in planning engineer operations and the importance of collaborative and parallel planning. Engineers realize the time needed for positioning critical assets and the time associated with performing engineering tasks or projects.
- **Civil considerations**. The influence of man-made infrastructure; civilian institutions; and attitudes and activities of the civilian leaders, populations, and organization within the AO impact the conduct of military operations. At the tactical level, they directly relate to key civilian areas, structures, capabilities, organizations, people, and events (ASCOPE). This engineer view provides a detailed understanding of the basic infrastructure needed for a community or society. The engineer view might identify challenges associated with specific deficiencies in the basic infrastructure and opportunities for improvement or development of the infrastructure.

UNIFIED ACTION

1-10. *Unified action* is the synchronization, coordination, and/or integration of the activities of governmental and nongovernmental entities with military operations to achieve unity of effort (JP 1-02). Engineer capabilities are a significant force multiplier in joint operations and unified action, facilitating the freedom of action necessary for the joint force commander (JFC) to meet mission objectives. This section provides an overview of non-Army engineer capabilities typically available within a multinational and interagency environment and of the integration of those capabilities. See appendix A for multinational, interagency, and HN considerations.

JOINT/INTERAGENCY/MULTINATIONAL CAPABILITIES

1-11. In full spectrum operations, Army engineers operate as part of a joint force and often within a multinational and interagency environment. Army engineers should be familiar with the core engineering units in each Service to include their combat, general, and geospatial engineering capabilities and limitations. It is also important to understand multinational, interagency, NGO, and intergovernmental organization engineer capabilities. The engineering capabilities of each Service component may provide engineering support to the other components to meet joint force requirements. See North Atlantic Treaty Organization (NATO) Military Committee Policy 0560; JP 3-08*;* JP 3-34; Allied Joint Publication (AJP) 3.12; and Standardization Agreement 2394/Allied Tactical Publication (ATP) 52(B) for further discussion of engineer participation in joint, interagency, and multinational operations. JP 3-34 provides information on other Service engineer capabilities, and discusses other engineering capabilities such as multinational military units, HN capabilities, and civil augmentation programs. Army engineers should be aware that some capabilities that reside in other (nonengineer) branches of the Army are categorized as engineering by other Services. Explosive ordnance disposal (EOD) and chemical, biological, radiological, and nuclear (CBRN) capabilities are two examples.

INTEGRATION OF CAPABILITIES

1-12. Integrating the variety and special capabilities of engineer organizations requires an understanding of the various capabilities and limitations of the engineer assets available for any given mission. Integration also requires a common understanding of the mission command structure and processes in place to employ the engineer capabilities in unified action. It also requires an understanding of the chain of command, interagency coordination, and multinational operations.

Chain of Command

1-13. As described in JP 1, the President and the Secretary of Defense exercise authority and control of the Armed Forces through two distinct branches of the chain of command—one branch for the conduct of operations and support and the other branch to carry out the military service departments' Title 10 responsibilities of recruiting, manning, equipping, training, and providing service forces to the combatant commanders (CCDRs). Although the service branch of the chain of command is separate and distinct from the operating branch, the Army Service component commander (ASCC) and the Army forces operate within the CCDR's chain of command in the theater.

1-14. At the theater level, when Army forces operate outside the United States, they are assigned to an ASCC under a JFC (see JP 1 and JP 3-0). The ASCC provides administrative and logistic services to assigned Army forces and the ARFORs of subordinate JFCs. (An *ARFOR* is the Army Service component headquarters for a joint task force or a joint and multinational force [FM 3-0]. See ARFOR under terms). When appropriate, the ASCC may delegate authority for support tasks to a single theater support command (TSC) or another subordinate Army headquarters, such as the theater engineer command (TEC) or the United States Army Medical Command, when the focus of support suggests this as the best solution. The USACE is often involved with supporting the ASCC as well and will generally operate through the TEC, if one is present. Chapter 4 provides additional discussion of joint mission command considerations and options.

Interagency Coordination

1-15. Because Army engineers will often be required to coordinate with government agencies to accomplish their mission, they should have an understanding of the capabilities of these agencies and their support functions. While government agencies may increase the resources engaged in a given operation, they may also increase and complicate the coordination efforts. Stability operations are now regarded as a core U.S. military mission and are given priority comparable to combat operations. Since integrated civilian and military efforts are key to successful stability operations, Department of Defense (DOD) engineer personnel must be prepared to conduct or support stability operations by working closely with U.S. departments and agencies, foreign governments and security forces, global and regional international organizations, United States organizations, foreign NGOs, private sector individuals, and for-profit companies.

