FM 3-34.22 (FM 3-34.221, 5-7-30, 5-71-2, 5-71-3)

ENGINEER OPERATIONS—
BRIGADE COMBAT TEAM AND BELOW

February 2009

HEADQUARTERS, DEPARTMENT OF THE ARMY

This publication is available at
Army Knowledge Online (www.us.army.mil) and
General Dennis J. Reimer Training and Doctrine
Digital Library at (www.train.army.mil).

Field Manual
No.3-34.22

Headquarters
Department of the Army
Washington, DC, 11 February 2009

Engineer Operations—
Brigade Combat Team and Below

Contents

***This publication supersedes FM 3-34.221, dated 7 January 2005; FM 5-7-30, dated 28 December 1994; FM 5-71-2, dated 28 June 1996; and FM 5-71-3, dated 4 October 1995.**

Figures

Tables

Preface

The engineer support doctrine for the brigade combat team (BCT) is focused on tactical-level maneuvers. The engineer organizations organic to the BCT are optimized to perform combat engineering (primarily mobility with limited capabilities in countermobility and survivability) tasks with geospatial engineering support provided by the organic terrain teams. Additional engineering support (combat and general) comes from modular engineer organizations that are task-organized to the BCT or providing support from echelons above brigade (EAB) organizations. This manual is aligned with current BCT doctrine (see Field Manual [FM] 3-90.6) and describes engineer support for the heavy brigade combat team (HBCT), infantry brigade combat team (IBCT), and Stryker brigade combat team (SBCT). Although the armored cavalry regiment (ACR) and its engineer company is not specifically addressed, the basic principles of this manual also apply to those organizations.

This manual combines, updates, and supersedes material from the following four tactical-level engineer manuals:

- FM 3-34.221.
- FM 5-7-30.
- FM 5-71-2.
- FM 5-71-3.

This manual is built directly on the doctrine contained in the following manuals:

- FM 3-0.
- FM 3-07.
- FM 3-34.
- FM 3-90.
- FM 3-90.5.
- FM 3-90.6.
- FM 3-90.61.
- FM 4-0.
- FM 5-0.
- FM 6-0.

Given the magnitude of doctrinal changes in recent years, becoming familiar with these FMs is essential to effectively using this manual. This manual applies across the spectrum of conflict, from peacetime engagement to major combat operations. It is focused at the tactical level of war and meets the tactical commander's engineer support requirements. It is the tactical engineer commander's guide regarding the aspects of operations in support of the BCT and intended for use by brigade and below commanders and supporting staff (augmenting unit commanders, staffs supporting brigade and below maneuver organizations).

This manual serves as a reference document for engineer commanders, staff, leaders, training developers, and doctrine developers throughout the Army. It is a primary manual for instructional purposes within the U.S. Army Engineer School (USAES) and assists other Army branch schools in teaching the integration of engineer capabilities into Army operations, since engineer involvement is a given for nearly every military operation.

This manual includes guidance on integrating organic and augmenting engineer forces into BCT tactical plans, orders production, and mission execution. It incorporates the use of essential tasks for mobility, countermobility, and survivability (M/CM/S) in BCT operations and highlights the organic and likely engineer augmentation to the BCT as it operates across the spectrum of conflict. The chapters and appendixes in this manual are as follows:

- Chapter 1 describes engineer roles in support of the BCT and includes considerations for operating in the operational environment (OE).
- Chapter 2 focuses on the integration of engineer operations during planning and the command and control (C2) of engineer forces during execution.

- Chapter 3 describes engineer support to operations and the integration of engineer reconnaissance.
- Chapter 4 focuses on the varying levels and types of engineer support for each form of security operations performed by the BCT.
- Chapter 5 describes the targeting process and engineer involvement in planning lethal and nonlethal fires in the BCT.
- Chapter 6 describes how the modular engineer force provides specialized capabilities to meet the needs of the BCT during offensive and defensive operations.
- Chapter 7 provides an overview of and discusses some of the associated engineer tasks and special considerations for each.
- Chapter 8 focuses on sustainment support for engineer operations within the BCT.
- Appendix A is a metric conversion chart that is included according to Army Regulation (AR) 25-30.
- Appendix B provides detail on the engineers organic to the BCT and ACR and highlights some of the likely modular engineer augmentation.
- Appendix C serves as a quick reference for leaders in performing breaching operations.
- Appendix D describes route and area clearance missions and provides leaders with some fundamental planning considerations.
- Appendix E highlights the fundamentals for conducting combined arms gap-crossing operations and serves as a quick-reference guide for planners.
- Appendix F provides detail on the engineer running estimate and how it supports planning, preparing for, and executing operations.
- Appendix G provides the format and instructions for producing the engineer annex and engineer company or battalion task force (TF) operation order (OPORD) that facilitates mission command.
- Appendix H describes urban operations (UO) and provides engineers with special considerations for operating in urbanized terrain.

This publication applies to the Active Army, the Army National Guard (ARNG)/Army National Guard of the United States (ARNGUS), and the United States Army Reserve (USAR) unless otherwise stated.

Unless stated otherwise, masculine nouns or pronouns do not refer exclusively to men.

The proponent for this manual is the U.S. Army Training and Doctrine Command (TRADOC). Send comments and recommendations on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Commander, U.S. Army Maneuver Support Center (MANSCEN), ATTN: ATZT-TDD, 320 MANSCEN Loop, Suite 240, Fort Leonard Wood, Missouri 65473-8929. Submit an electronic DA Form 2028 or comments and recommendations in DA Form 2028 format by e-mail to <leon.mdottddengdoc@conus.army.mil>.

Introduction

This manual provides engineer doctrine for operating at the BCT and below and within the framework of full spectrum operations. Like FM 3-34, it describes engineer operations integrated through the warfighting functions in a combined arms application of combat power. This manual, however, provides greater detail for commanders and staff at brigade echelons and below to ensure synchronization of engineer capabilities throughout operations and across the spectrum of conflict and applied operational themes. This manual answers the question, "How to?" for engineers supporting the BCT.

This manual supersedes four manuals and reflects the considerable changes that have occurred over the 13 years since their release. Many of the tactical tasks associated with combat and general engineering support have remained essentially constant, although the OE has dramatically shifted with new focused threats such as improvised explosive devices (IEDs), and the increased emphasis on stability operations. Another major change involves Army reorganization and restructuring to a modular force and the effects that this has on doctrine and operations. Changes that directly affect this manual include the—

- Replacement of battlefield operating systems with the warfighting functions and the subsequent splitting of the M/CM/S battlefield operating system between the movement and maneuver and protection warfighting functions.
- Maturation of the term "assured mobility" (see FM 3-34, chapter 3 and chapter 4).
- Restructuring of the engineer organizations within each of the three types of BCTs and the ACR.
- Formalization of a planning tool that supports the running estimate known as essential tasks for M/CM/S (see FM 3-34).
- Likelihood that the operations conducted will be joint, interagency, intergovernmental, and multinational (see FM 3-0). The primary focus of joint engineer operations is to achieve the commander's intent by coordinating engineer support throughout the joint area of operations (AO). All branches of Service possess the organic capability to conduct survivability operations. When available, Naval construction force (NCF) (Seabees), Air Force rapid engineers deployable heavy operations repair squadron, engineers (RED HORSE), and prime base engineer emergency force (Prime BEEF) organizations can greatly increase the breadth and depth of the effort (see JP 3-34).
- Alignment of engineer doctrine supporting FM 3-90.5 and FM 3-90.6.
- Formalization of support requirements to homeland security (HLS) (see FM 3-07 and JP 3-28).
- Frequency of contractors on the battlefield and their support for many of the survivability tasks associated with general engineering (see AR 715-9, FM 3-100.21, FM 100-10-2, and FMI 4-93.41).
- Resulting changes in the basic design and organizational structures and equipment of engineer organizations to support ongoing Army transformation.

This manual includes the discussion of many items covered in greater depth in other engineer manuals that have been recently released or are currently being rewritten. These manuals include—

- FM 3-34.
- FM 3-34.170.
- FM 5-103.
- FM 3-34.400.
- FM 3-34.2
- FM 3-90.12.

This manual incorporates those areas of emerging doctrine from the manuals above and—

- Links assured mobility to the six warfighting functions and across the engineer functions.
- Integrates engineer reconnaissance capabilities, specifically the engineer reconnaissance team (ERT), within the combined arms team.
- Acknowledges the term and concept shift from river-crossing operations to combined arms gap crossing operations.

Note. The three types of gap crossings are also redefined to align with the three types of breaching operations—introducing covert gap crossing as the third type of gap crossing.

- Acknowledges the development of clearing operations (area and route clearance) as a tactical enabling operation.

Finally, the OE on which this manual is based is more variable than the OE on which previous doctrine was based. Engineers must be prepared to go into any OE and perform the full range of engineer tasks in support of the maneuver commander while dealing with a wide range of threats and other influences. It builds on the collective knowledge and wisdom gained through recent operations (combat and operations other than war) numerous exercises, and the deliberate process of informed reasoning throughout the Army. It is rooted in time-tested principles and fundamentals, while accommodating new technologies and diverse threats to national security.

This page intentionally left blank.

Chapter 1
Engineer Support to the Brigade Combat Team

My engineers can do anything. There just aren't enough of them.

—Major General Raymond Odierno
Commander, 4th Infantry Division, Operation Iraqi Freedom

Engineers supporting maneuver forces today face unique challenges, not only with the unpredictability of the OE they operate, but also in adapting to the organizational restructuring of the Army as it continues to transform to a modular force. Within the BCT, this transformation has resulted in a streamlined, organic engineer company and a reliance on task-organized EAB engineer augmentation. This chapter discusses the need for engineer support within the BCT, the mechanism for providing responsive and mission-tailored engineer capabilities, and the integration of the engineer functions (combat, general, and geospatial engineering) through the warfighting functions to generate combat power in combined arms operations.

REQUIREMENTS

1-1. The Army operational concept is full spectrum operations. Full spectrum operations are the purposeful, continuous, and simultaneous combinations of offense, defense, and stability or civil support to dominate the military situation at operational and tactical levels. In full spectrum operations, Army forces adapt to the requirements of the OE and conduct operations within it using synchronized action, joint interdependent capabilities, and mission command. They defeat adversaries on land using offensive and defensive operations and operate with the population and civil authorities in the AO using stability or civil support operations. Integrated engineer support is not only critical in conducting combined arms in full spectrum operations, but it also adds to the combined arms commander's understanding of OE requirements.

OPERATIONAL ENVIRONMENT

1-2. Understanding the OE is essential to successful operations. Today's OE is more unpredictable than those of the past, witnessing new threat and a complex and dynamic array of other influences. As with other leaders, Army engineers are challenged to understand the OE they face and apply their knowledge and capabilities to support the force. They must be prepared to face future adversaries that are adaptive and have a wide array of asymmetric capabilities that allow them to successfully fight a more technologically superior force. In the OE, engineers have difficulty predicting an enemy course of action (COA) based on doctrinal templates. Engineers must be able to describe an enemy force in terms of function (fixing, assaulting, exploiting, shielding) of subelements and not in terms of where it might be found on a contiguous battlefield (2d echelon, main defensive belt). Engineers have to develop methods to discern and identify threat engineer patterns of behavior. Engineers can also anticipate dealing with increased explosive hazards (EHs) (mines, booby traps, IEDs, unexploded ordnance [UXO]) throughout the contiguous and noncontiguous AO.

1-3. Warfighting commanders rely on engineers as one of the specialists available to add breadth and depth to the overall understanding of the OE. 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. Guided by a common general understanding, the engineer view seeks to identify potential challenges and opportunities associated with OE variables. The engineer view is not constrained to the considerations that may result in engineer functional missions, and subsequent engineer planning is not

limited only to the development of engineer functional tasks. The engineer, employing the common analytical framework and a unique technical background, identifies significant and relevant challenges and opportunities of potential impact to the combined arms operation to add to the overall understanding.

1-4. FM 3-0 describes an OE in terms of eight operational variables (political, military, economic, social, infrastructure, information, physical environment, and time [PMESII-PT]). However, these variables are too broad for planning at the tactical level. Army leaders at the BCT level and below narrow their focus to the six mission variables (mission, enemy, terrain and weather, troops and support available, time available, and civil considerations [METT-TC]). Once a mission or warning order (WARNORD) is received, an analysis of the OE (in terms of mission variables) provides the relevant information (RI) that commanders use to frame tactical problems. Engineers must understand these mission variables to best understand how to leverage the capabilities organized into the engineer functions to support the BCT mission. The resulting engineer view of the OE is then organized and linked to the warfighting functions. 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 the essential tasks. Engineers conduct the same analysis, with added focus on the engineer requirements, to determine the essential tasks for M/CM/S. Early identification of the essential tasks for M/CM/S supports the maneuver commander's request for engineer augmentation. Engineer comprehension of the mission requirements and the necessary engineer capabilities to meet those requirements facilitate the appropriate task organization of engineer assets.
- **Enemy.** The engineer view of the enemy concentrates on enemy tactics, equipment, and capabilities that could threaten friendly movement, maneuver, protection, and sustainment and 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) and weather 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 important 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). They also consider support from Department of Defense (DOD) or DA civilians, U.S. Army Corps of Engineer (USACE) field force engineering (FFE), contracted civilians, and the host nation (HN). FFE is the application of Engineer Regiment capabilities across the range of engineer functions (primarily general engineering-intensive) across the entire spectrum of conflict through both reachback (TeleEngineering) and forward presence.
- **Time available.** Effective commanders and staff know how much time and space their units need to plan, prepare, and execute operations. Engineers understand the time required in planning engineer operations and the importance of collaborative and parallel planning. Engineers realize the time needed for positioning critical engineer 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 infrastructure that comprises the basic facilities, services, and installations needed for a community or society. The engineer view might identify challenges associated with specific deficiencies in the basic infrastructure and opportunities in the form of improvements to existing infrastructure.

FULL SPECTRUM OPERATIONS

1-5. In the spectrum of conflict, Army engineers operate as part of a joint force and often with multinational and interagency partners. Joint integration, as part of a unified action, does not require joint command at all echelons. Joint integration does require joint interoperability and certainly a working knowledge of joint and multinational and interagency engineering capabilities (potentially available at all levels). Integrated Army, joint, and other engineer capabilities are a significant force multiplier in combined arms operations, facilitating the freedom of action necessary to meet mission objectives. Engineer operations modify, maintain, provide understanding of, and protect the physical environment. In doing so they—

- Enable the mobility of friendly forces.
- Alter the mobility of adversaries.
- Enhance the protection and enable the sustainment of friendly forces.
- Contribute to a clear understanding of the physical environment.
- Provide support to noncombatants, other nations, and civilian authorities and agencies.

1-6. Engineer operations contribute significant combat (lethal and nonlethal) to all elements of full spectrum operations. Engineer activities at the tactical level focus on support to the ordered arrangement and maneuver of combat elements (in relation to each other and the enemy) that are required to achieve combat objectives. Tactical missions are complex, and planning must consider both symmetric and asymmetric threat capabilities. Organic engineer capabilities are embedded in each of the BCTs to provide close support to the maneuver of those forces. Based on a METT-TC analysis, the BCTs may be task organized with additional modular engineer capabilities to meet mission requirements.

1-7. For offensive and defensive operations, engineer augmentation in the BCTs is usually required. Augmentation primarily comes from combat engineering, but also includes general engineering assets and capabilities. Other, more technically specialized engineering capabilities may provide support to BCT requirements for movement and maneuver, intelligence, protection, and sustainment. Engineer augmentation may come in modular teams, sections, platoons, or companies or under the C2 of a task-organized, multifunctional, battalion-size engineer TF headquarters. (See chapter 6 for more information on engineer support to combat operations.)

1-8. Stability and civil support operations change the nature and focus of much of the engineer support to the BCT. While augmentation of selected combat engineering skills remains essential, the likely requirement centers on general engineering organizations and capabilities. As with support for combat operations, engineer augmentation may come in modular teams, sections, platoons, or companies or under the C2 of a task-organized, multifunctional, battalion-size engineer TF headquarters. If so, the focus of this engineer battalion TF is likely on general engineering support and clearing operations with an emphasis on reestablishing infrastructure within the AO. (See chapter 7 for more information on engineer support to stability and civil support operations.)

CAPABILITIES

1-9. The streamlined engineer company organic to each of the BCTs provides a baseline of combat capabilities to which augmentation can be added. The organic engineer staff within the BCT staff not only identifies augmentation that is required, but also coordinates its application. Each BCT also has organic geospatial engineering capabilities to provide a baseline of geospatial support. As mentioned, additional Army, joint, multinational, interagency, and other engineering capabilities may be available to augment the BCT. Additional Army engineering capabilities are organized within a modular engineer force pool. The modular construct of the Army engineer operational force is a complementary and interdependent relationship between four major unit categories (organic engineer, engineer headquarters, baseline, and specialized engineering units).

ORGANIC ENGINEER COMPANIES

1-10. The BCT is the Army basic instrument of tactical execution in implementing combat and stability operations. It also has applicability in civil support operations. The following are the three types of BCTs:

- **HBCT.** A single heavy brigade replaces the armored, mechanized, and balanced brigades of the heavy divisions. This new HBCT fields tanks and mechanized infantry, in rough balance, within a standardized combined arms battalion (CAB). The HBCT has a single organic engineer company and is organized as part of the brigade special troops battalion (BSTB).
- **IBCT.** As the light force, the IBCT is a uniform design that replaces the specialized airborne, air assault, and light infantry brigade. The IBCT has a single organic engineer company and is organized as a part of the BSTB.
- **SBCT.** This lightly armored, motorized infantry brigade has a single organic engineer company organized as an independent company within the BCT.

1-11. Each BCT and the ACR has an organic engineer (Sapper) company (see appendix B). In the HBCT and IBCT, this company is located within the BSTB. In the SBCT, it is positioned as a separate unit under the brigade. The combat engineering company of the ACR is also positioned as a separate unit under the regiment similar to that of the SBCT. The engineer company is organic to the BCT and the ACR and is focused on maneuver at the tactical level. Its mission is to provide assured mobility to the BCT and the ACR by conducting M/CM/S and limited general engineering support to enhance maneuver in the AO. As a combat multiplier, engineers concentrate their efforts on maintaining BCT freedom of movement and lessening the enemy's ability to mass and maneuver in the OE. Organic engineer capabilities include—

- Providing geospatial data management and analysis (except in the ACR which does not have organic geospatial elements).
- Providing support to close combat (M/CM/S).
- Providing mobility assessments.
- Detecting and neutralizing EHs.
- Supporting mobility through urban terrain.
- Providing C2 for engineer forces.

1-12. During offensive and defensive operations, the BCT requires augmentation through baseline elements that could include an engineer battalion headquarters. Other specialized engineering units and equipment may also provide mission-tailored engineer support when their unique engineer capabilities are required. Explosive ordnance disposal (EOD) elements may be included in this augmentation.

ENGINEER HEADQUARTERS UNITS

1-13. Engineer headquarters units are the basis for integrating engineer functions, elements, and capabilities. They consist of the theater engineer command (TEC), engineer brigade, and engineer battalion. Each has a staff that allows the commander to provide C2 for assorted and various engineer organizations. Each is also capable of providing C2 for other selected nonengineer units to support multifunctional missions (combined arms breaching and combined arms gap crossing). The TEC provides C2 for all assigned or attached Army engineer brigades and other engineer units and missions for the combatant or joint task force (JTF) commander. The engineer brigade is one of the Army functional brigades and provides C2 for up to five engineer battalions at the division and corps levels. The engineer battalion is typically found within the engineer brigade or maneuver enhancement brigade (MEB) or in support of a BCT.

1-14. When in support of a BCT, an engineer battalion conducts engineer missions and controls any mix of up to five mission-tailored engineer companies. The engineer battalion headquarters is capable of providing C2 for either combat or general engineering missions when they have been task-organized to perform in these roles. The battalion may be focused on a single mission such as route clearance, security construction, or cache interrogation and reduction. The engineer battalion may be organized to perform as a breach force command when the BCT is conducting a combined arms breach. During a gap- or river-crossing operation, the engineer battalion provides the option to be designated as the crossing site

command. For conducting construction or EH clearance missions, the battalion receives construction design, survey, or EH teams to facilitate these missions.