1-16. Because engineers are likely to operate with other agencies, foreign governments, NGOs, and intergovernmental organizations in a variety of circumstances, their participation in the JFC's interagency coordination is critical. Two methods for facilitating such coordination are the civil-military operations center (CMOC) and the joint interagency coordination group. Additional information on the CMOC and the joint interagency coordination group is provided in JP 3-0, JP 3-34, and JP 5-0.

Multinational Operations

1-17. During multinational operations, U.S. forces establish liaison with multinational forces early. Army forces exchange specialized liaison personnel in fields such as aviation, fire support, engineer, intelligence, military police, public affairs, and civil affairs (CA) based on mission requirements. Missions to multinational units should reflect the capabilities and limitations of each national contingent. Some significant factors are relative mobility and size, intelligence collection assets, long-range fires, special operations forces, and organic sustainment capabilities. Effective operational-level engineer planning requires an engineer staff to support the multinational commander, providing advice on all engineer aspects of the operation. When assigning missions, commanders should also consider special skills, language, and rapport with the local population, as well as the national pride of multinational partners. Multinational commanders may assign HN forces home defense or police missions, such as sustainment area and base security.

1-18. Commanders should give special consideration to "niche" capabilities, such as mine clearance that may exceed U.S. capabilities. Multinational engineer forces may possess additional engineering specialties that exceed or enhance U.S. capabilities. See FM 3-17 for additional discussion of the employment of multinational forces.

SPECTRUM OF CONFLICT

1-19. Engineers provide support throughout the continuum of operations and across all levels of war. Their support is critical for full spectrum operations at all points along the spectrum of conflict and in all operational themes.

ENGINEER SUPPORT WITHIN THE CONTINUUM OF OPERATIONS

1-20. While the magnitude of violence varies over the spectrum of conflict, the magnitude of requirements for engineers may remain consistently high from stable peace through general war. This magnitude provides a menu of actions available to support military operations.

1-21. Engineer requirements at the end of the spectrum characterized as stable peace may include geospatial engineering support to provide a clear understanding of the physical environment. Military engagement, security cooperation, and deterrence activities sometimes require large numbers of forces. These forces will need infrastructure, facilities, 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, or repair it to support operations in theater. Assistance in response to disaster and humanitarian relief usually includes significant engineering challenges and opportunities to immediately and positively impact the situation.

1-22. Engineer activities at the far end of the spectrum, characterized as general war, require support for ground combat (or the possibility of ground combat). This requires integrating engineer and other support activities with the fires and maneuver of ground combat forces to assure the mobility of friendly forces, alter the mobility of adversaries, and enhance the survivability of friendly forces. It also involves significant challenges associated with sustaining the operation.

1-23. Between these two ends of the spectrum—stable peace and general war—engineers are often required to improve stability through projects to develop infrastructure, efforts to create or improve HN technological capacity, or other engineering projects (see chapter 3). There may also be requirements to provide specialized engineer support to other agencies. Engineers involved in unconventional warfare (which includes counterinsurgency and support to insurgencies) help overcome challenges to the commander's ability to move and maneuver freely, protect the forces employed, and sustain the operation. Other requirements include directly impacting the adversaries' freedom of action and improving stability.

1-24. Engineers will be challenged to understand the OE they face and apply their knowledge and background to add to the overall understanding. The engineer view must be consistent with the shared framework and variables employed to analyze the OE. But while the levels of conflict and corresponding politically motivated violence may vary in different areas of the world and within a theater, the challenges and opportunities identified by an engineer understanding of the OE remains consistently high across the spectrum of conflict. Similarly the engineer view of the OE provides relevant and sometimes unique understanding at each level of war.

ENGINEER ACTIVITIES SPANNING THE LEVELS OF WAR

1-25. The challenges of planning, preparing, executing, and continuously assessing operations within diverse theaters are numerous and varied. The engineer staff must be involved in the operations process activities at each level of war, described in FM 3-0 as strategic, operational, and tactical. Understanding the challenges and opportunities identified from an engineer view equips the staff with relevant information to form a more comprehensive understanding. The omission of engineer considerations at any level may adversely impact the effectiveness of the operation. Engineer support to operations must be synchronized from strategic to the tactical level. Strategic engineer decisions affect tactical engineer support and tactical engineer support will affect strategic.