BASELINE ENGINEERING UNITS

1-15. Baseline engineering units include combat and general engineering units (see table 1-1). They are the primary building blocks for the organization of most engineer battalions. These units are used to augment the organic engineer capabilities of a BCT and may be task-organized under an engineer battalion headquarters to serve under a variety of larger headquarters, providing the specific tailored capabilities needed to support any particular mission requirements. (See appendix B for more detailed information on baseline engineering units.)

Table 1-1. Baseline engineering units

Combat Engineering Unit	*General Engineering Unit*
Sapper company	Engineer support company
Mobility augmentation company	
Clearance company	Horizontal construction company
MRBC	Vertical construction company

Combat Engineering Units

1-16. Baseline combat engineering units are focused on supporting combined arms operations at the tactical level and are designed to participate in close combat operations as necessary. All have the capability to fight as engineers or, if required, as infantry. An engineer battalion headquarters is typically included to provide the necessary C2, logistics, and staff supervision for attached and assigned units when two or more are assigned to a BCT. Sapper units may construct tactical obstacles, defensive positions, and fixed and float bridges; repair command posts (CPs), lines of communication (LOCs), tactical routes, culverts, and fords; and conduct other selected general (horizontal and vertical, construction-related) engineering tasks. Combat engineering units also provide engineer support for gap- and 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 baseline Sapper companies to allow them to accomplish their broader mission requirements.

General Engineering Units

1-17. General engineering 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, main supply routes (MSRs), supply locations, 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 significantly expanded. Through the augmentation of specialized personnel and equipment, these baseline construction units can provide bituminous mixing and paving, quarry and crushing operations, and major horizontal construction projects (highways, storage facilities, airfields). Additional augmentation could also include pipeline construction or dive support depending on the type and scope of the construction mission.

SPECIALIZED ENGINEERING UNITS

1-18. Specialized engineering units are a variety of typically low-density engineer forces that provide the remaining category of engineer support. They are technically focused units that provide selected support at the tactical level. These specialized forces include modules for construction support, infrastructure development, EH mitigation, mine detection dogs, geospatial support, well drilling, real estate management, and firefighting.

OTHER ENGINEER CAPABILITIES

1-19. Each Service has baseline engineering units and capabilities that stem from their traditional roles and associations to meet specific operational needs and to support accomplishing a variety of mission requirements in any OE. Multinational, interagency, nongovernmental organization (NGO), and intergovernmental organization engineer capabilities can be a valuable addition to U.S. military engineer forces. Host nation (HN), multinational, and U.S. civilian contractors may possess certain engineering capabilities specifically adapted to the local environment (in addition to providing labor, material, infrastructure, and services).

1-20. There are other benefits to using multinational, HN, and U.S. contractors, but they must be weighed against their potential limitations. HN engineer capabilities may be available if an adequate infrastructure exists. This could potentially include a wide array of civil and public works organizations. It is also increasingly common to contract for a wide range of engineer services with local or third party national organizations and civilian contractors. These assets are typically used to free up military assets, minimizing the military footprint in a theater, when requirements exceed military capabilities or when the engineer operations and requirements are to be conducted in areas that are relatively safe from active combat. (See FM 3-34, appendix D, for more information on other multinational, interagency, and HN engineer capabilities.)

1-21. The engineering capabilities of each Service component may provide engineering support to the other components to meet joint force requirements. (See FM 3-34, appendix C, and JP 3-34 for more information on other Service engineer capabilities.) A brief summary of other Service engineer capabilities are in the following paragraphs.

Navy Engineers

1-22. Navy construction battalion engineers, organized under the NCF, have rapidly deployable general engineering units of various sizes and configurations, tailored to provide responsiveness and flexibility. Seabees provide advanced base construction (airfields, LOCs, upgrade and maintenance, battle damage repair, underwater and amphibious structures, and logistic facilities). Navy engineers also provide engineering support to the Marines at various levels, including functioning as a major subordinate command to a Marine air-ground task force (MAGTF). The Navy does not have combat engineers.

Marine Corps Engineers

1-23. The Marine Corps engineer's primary tasking is combat engineering and limited general engineering in support of MAGTFs. The Marine Corps has limited geospatial engineering capabilities, which reside in the intelligence branch of the Marine Corps, with one topographic platoon supporting each Marine expeditionary force (MEF).

Air Force Engineers

1-24. A primary tasking for Air Force engineers is enabling rapid global mobility for airlift, bombers, and fighters and supporting other manned and unmanned aerial weapon systems. Air Force engineers are trained and equipped with organic capabilities to support all aspects of airfield operations where heavy strategic airlift, bombers, or fighters operate on a daily or frequent basis. The Air Force has the capability to rapidly deploy general engineering units organized as part of an air and space expeditionary task force to open, establish, and maintain airbase power projection platforms. These same units can deploy as detached units operating in support of specific missions and operational tasks (airfield pavement evaluations, crash and fire rescue, EOD, emergency management response, airfield damage repair, facility construction and maintenance, utility systems construction and maintenance, aircraft arresting system installation and maintenance, airfield lighting and marking, and navigation aid installation. Organized as Prime BEEF and RED HORSE units, they provide a broad array of general and geospatial engineering capabilities.

OPERATIONS

1-25. Commanders visualize and direct operations through the warfighting functions. The warfighting functions provide engineers with a common framework to link the required engineer capabilities to the synchronized application of combined arms. Broadly categorizing engineer capabilities into engineer functions enables a clear linkage to the warfighting functions and facilitates engineer planners in integrating engineer operations into the BCT.

FUNCTIONS

1-26. *Engineer functions* are categories of related engineer capabilities and activities grouped together to help joint force commanders integrate, synchronize, and direct engineer operations. The three engineer functions are combat, general, and geospatial engineering. (FM 3-34) These engineer functions are useful in describing the various engineer capabilities in support of the spectrum of conflict. (See table 1-2.)

Table 1-2. Traditional engineer support capabilities

Task	*Actions Involved*
Combat Engineering	Mobility Breaching Clearing Bridging Countermobility Emplacing or reinforcing obstacles Survivability Fighting positions Protective positions CCD
General Engineering	General construction Reinforcement of combat engineering tasks
Geospatial Engineering	Mapping Terrain analysis

Combat Engineering

1-27. *Combat engineering* is defined as those engineering capabilities and activities that support the maneuver of land combat forces and require close support. Combat engineering consists of three types of capabilities and activities—M/CM/S. (JP 3-34) Combat engineering is an integral part of a combined arms unit's ability to maneuver. It is focused on support of close combat forces. (See FM 3-34, chapter 3, for further discussion of M/CM/S operations.) Combat engineering includes those capabilities organic to and augmenting the BCTs. Combat engineering provides tactical-level engineer support to combat (offense and defense), stability, or civil support operations. It may be augmented at times with general engineering support, but retains its focus on the integrated application of engineer capabilities to support the combined arms unit's freedom of maneuver (mobility and countermobility) and protection (survivability). Combat engineering is typically associated with close combat operations, while general engineering is not.

1-28. *Mobility operations* are defined as obstacle reduction by maneuver and engineer units to reduce or negate the effects of existing or reinforcing obstacles. The objective is to maintain the freedom of movement for maneuver units, weapon systems, and critical supplies. (FM 3-34) For combat engineering, it is focused on the movement and maneuver warfighting function. (See FM 3-34.2 for information on combined arms mobility operations, FM 3-90.12 for the specifics of combined arms gap crossing operations, FM 3-90.119 for the specifics of combined arms IED defeat operations, and FM 3-34.210 for the specifics of EH and military search operations).

1-29. *Countermobility operations* are defined as operations that deny the enemy the freedom of maneuver through the employment of reinforcing obstacles. (FM 3-34) Countermobility also includes the construction of entry control points and other barriers to deny free access to fixed sites. The primary purpose of countermobility operations is to slow or divert the enemy, increase the time for target acquisition, and increase weapon effectiveness. Countermobility operations block, fix, turn, or disrupt the enemy's ability to maneuver, giving the commander opportunities to exploit enemy vulnerabilities or react effectively to enemy actions. Countermobility must include proper obstacle integration with the maneuver plan, adherence to obstacle emplacement authority, and rigid obstacle control.

1-30. *Survivability operations* are defined as the development and construction of protective positions (earth berms, dug-in positions, overhead protection, countersurveillance means) to reduce the effectiveness of enemy weapon systems. (FM 3-34) Survivability considerations are applied in support of battle positions (BPs), combat outposts, base camps and, in many cases, HN and other infrastructure support. Two key factors in the development of defensive fighting positions are—

- Proper siting in relation to the surrounding terrain.
- Proper siting for the most effective employment of weapon systems.

1-31. Defensive protective positions may include—

- C2 facilities and critical equipment (to include radars).
- Supply and ammunition storage or holding areas.
- Other items that are likely to be targeted first by enemy action.

Note. See FM 5-103 for more information on survivability operations.

General Engineering

1-32. *General engineering* is defined as those engineering capabilities and activities (other than combat engineering) that modify, maintain, or protect the physical environment. Examples include—

- Infrastructure, facility, LOC, and base—
  - Construction.
  - Repair.
  - Maintenance.
  - Operation.
- Terrain modification and repair.
- Selected explosive hazard activities.

Note. See FM 3-34, FM 3-34.400, FM 3-100.4, FM 7-15, and JP 3-34 for additional information on general engineering.

1-33. General engineering capabilities are not organic to the BCTs, and general engineering tasks are not typically associated with close combat, which is the focus for combat engineers. However, general engineering tasks may be performed in support of combat operations. While general engineering is typically performed by general engineers, selected general engineering tasks may also be performed by combat engineers.

Geospatial Engineering

1-34. *Geospatial engineering* is defined as the art and science of applying geospatial information to enable understanding of the physical environment for military operations. The art is the ability to understand METT-TC and the geospatial information available, including intent of use and limitations, in order to explain the military significance of the terrain to the commander and staff and create geospatial products for decisionmaking; the science is the ability to exploit geospatial information, producing spatially accurate products for measurement, mapping, visualization, modeling, and all types of analysis of the terrain. (FM 3-34)

1-35. Engineer planners are charged to be terrain visualization experts and advise commanders on how to conceptualize the OE. They must be supported by terrain analysts to fully assist others in using terrain more effectively. Integrating geospatial support within the BCT is discussed in chapter 2. (See FM 3-34.230 and JP 2-03 for more information on geospatial support to Army and joint systems.)

COMBAT POWER

1-36. As stated in FM 3-0, Army forces generate combat power by converting fighting potential into effect action. Commanders apply combat power through the warfighting functions using leadership and information. To effectively support the combined arms team, engineer capabilities are organized by the engineer functions and synchronized in their application through the warfighting functions. The engineer functions are generally aligned in support of specific warfighting functions (see figure 1-1), although they have impact on and across the others. Combat engineering is primarily aligned with movement and maneuver and protection functions, general engineering focuses its support on sustainment and protection functions, and geospatial engineering is primarily aligned with C2 and intelligence functions. (See FM 3-34, chapter 3.)

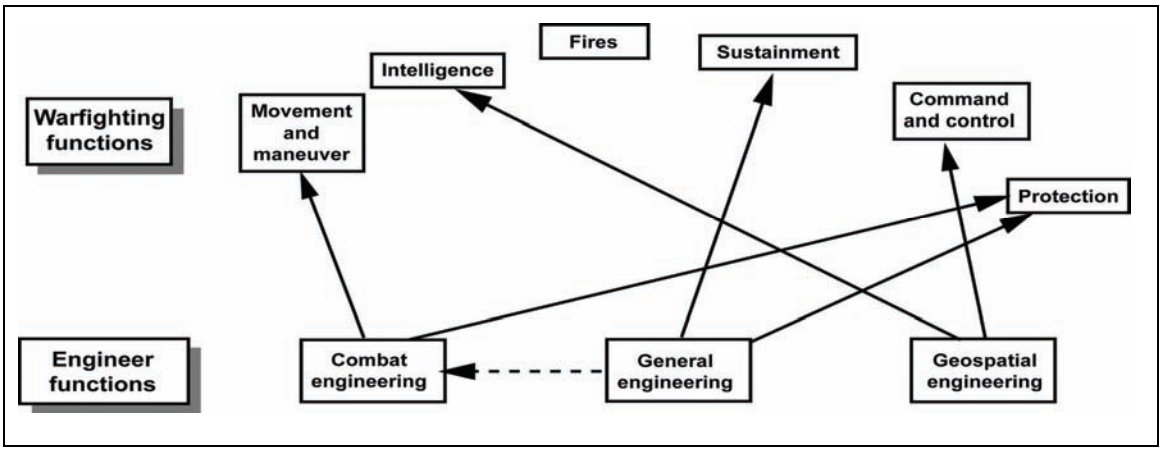


Figure 1-1. The primary relationships of engineer functions to warfighting functions

Movement and Maneuver

1-37. The warfighting function of movement and maneuver is the related tasks and systems that move forces to achieve a position of advantage in relation to the enemy. It includes those tasks associated with projecting, protecting, and employing forces. Maneuver is the means by which commanders mass the effects of combat power to achieve surprise, shock, and momentum. Movement is necessary to support that function and assure the protection, dispersion, and displacement of the force as a whole. The use of tempo and coordination with fires are indispensable to effective maneuver. The movement and maneuver warfighting function includes the following tasks:

- Deploy.
- Maneuver.
- Move.
- Conduct mobility and countermobility operations.
- Employ direct fires.
- Occupy an area.
- Employ battlefield obscuration.

Combat Engineering

1-38. Combat engineering support applied through the movement and maneuver warfighting function includes mobility operations (see FM 3-34.2) and countermobility operations (see FM 90-7 [to be revised as FM 3-90.13]). Mobility operations include the following tasks:

- Overcome barriers, obstacles, and mines.
  - Conduct breaching operations.
  - Conduct clearing operations.
  - Conduct gap-crossing operations (see FM 3-90.12).
- Enhance movement and maneuver.
  - Construct and maintain combat roads and trails.
  - Construct and maintain forward airfields and landing zones (LZs).
- Negotiate a tactical AO.
- Provide diver support.

1-39. Countermobility operations include the following tasks:

- Site obstacles.
- Construct, emplace, or detonate obstacles.
- Mark, report, and record obstacles.
- Maintain obstacle integration.

1-40. Combat engineers fight alongside maneuver units with a focus on close combat. When conducting combat operations, they must be prepared to fight as engineers; employing their combat skills, using fire and maneuver to accomplish the engineer mission. Consequently, all combat engineers are organized, trained, and equipped to fight as engineers to destroy the enemy in addition to their primary responsibility of combat engineering.

1-41. Combat engineers are organized, trained, and equipped to engage as engineers in close combat to accomplish the engineer missions and—

- Support a movement to contact or attack as part of a maneuver formation to accomplish the mission.
- Fight as the breach force during BCT combined arms breaching operations.
- Assist the supported organization to defeat an unexpected attack.
- Protect a critical demolition target that must remain passable until friendly forces are able to withdraw.
- Maintain security at a work site.
- Protect themselves in an assembly area or on the march.

1-42. During combat operations, combat engineering units are task-organized with maneuver units and are integrated into the combined arms formation. The engineer unit is designed to provide demolition, breaching, and hasty gap-crossing capabilities to the combined arms team. The engineer unit can also employ direct-fire weapons systems to aid in employing demolitions and breaching assets. A combat engineer organization is capable of executing infantry tasks or task organizing to fight as infantry with other combat units. However, engineers have organizational deficiencies that include a lack of organic fire control personnel, communications equipment, and medical personnel. If an engineer battalion has been redesignated to fight as infantry (a maneuver unit), it typically must be retask organized. These reorganized engineers require the same support and potentially the integration of other maneuver elements (armor, fire support [FS]) into its task organization to accomplish its mission.

1-43. Any commander who commands combat engineers has the authority to employ them as infantry, unless otherwise reserved. However, a commander must carefully weigh the gain in infantry strength against the loss of engineer support. Engineers provide far more combat power in their primary mission than when configured as infantry. Stopping the engineer work may reduce the combat power of an entire force.

1-44. An emergency or immediate requirement for infantry may not require reorganization as engineers are simply committed to the fight, to fight as engineers, and understanding their limitations. Reorganization occurs when time allows, moving unneeded engineer elements and equipment from the battlefield and augmenting the engineer structure with additional capabilities. A commander normally considers reorganizing when forecasting a shortage of infantry before a future operation or phase of an operation. The commander makes a decision after weighing METT-TC factors and determining an acceptable risk level. Reorganizing engineer units as infantry requires resources, time, and training.

General Engineering

1-45. Support to movement and maneuver includes the support of tasks exceeding the capability of the combat engineering force and more extensive upgrades or new construction of LOCs (see FM 3-34.400). General engineering support is typically applied through the sustainment warfighting function, but may include many of the following tasks that also crossover to support movement and maneuver:

- Construct and maintain combat roads and trails exceeding the capability of combat engineering assets.
- Provide forward aviation combat engineering (FACE) exceeding the capabilities of combat engineering assets, to include the repair of paved, asphalt, and concrete runways and airfields.
- Install assets that prevent foreign object damage (FOD) to rotary-wing aircraft.
- Construct tactical and LOC bridging.

Intelligence

1-46. The warfighting function is the related tasks and systems that facilitate the understanding of the OE, enemy, terrain, and civil considerations. Commanders make decisions and direct actions based on their situational understanding (SU). They keep their SU current by continuously assessing the situation and stating the information they need in the commander's critical information requirements (CCIR). The required information is obtained through various detection methods and systematic observation, reconnaissance, and surveillance. (See chapter 3 for engineer support to ISR operations.)

1-47. Engineer capabilities can be employed during key activities in the operations process to add to the commander's SU. Engineers play a major role in the intelligence preparation of the battlefield (IPB) process by anticipating and providing terrain analysis products of likely contingency areas. Geospatial support assists in describing the effects of the OE on enemy and friendly capabilities and broad COAs.

1-48. Engineer reconnaissance (see chapter 3) can provide data that contributes to answering the CCIR. Most tactical engineer reconnaissance capabilities enable the collection of technical information in support of the combat engineering function. Reconnaissance in support of M/CM/S operations is conducted primarily by ERTs comprised of combat engineers and focuses on the collection of tactical and technical information to support the BCT freedom of maneuver and protection of friendly forces and facilities. FM 3-34.170 provides a detailed discussion of reconnaissance support for the five areas of mobility operations, obstacle integration and turnover in countermobility operations, fighting and other protective positions, and other tactical operations in the BCT.

Fires

1-49. The fires warfighting function is the related tasks and systems that provide collective and coordinated use of Army indirect fires, joint fires, and C2 warfare through the targeting process. It includes tasks associated with integrating and synchronizing the effects of these types of fires with the effects of other warfighting functions. Lethal and nonlethal fires (including C2 warfare) are integrated in to the concept of operations during planning and targeting, based on the targeting guidance. Engineer operations contribute significant combat power (lethal and nonlethal) to all elements of full spectrum operations. (Engineer participation in the targeting process for the use of lethal and nonlethal fires is discussed in chapter 5.)

Sustainment

1-50. Sustainment is the provision of logistics, personnel services, and health service support (HSS) necessary to maintain and prolong operations until mission accomplishment. The sustainment warfighting function is the related tasks and systems that provide support and services to ensure the freedom of action, extend operational reach, and prolong endurance. The endurance of Army forces is primarily a function of their sustainment. Sustainment determines the depth to which Army forces can conduct decisive operations, allowing the commander to seize, retain, and exploit the initiative.

1-51. General engineering applications are predominantly linked through major task categories and reside in logistics support within warfighting functions. As already discussed, general engineering support can also be applied in support of combat engineering applications and has linkages across the movement and maneuver and protection warfighting functions. General engineering support to sustainment (see FM 3-34.400) includes the following tasks:

- Restore damaged areas.
- Construct and maintain sustainment LOCs, including constructing and maintaining—
  - Roads and highways.
  - Over-the-shore facilities.
  - Ports.
  - Railroad facilities.
  - Airfield facilities.
  - Pipelines and bulk fuel storage facilities (tank farms).
  - Standard and nonstandard fixed bridges.
- Provide engineer construction support.
- Supply mobile electric power.
- Provide facilities engineering support, including—
  - Waste management.
  - Real estate acquisition, management, and disposition.
  - Firefighting.
  - Base and installation construction, management, and maintenance.