1-26. Engineer planning at each level of war is not limited or constrained to the development of engineer functional tasks. The warfighting functions and the parallel joint functions are used to synchronize engineer support at every level of war. While there are significant linkages to each of the warfighting functions, planning support at the strategic to operational level is focused primarily within the movement and maneuver, intelligence, sustainment, and protection functions. At the operational to tactical level, planning support focuses primarily on the movement and maneuver, intelligence, mission command, sustainment, and protection warfighting functions. While the primary focus and, in many cases, the staff organization for engineer considerations vary among levels of war, the engineer Soldier remains consistently central to the capability to provide and integrate an engineer view of the OE. Chapter 3 includes a more detailed discussion of engineer support to combined arms and the linkages to all of the warfighting functions. Chapter 4 discusses the engineer staff organization. The following paragraphs briefly describe some of the engineer considerations at each level of war, and more information is provided in ATTP 3-34.23 and FM 3-34.22.

Strategic Level

1-27. Engineer activities at the strategic level include force planning, engineer policy, and the support of campaigns and operations, focusing primarily on the means and capabilities to generate, deploy, employ, 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. Engineers at the strategic level advise on terrain and infrastructure, including sea ports of debarkation (SPODs) and aerial ports of debarkation (APODs), force generation, priorities of engineer support, LOCs, air base and airfield operations, base camp placement and design, joint targeting, foreign humanitarian assistance, environmental considerations, engineer interoperability, input to the rules of engagement (ROE), rules for the use of force, and support to protection.

1-28. Environmental issues can have strategic implications and affect mission success and end states if not recognized early and incorporated into planning and operations. Natural resource protection can be a key strategic mission objective important to HN reconstruction. Failure to recognize environmental threats can result in significant risk to the joint task force (JTF), adversely impacting readiness. If not appropriately addressed, environmental issues have the potential to negatively impact local community relations, affect insurgent activities, and create diplomatic problems for the JTF.

Operational Level

1-29. Engineer activities at the operational level focus on the impact of geography and force-projection infrastructure on the CCDR's operational design. Engineer planners must determine the basic yet broad mobilization, deployment, employment, and sustainment requirements of the CCDR's concept of operations. Operational planning merges the operation plan (OPLAN) or operation order (OPORD) of the joint force, specific engineer missions assigned, and available engineer forces to achieve success. JFC engineer planners also need to understand the capabilities and limitations of Service engineer forces.

1-30. Many of the engineer 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 operational area and environmental assessments and work with intelligence officers to analyze the threat. They provide master planning guidance that incorporates the construction of contingency base camps and other facilities. Engineers anticipate requirements and request capabilities to meet them. They develop geospatial products and services and make recommendations on joint fires and survivability for the forces employed. As the link to tactical engineer integration, operational planning ensures that adequate engineer capabilities are provided to accomplish combat engineering support requirements.

Tactical Level

1-31. Engineer activities at the tactical level focus on support to the ordered arrangement and maneuver of forces—in relationship to each other and to the enemy—that are required to achieve combat objectives. At the same time, engineer support is critical to achieving necessary stability tasks, involving activities such as those described in paragraph 1-28.

1-32. Tactical planning is conducted by each of the Services; in the context of engineer support to operations, this translates to a primary focus on combat engineering tasks and planning done within tactical organizations (see chapter 2 for a discussion of the engineer disciplines including combat engineering). Operational planners set the conditions for success at the tactical level by anticipating requirements and ensuring that capabilities are available. Engineer tactical planning is typically focused on support to combat maneuver (mobility and countermobility), survivability, and sustainment support that is not addressed by the higher-echelon commander. Construction planning at the tactical level will typically focus on survivability in support of the protection warfighting function and infrastructure development in support of primarily the sustainment warfighting functions. Engineer planners at the tactical level use the engineer assets provided by operational planners to support the tactical mission tasks assigned to those combat maneuver units they support. With the support of the engineer, the subordinate JFC ensures that engineer capabilities are effectively integrated into the scheme of maneuver and the performance of assigned tasks. Tactical missions are complex, and planning must consider threat capabilities.

1-33. Special consideration includes performing terrain analysis with an understanding of these threat capabilities. Engineer reconnaissance (both tactical and technical) is a critical capability to the combat maneuver commander at the tactical level. Threat information must be very specific. Engineers discern and identify patterns and plan specific detection strategies based on the threat. The proliferation of mines and improvised explosive devices (IEDs) requires engineers to continuously develop new countering procedures. The tactical integration of EOD capabilities has become an increasing requirement.

ENGINEER SUPPORT TO FULL SPECTRUM OPERATIONS

1-34. The Army's operational concept is *full spectrum operations*: Army forces combine offensive, defensive, and stability or civil support operations simultaneously as part of an interdependent joint force to seize, retain, and exploit the initiative, accepting prudent risk to create opportunities to achieve decisive