Command and Control

1-52. The warfighting function is the related tasks and systems that support commanders in exercising authority and direction. It includes those task associated with acquiring friendly information, managing RI, and directing and leading subordinates. Geospatial engineers provide the foundation for the COP; giving the commander a clear understanding of the physical environment by enabling visualization of the terrain and explaining its impact on friendly and enemy operations. (Controlling engineer operations and the engineer's participation in the supported BCT commander's C2 is discussed in chapter 2.)

Protection

1-53. The protection warfighting function is the related tasks and systems that preserve the force so that the commander can apply maximum combat power (see FM 3-0). Preserving the force includes protecting personnel (combatant and noncombatant), physical assets, and information about the U.S. and multinational partners. The protection warfighting function facilitates the ability of the commander to maintain the integrity and combat power of the deploying force. Protection determines the degree to which potential threats can disrupt operations. Protection efforts begin during preparation and continue throughout the duration of the operation. Within the AO, the application of the protection warfighting function integrates protection capabilities within the force to safeguard bases, secure routes, and protect forces. The protection warfighting function includes the following tasks:

- Air and missile defense.
- Personnel recovery.

- Information protection.
- Fratricide avoidance.
- Operational area security.
- Antiterrorism.
- Survivability.
- Force health protection.
- Chemical, biological, radiological, and nuclear (CBRN) operations.
- Safety.
- Operations security.
- EOD.

1-54. Engineers have unique equipment and personnel capabilities that can be used to support protection efforts. Combat engineers, supported by general engineering capabilities when required, provide selected survivability operations (see FM 5-103) through the protection warfighting function. Survivability operations also include camouflage, concealment, and deception (CCD) support to tactical ground maneuver forces. Combat engineers typically provide "lower-end hardening" and CCD support, while general engineering support is focused on those aspects that are not involved with close combat. General engineering support is also applied through the protection warfighting function to control pollution and hazardous materials (HM). Survivability operations include the following engineer tasks:

- Protect against enemy hazards within the AO.
  - Construct vehicle fighting positions, crew-served weapon fighting positions, or individual fighting positions.
  - Construct protective earth walls, berms, and revetments; or construct vehicle, information systems, equipment, and material protective positions.
  - Employ protective equipment such as vehicle crash barriers and security fences.
  - Install bridge protective devices for an existing float bridge or river-crossing site to protect against waterborne demolition teams, floating mines, or floating debris.
  - Install or remove protective obstacles.
- Conduct actions to control pollution and HM (see FM 3-100.4).

1-55. When conducting stability operations or civil support operations, survivability remains a key concern. Although the likelihood of combat operations is reduced, key resources and personnel remain vulnerable to other types of hostile action or attack. Commanders must consider protecting vital resources such as fuel sites, logistics convoys, logistics support areas, and forward operating bases (FOBs), since the entire AO has an equal potential for enemy attack. Therefore, the priority of work for construction assets is more focused on protecting these types of resources than constructing fighting positions for combat vehicles or crew-served weapons. Engineers also employ protective obstacles as a key tool in protecting these important assets and locations. Protective obstacles range from tetrahedrons and concrete barriers to networked munitions. Physical barriers provide relatively inexpensive, inflexible protection capability. Networked munitions, with their built-in sensor capabilities and central control over nonlethal and lethal fields, provide a flexible intrusion detection and denial system. Vital resources requiring protection may also include facilities critical to the civilian infrastructure such as key industrial sites, pipelines, water treatment plants, and government buildings.

TEAM STAFF AND ORGANIZATION

1-56. BCT staff sections are organized into functional and integrating cells (see figure 1-2). This organization may vary depending on the mission assigned to the BCT. (See FM 3-90.6 for more detailed information.) The BCT staff usually organizes the following six functional cells:

- Sustainment.
- Intelligence.
- Operations.

- Network operations.
- Information operations (IO).
- Civil affairs (CA) operations.

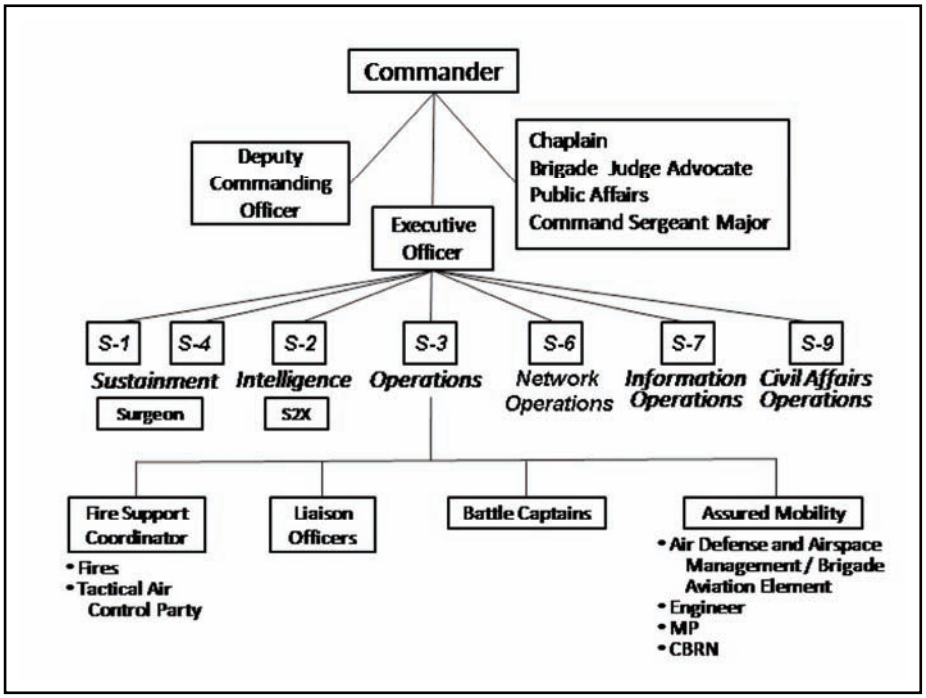


Figure 1-2. BCT staff organization

Assured Mobility Section

1-57. The assured mobility section is an integration cell that can include the air defense artillery (ADA) officer, engineer coordinator (ENCOORD), provost marshal (PM), CBRN officer, EOD officer, and other staff members when configured in the BCT. An assured mobility section leader is normally designated to coordinate section actions and is usually the senior officer of the represented staff members. The purpose of the assured mobility section is to coordinate all tasks associated with M/CM/S throughout the BCT AO in coordination with the BCT operations cell. The exact organization and configuration of the assured mobility section may vary, as can the roles and responsibilities of its members, and should be prescribed in the unit standing operating procedure (SOP). (The integration of assured mobility within the BCT is discussed in chapter 2.)

Engineer Coordinator

1-58. The *ENCOORD* is the special staff officer (usually the senior engineer officer on the staff) responsible for coordinating engineer assets and operations for the command. (FM 3-34) When an organic engineer staff does not exist at the maneuver battalion level, the ENCOORD is the senior engineer supporting that unit. When an engineer battalion is task-organized in support of a BCT, the BCT commander determines if a change will occur in ENCOORD designation. The ENCOORD is normally located in the main CP, but may be located within the tactical CP based on METT-TC analysis. (See FM 3-34.)

1-59. The ENCOORD's primary duty is to coordinate engineer operations in support of the combined arms operation. The ENCOORD must understand the full array of engineer capabilities (combat, general, and geospatial engineering) available to the force and synchronize them to best meet the needs of the maneuver commander. The ENCOORD integrates specified and implied engineer tasks into the maneuver unit plan

and ensures that supporting engineer units are integrated into mission planning, preparation, execution, and assessment activities. Regardless of task organization, the ENCOORD is responsible for the functional control (through the maneuver commander) of all engineer units supporting the maneuver unit. In conducting engineer operations, the ENCOORD plans, prepares, executes, and assesses.

1-60. When planning for operations, the ENCOORD—

- Assists the intelligence staff officer (S-2) with the IPB (including information from the preparation of the engineer running estimate).
- Determines and evaluates critical aspects of the engineer situation.
- Formulates ideas for engineer support to meet the maneuver commander's intent.
- Decides what engineer missions must be accomplished to support current and future operations.
- Integrates geospatial products into the planning process to explain the military significance of the terrain to the commander and staff and to support decisionmaking.
- Advises the commander on using organic and nonorganic engineer assets, employing and reducing obstacles, and employing engineer reconnaissance.
- Identifies any support requirements for EAB engineer and other related assets.
- Makes the maneuver commander aware of the capabilities, limitations, and employment considerations of supporting engineers and related assets.
- Develops a scheme of engineer operations concurrent with the maneuver COAs.
- Recommends the engineer priorities of effort and support, essential tasks for M/CM/S, and acceptable mission risks to the commander.
- Recommends the engineer organization for combat.
- Visualizes the future state of engineer operations within the supported maneuver unit.
- Integrates the engineer functions of combat, general, and geospatial engineering into the supported maneuver unit's future plans.

1-61. When preparing for operations, the ENCOORD—

- Trains the engineer cell located within the main CP.
- Issues timely instructions and orders to subordinate engineer units through the maneuver unit base order to simplify preparation and integration and develops the necessary input to maneuver unit orders, annexes, and engineer unit orders (as required).
- Coordinates the production and distribution of maps and terrain products.
- Recommends intelligence requirements to the S-2 through the operations staff officer (S-3).
- Participates in the targeting process.
- Participates in appropriate working groups.
- Plans and coordinates with the fires cell (FC) on the integration of obstacles and fires.
- Recommends MSRs and logistics areas to the logistics staff officer (S-4) based on technical information.
- Coordinates with the appropriate S-4 for additional resources to support the M/CM/S effort.
- Coordinates with the maneuver unit S-4 to support base camp, facilities, and other sustainment-related construction requirements.
- Advises the commander on environmental issues, coordinates with other staff members to determine the impact of operations on the environment, and helps the commander integrate environmental considerations into decisionmaking.
- Recommends when engineer diver support may facilitate specific engineer reconnaissance in support of the maneuver unit's mission.
- Ensures that EOD is integrated into operations.

1-62. When executing operations, the ENCOORD—

- Alters the engineer plan using the feedback received from subordinate maneuver and engineer units as required.
- Provides information on the status of engineer assets on hand.
- Makes time-sensitive recommendations on requests for immediate engineer support received from subordinate units and implements decisions.

1-63. When assessing operations, the ENCOORD—

- Tracks all planned and known obstacles, scatterable mines (SCATMINEs), the survivability status, the route status, engineer missions, and any other engineer-specific information.
- Establishes and maintains a continuous, open link among engineer cells, ENCOORDs, and (when applicable) supporting engineer CPs.
- Uses the running estimate and the continuous link with the supporting engineer staffs and units to compute resource and force requirements and recommend engineer task organization.
- Monitors the execution of engineer orders and instructions by tracking current operations.
- Uses reports from engineer units to measure and analyze engineer performance and anticipate change and unforeseen requirements.

Chapter 2
Integration of Engineer Operations

The instruments of battle are valuable only if one knows how to use them.

—Colonel Ardant du Picq

Engineers are challenged when trying to execute engineering tasks in today's OE. Force modularity, the application of engineer force tailoring, and limited engineer resources require flexible task organization and the ability of engineers to rapidly transition within the AO to meet mission requirements. Commanders and planners must understand this setting and the inherent C2 challenges they face in integrating engineer operations. This chapter centers on engineer participation in the supported BCT commander's C2 and applies to organic and augmenting engineer unit commanders and planners. This chapter discusses planning (which is part of C2) and provides considerations for engineers as integrated members of the combined arms team. The construct and format for essential tasks for M/CM/S and the engineer staff running estimate are highlighted to assist engineer planners in integrating engineer operations. Finally, this chapter provides an overview of integrating processes and continuing activities and their contribution to the overall operations process.

COMMAND AND CONTROL

2-1. Limited engineer resources are a predominant factor in the OE. Careful prioritization and allocation of resources must occur to accomplish objectives. Because engineer assets are mission-tailored and allocated against specific requirements, engineers must be able to rapidly transition between phases of the operation and shifted throughout the AO to meet mission requirements. Effective C2 of engineer units is paramount.

2-2. FM 6-0 provides Army doctrine for C2 and are interrelated. Command resides with commanders; it consists of authority, decisionmaking, and leadership. Control is how commanders execute command; it resides with both commanders and staffs. Commanders cannot exercise command effectively without control. Conversely, control has no purpose without command to focus it.

2-3. In the past, engineer commanders supporting combined arms operations were always confronted with the dichotomy of exercising C2 responsibilities over their units, while fulfilling their role in supporting the maneuver commander's C2 of the unit. Engineer leaders today are more challenged in ensuring effective C2 of engineer units given the requisite task organization of engineer forces (organic and augmenting) within the construct of the modular Army. Engineer unit commanders and planners must work together to ensure the effective control of engineer operations to facilitate their complete integration into combined arms operations. Command and support relationships are the basis for building task organization and provide the basis for ensuring the unity of command and unity of effort in operations. (See FM 3-0 for more information on command and support relationships.)

COMMAND AND SUPPORT RELATIONSHIPS

2-4. Additional engineer units augmenting the BCT are task-organized to the BCT in a command or support relationship, depending on the mission requirements. Those units and engineer units organic to the BCT may also be task-organized to a maneuver TF or the reconnaissance squadron (RS) or be subordinate to a company or troop. Command relationships prescribe the supporting engineer unit chain of command

and the degree of control that the gaining or supported commander exercises over the unit. Support relationships define the manner of support that the supporting engineer unit provides (see table 2-1).

Table 2-1. Command and support relationships

An engineer element with a/an—	*Commanded by the—*	*Maintains liaison and communications with the—*	*May be task-organized by the—*	*Can be—*	*Responds to support requests from the—*	*Has work priority established by the—*	*Forwards requests for additional support through the—*	*Receives sustainment from the—*	*Sends reports to the—*
Attached relationship	Gaining unit	Gaining unit	Gaining unit	Further attached, OPCON, or DS to divisions, brigades, or TFs or retained GS	Gaining unit	Gaining unit	Gaining unit	Gaining unit	Gaining unit and information to parent unit
OPCON relationship	Gaining unit	Gaining unit and parent unit	Gaining unit	Placed OPCON to other engineer or maneuver units; DS to divisions, brigades, or TFs; or retained GS	Gaining unit	Gaining unit	Gaining unit	Parent unit	Gaining unit and information to parent unit
DS relationship	Parent unit	Supported unit and parent unit	Parent unit	Dedicated support to a particular unit and may be given task or area assignments	Supported unit	Supported unit	Parent unit	Parent unit	Supported unit and information to parent unit
GS relationship	Parent unit	Parent unit as required	Parent unit	Used only to support the supported force as a whole and may be given task or area assignments	Parent unit	Parent unit	Parent unit	Parent unit	Parent unit

Note. Regardless of the type of relationship, engineer units working in a BCT AO must coordinate through the BCT ENCOORD.

2-5. Many factors are considered when task-organizing units and determining the appropriate command or support relationships. A major determining factor is the expected longevity of the relationship with the headquarters involved. The type of operation is also a factor, which is described further under Planning Considerations, paragraph 2-19. Another important factor is based on variances in unit organizations, with an aim to leverage existing C2 structures. The C2 structure for the organic engineer company in each of the BCTs varies. Within the IBCT and HBCT, the organic engineer company is under the C2 of the BSTB and this battalion level headquarters is able to provide C2 for most engineer augmentation to the BCT, short of an engineer battalion. The situation in the SBCT and ACR is significantly different because its organic engineer company is a separate element under the SBCT or regimental headquarters without a BSTB to function in the role of a C2 headquarters for engineer augmentation. In this instance, the C2 for augmenting engineer elements may require special consideration by engineer planners. In certain situations, the augmentation of a BCT by a task-organized engineer battalion TF provides the necessary, additional C2 to orchestrate engineer operations and support, but even this does not address a lack of an organic TF engineer cell in many of the maneuver battalions and the RS of the BCTs.

2-6. Command relationships define superior and subordinate relationships between unit commanders. A command relationship over engineer units allows maneuver commanders the ability to optimize subordinate forces with maximum flexibility. Command relationships can be designated as attached or operational control (OPCON). Attached engineer units are temporarily associated with the gaining unit and return to their parent unit when the reason for the attachment ends. Engineer units are normally assigned OPCON to a gaining unit for a given mission, lasting perhaps a few days. In both attached and OPCON relationships, the augmenting engineer unit is tasked and provided priorities by the gaining unit. In an OPCON relationship, all logistical support comes from the parent unit unless coordinated otherwise; however, the gaining unit usually furnishes Class IV and V barrier materials. The OPCON relationship is appropriate when the gaining unit needs task organization authority over the supporting unit and there is a need for the parent unit to remain responsible for providing logistical support or to minimize the impact on the gaining unit's sustainment infrastructure.

2-7. Commanders establish support relationships when subordination of one unit to another is inappropriate; typically when maximum flexibility is needed to rapidly move key engineer capabilities between multiple units. All command, administrative, and logistical responsibilities remain with the parent unit in a support relationship. The parent unit commander organizes the unit and allocates tasks in a manner that most effectively meets the needs of the supported commander. Support relationships are graduated from a supporting relationship between two units (direct support [DS])) to a broad level of support extended to all units under the control of the higher headquarters (general support [GS]). In a DS relationship, the supporting unit answers directly to the supported commander's request for support. A DS relationship is typically used when it is anticipated that a change to the engineer task organization may require frequent shifting of an engineer unit to multiple locations. In a GS relationship, the supporting unit receives all missions and support from its parent unit and the supporting unit aids the unit as a whole and not as any particular part or subdivision. A GS relationship is appropriate when central control and flexibility in employing limited engineer forces is required. Engineers in sustainment areas are typically employed using a GS relationship.

CONTROL OF ENGINEER OPERATIONS

2-8. *Control* is the regulation of forces and warfighting functions to accomplish the mission according to the commander's intent. (FM 3-0) The primary function of the staff is to help the commander and subordinate commanders exercise control. Control includes information management (IM) (the provision of RI to the right person, at the right time, in a usable form, to facilitate SU and decisionmaking). IM uses procedures and information systems (INFOSYS) to collect, process, store, display, disseminate, and protect knowledge products, data, and information. (See FM 3-0.)

COMMAND POST FUNCTIONS

2-9. CPs are facilities for exercising C2. CP staff and equipment are arranged to facilitate coordination, the smooth exchange of information, and rapid decisionmaking. Well-designed CPs integrate command and staff efforts by matching CP manning, equipment, INFOSYS, and procedures against its internal layout and utilities. Organizing the CP into functional and integrating cells promotes efficiency and coordination. Figure 2-1 shows a typical BCT CP layout. CP configurations and layouts vary between units and echelons. Units establish detailed SOPs to standardize CP operations. These SOPs must be followed and revised throughout training to ensure CP efficiency and ease CP personnel training.

2-10. Most CP functions directly relate to assessing and directing current operations, planning future operations, or supporting the force. The five functions of a CP are—

- Developing and disseminating orders.
- Maintaining running estimates.
- Controlling operations.
- Assessing operations.
- Administrating.

2-11. In performing their functions, all CPs have the responsibility to conduct the following five basic functions of IM:

- Collect RI.
- Process information from data to knowledge.
- Store RI for timely retrieval to support C2.
- Display RI tailored for the needs of the user.
- Disseminate RI.

INFORMATION MANAGEMENT

2-12. Proper IM ensures that the commander receives the necessary information to make timely decisions. It consists of RI and INFOSYS. The commander must understand how to avoid potential information overload while developing SU. The development of well-structured SOPs can provide roles and responsibilities for staff sections and their members in collecting and processing RI and procedures to handle critical or exceptional information.

2-13. Because collection assets are limited, a method of prioritizing collection and processing is required. CCIR and intelligence requirements (IR) are the categories used to prioritize collection asset allocation and information processing within the C2 system.

RELEVANT INFORMATION

2-14. *RI* is all information of importance to commanders and staffs in the exercise of C2. (FM 3-0) The commander applies judgment to RI to reach SU. The potential volume of information provided to the commander could be overwhelming—adversely affecting sound and timely decisionmaking. Utilizing RI helps prevent information overload. The commander establishes CCIR to define RI to the staff.

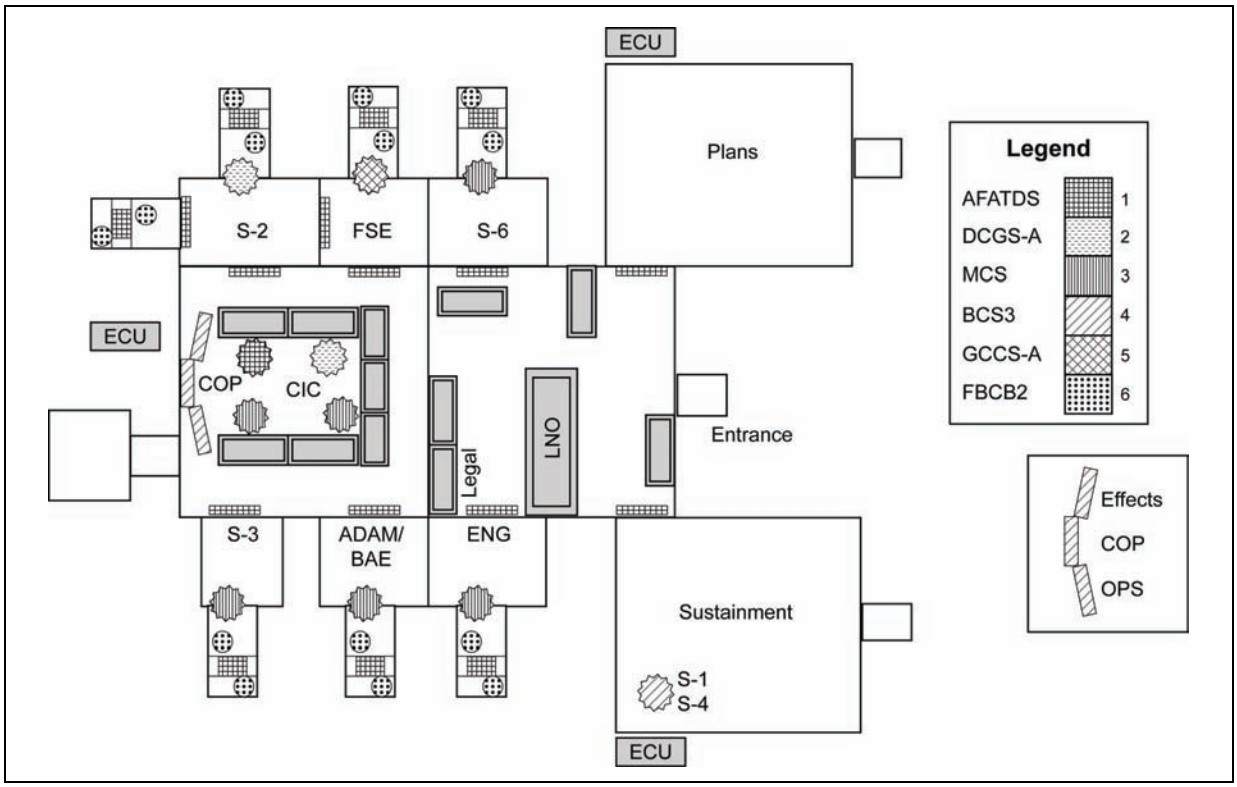


Figure 2-1. Typical BCT CP layout

COMMANDER'S CRITICAL INFORMATION REQUIREMENTS

2-15. The commander controls the flow and collection of critical information through establishing the CCIR. The CCIR consist of the following two components:

- **Priority intelligence requirements (PIR)**. *PIR* are intelligence requirements (stated as a priority for intelligence support) that the commander and staff need to understand the adversary or the operational environment. (JP 2-0)
- **Friendly forces information requirements (FFIR).** *FFIR* are information that the commander and staff need about the forces available for the operation. (FM 6-0)

BATTLE TRACKING

2-16. Battle tracking involves monitoring elements of the common operational picture (COP) that are tied to forecasted outcomes. Each engineer CP supporting the BCT (organic or augmenting) is responsible for tracking the progress of the tactical operation. Because organic engineer company parent organizations differ between the three types of BCTs, the information flow may differ also.

2-17. Engineer units augmenting a BCT are responsible for ensuring that their CP tracks engineer execution and passes the information to the supported unit CP and the next higher engineer organization or staff. When an engineer battalion is task-organized to a BCT, it gathers reports from its subordinate units and forwards them to the BCT, main CP, and ENCOORD.

2-18. Battle tracking for engineer forces includes, but is not limited to—

- Engineer unit locations and combat power (personnel, equipment, supplies).
- Status of CCIR.
- Obstacles planned and executed.
- Survivability preparations.

- Enemy obstacle locations.
- Breach sites and lanes.
- Condition of existing bridges.
- Condition of gap-crossing sites.
- Results of engineer reconnaissance.
- Barrier material availability and location.
- Key engineer Class V (mines, mine clearing line charge [MICLIC] loads, 25-millimeter ammunition, explosives) stock levels.

PLANNING CONSIDERATIONS

2-19. Engineer operations are complex, are resource-intensive (time, manpower, materiel), and require extensive and proactive coordination. The scope, complexity, and length of planning horizons are different at the operational and tactical levels. Tactical planning has the same clarity of purpose, but typically reflects a shorter planning horizon. Planning horizons (short-, mid-, and long-range) vary based on the type of operations. Planning too far into the future may overwhelm the capabilities of planning staffs, especially subordinate staffs. Not planning far enough ahead may result in losing the initiative and being unprepared. The commander must ensure that the staff is focused on the right planning horizon. In some cases, engineers may have to look farther out than their counterparts, based on budgeting constraints and construction timelines associated with engineering projects. Engineer operations must be directed and synchronized through planning as one of the critical activities in the operations process. Engineer planners in a combined arms headquarters must understand the planning processes described in FM 5-0 and become integral members of the planning staff during all phases of planning.

2-20. In planning engineer operations at every level, the ENCOORD should consider the following:

- **Speed.** Engineering tasks are resource-intensive in terms of time, manpower, and materiel. Practices that support speed include the utilization of existing facilities, standardization, simplicity of design and construction, bare-bases construction, and construction in phases.
- **Economy.** Engineering demands the 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 are used when possible. For example, forward airfields should be designed and located so that they can be expanded into more robust facilities.
- **Authority decentralization.** The dispersion of forces requires that engineer authority at a particular location must have authority consistent with responsibilities.
- **Priority establishment.** Priorities and resource allocation must be established to determine how much engineer effort should be devoted to a single task. All levels of command, beginning with the joint force commander, issue directives establishing broad priorities. Resources are initially assigned to the highest priority tasks, while low-priority tasks may be left unfinished while recognizing and mitigating the risk.

2-21. During offensive combat operations, task-organized engineer units tend to have command relationships to the supported unit. OPCON is the most common command relationship for engineers during offensive operations because it allows them to be responsive and provides the maneuver commander the greatest flexibility. Although the forms of offensive maneuver have different intentions, the planning phase must always begin with predicting enemy intent through a thorough understanding of the threat, engineer capabilities, and terrain effects. Geospatial products become the foundation and common reference for planning. Knowledge of the threat disposition is especially critical and required for an infiltration or penetration due to the requirements for stealth and surprise. Engineer planning tends to focus on mobility support (robust reconnaissance effort). A greater degree of planning is required for a penetration from the breach to the ultimate control of the decisive objective. (More planning considerations for offensive operations are discussed in chapter 6.)

2-22. During defensive combat operations, command or support relationships are considered based on the ability of the parent unit to C2 operations and the flexibility to shift key assets as needed. Planning for defensive operations is inextricably linked to offensive operations and, for planning purposes, must consider the transition from offensive operations and follow-on offensive operations. During defensive operations, engineers use geospatial products to determine the best locations for unit positions, engagement areas (EAs), and obstacles. Engineers apply their understanding of threat engineer capabilities and TTPs, while working with the intelligence staff to describe threat functions and predict where the threat is likely to attack. The ENCOORD works with other staff members to ensure that the counterattack force can maneuver and mass its effects on the enemy for decisive operations. The type of defensive operation defines the amount and focus of engineer effort required. An area defense typically requires a greater amount of effort due to increased survivability requirements. A mobile defense effort requires less effort (although mobility requirements may increase) because it has greater flexibility and takes advantage of the terrain in depth. (More planning considerations for defensive operations are discussed in chapter 6.)

2-23. In planning for stability operations, engineers consider the requirements necessary for the support of primary stability tasks. Engineer assessment of the OE focuses on different aspects of the terrain and friendly and threat capabilities. Terrain products continue to have a great deal of importance, but political and cultural considerations may be more important than strictly a combat terrain analysis. Terrain analysts work with the intelligence staff to develop usable products for the commander to reflect this information if it is available. When analyzing the troops available, the ENCOORD considers if there are HN, third party NGO, or other multinational forces involved with engineering capabilities. Interaction with these other parties requires engineers to address interoperability, common standards, and mutual agreements. Engineers should also plan for engineer units operating amongst civilians or in conjunction with NGOs and other international organizations.

2-24. Planning for civil support operations is significantly different from offense, defense, or stability operations because of the unique nature of the threat, although the basic missions may be very similar to those of stability operations. The threat is likely a natural or man-made disaster with unpredictable consequences. Additionally, planners must be aware of the number of statutes and regulations that restrict Army interaction with other government agencies (OGAs) and civilians during civil support operations. The local and state response normally leads the effort with a federal response providing support as required.

GEOSPATIAL SUPPORT

2-25. Engineer staffs are responsible for terrain analysis and visualization. In their role as terrain visualization experts, engineers advise maneuver commanders on ways to conceptualize the OE, which must be supported by terrain analysis. Terrain analysis is a key product of geospatial support. It is the study of terrain properties and how they change over time and under varying weather conditions. Terrain analysis starts with collection, verification, processing, revision, and construction of source data. It requires the analysis of climatology (current and forecasted weather conditions), soil conditions, and enemy or friendly vehicle performance metrics. Terrain analysis is a technical process and requires the expertise of geospatial information technicians and a geospatial engineer.

2-26. The geospatial engineer uses analysis and visualization capabilities to integrate people, processes, and tools, using multiple information sources and collaborative analysis to build a shared knowledge of the physical environment. In combination with other engineers and staff officers, the geospatial engineer provides support to the unit mission and commander's intent. (FM 3-34.230 and JP 2-03 are the primary references for geospatial engineering.)

2-27. All three types of BCTs have an organic geospatial engineering team that performs analysis, management, and dissemination of geospatial data and products in support of brigade planning, preparation, execution, and assessment. It maintains the brigade common topographic operating picture (CTOP) on the brigade server and provides updates to the brigade portion of the theater geospatial database (TGD). The team primarily supports the S-2 and S-3, but also supports other staff and subordinate units as directed. The team works with the intelligence staff to fuse intelligence and geospatial information into a

COP for the commander. The brigade level team is too small to provide continuous support to the S-2, but forms improvised geospatial intelligence (GEOINT) cells as necessary to support operations. The geospatial engineering team requires access to the classified tactical local area network (LAN) and Secret Internet Protocol Router Network (SIPRNET) to update and disseminate geospatial information and products. The geospatial engineering team has the capability to—

- Generate and analyze terrain data.
- Prepare decision graphics.
- Produce image maps.
- Provide three-dimensional (3-D) terrain perspective views.
- Manage the theater geospatial database.
- Update maps.
- Produce tactical decision aids.
- Produce IPB overlays.
- Operate on a 24-hour basis.

2-28. Geospatial engineering provides commanders with terrain analysis and visualization, which improves situational awareness (SA) and enhances decisionmaking during planning, preparation, execution, and assessment. Some example applications of tactical decision aids include—

- Promoting the timely development of the modified combined obstacle overlay (MCOO) during IPB to identify avenues of approach (AAs), mobility corridors, and choke points.
- Enhancing rehearsals with the use of 3-D fly-throughs or simulations.
- Facilitating the positioning and routing of ground and aerial surveillance assets through visibility analysis (intervisibility lines and flight line masking).

PARALLEL PLANNING

2-29. Commanders must ensure that plans are sent to subordinates in enough time to allow them to adequately plan and prepare their operations. Echelons plan in parallel as much as possible to accomplish plan and prepare their operations. Parallel planning is two or more echelons planning for the same operation nearly simultaneously. It is facilitated by continuous information sharing by higher headquarters with subordinate units concerning future operations. Parallel planning requires significant interaction between echelons. With parallel planning, subordinate units do not wait for their higher headquarters to publish an OPORD or operation plan (OPLAN) to begin their own planning and orders development process.

2-30. To facilitate effective parallel planning at the engineer unit level, engineer unit commanders and staff planners must—

- Understand the higher commander's intent and planning guidance.
- Analyze the terrain, obstacle intelligence (OBSTINTEL), and threat capabilities.
- Know engineer systems and capabilities to accomplish the identified tasks within the time allotted.
- Identify risks where engineer capabilities are limited or time is short and identify methods to mitigate the risks, ensuring that all potential reachback capabilities have been leveraged.
- Consider the depth of the AO and the transitions that occur among operational elements (integration of environmental considerations).
- Plan for the sustainment of engineer operations. Engineers ensure that all logistical requirements are analyzed and accounted for to the end state of the operation and resourced to accomplish the mission and facilitate future operations.

DISTRIBUTED PLANNING

2-31. Digital communications and INFOSYS allow staffs to execute planning without being arranged in a certain order. Distributed planning saves time and increases the accuracy of available information through using rapid voice and data transmissions throughout the AO. A prime example is USACE FFE that allows

engineers in the field to use TeleEngineering and other reachback capabilities to access nondeployed subject matter expertise that is in the USACE broad range of engineering service support.

COLLABORATIVE PLANNING

2-32. Collaborative planning is the real-time interaction among commanders and staffs at two or more echelons developing plans for a particular operation. This could be between an ENCOORD at a battalion TF or the BCT and an engineer battalion headquarters providing general engineering support in the BCT AO.

PLANNING PROCESS

2-33. As members of the combined arms staff, engineer planners must thoroughly understand the planning process and how they contribute during each phase. The military decision-making process (MDMP) can be rather complex and time-consuming with no shortcuts. The engineer planning staff must implement parallel and collaborative planning to leverage the information resources and planning support capacities of higher, adjacent, and subordinate engineer units. Managing information, focusing on obtaining RI, and preventing information overload are fundamental to effective planning.

MILITARY DECISION-MAKING PROCESS

2-34. The MDMP (and associated troop-leading procedures [TLPs]) is the doctrinal planning model that establishes procedures for analyzing a mission; developing, analyzing, and comparing COAs against each other; selecting the optimum COA; and producing a plan or order (see figure 2-2). TLPs are used at the company level and below. (See FM 5-0 for more detailed references to the MDMP and TLPs.)

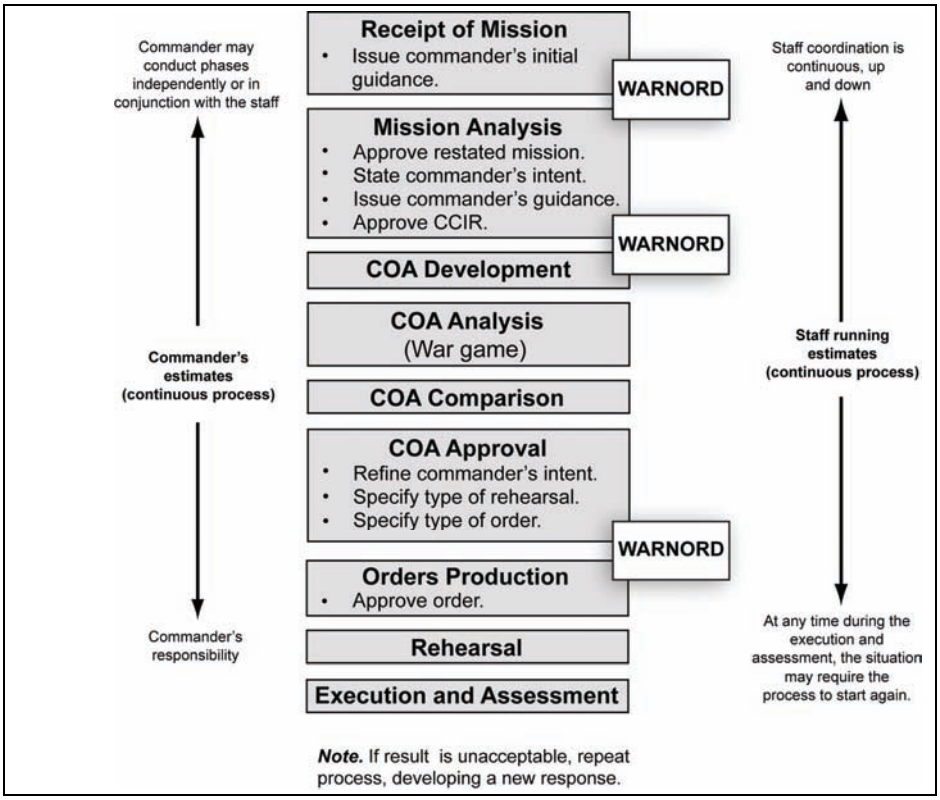


Figure 2-2. MDMP

2-35. As part of the combined arms team conducting the MDMP, engineer planners focus their efforts on specific considerations for each step of the process. Table 2-2 shows engineer considerations in relation to each step of the MDMP. The ENCOORD uses all members of the engineer cell to help accomplish the tasks. A planning SOP can be an effective method for delineating the various roles and responsibilities within the engineer planning staff.

Table 2-2. Engineer considerations in the MDMP

Steps	*Engineer Considerations*
Receipt of the mission	● Receive higher headquarters plans, orders, and annexes. ● Understand the unit mission and the commander's intent (two levels up). ● Understand the engineer mission, intent, and scheme of engineer operations (two levels up). ● Understand the higher echelon essential tasks for M/CM/S. ● Request geospatial information on the AO. ● Determine the availability of OBSTINTEL on existing obstacles.
Mission analysis	● Identify specified and implied tasks for M/CM/S, and develop a recommended list of essential tasks for M/CM/S (for the commander's approval during the mission analysis brief). ● Identify any obvious shortfalls in engineer forces or equipment based on specified or implied tasks, and initiate RFIs or request augmentation as early as possible. ● Analyze available OBSTINTEL on existing obstacles. ● Evaluate the terrain, climate, and threat capabilities to determine the potential impact on M/CM/S. ● Identify available information on major roads, bridges, and key facilities in the AO. ● Determine the availability of construction and other engineering materials. ● Review the availability of engineer capabilities, to include Army, joint, multinational, HN, and contract. ● Determine troop support requirements (such as bed down) for the supported force. ● Review theater construction standards and base camp master planning documentation if available. ● Review existing geospatial data on potential lodgment areas and base camps, and conduct site reconnaissance if possible. ● Determine the threat (environmental, EHs). ● Obtain necessary geologic, hydrologic, and climatic data. ● Determine the level of interagency cooperation required. ● Determine engineer-related IR (terrain and mobility restraints, OBSTINTEL, threat engineer capabilities, critical infrastructure), and make recommendations for inclusion in the CCIR as necessary. ● Integrate engineer IRs and reconnaissance into ISR operations. ● Provide the commander with suggested guidance for engineers that can be included in the commander's guidance for COA development.
COA development	● Identify priority engineer requirements. ● Refine essential tasks for M/CM/S if necessary. ● Integrate engineer support into COA development, and develop a scheme of engineer operations for each COA. ● Array engineer forces using task and purpose. ● Recommend an appropriate level of protection effort for each COA, based on the expected threat. ● Develop COA evaluation criteria focused on the engineer effort.
COA analysis	● Role-play as the enemy engineer, and interject enemy engineer actions or events during wargaming. ● Refine the engineer plan, based on the results of war-gaming.
COA comparison	● Provide advantages and disadvantages of each COA from the engineer perspective (ability to support, risk to engineer forces or equipment).

Table 2-2. Engineer considerations in the MDMP (continued)

COA approval	● Gain approval for any changes to the essential tasks of M/CM/S. ● Gain approval for engineer priorities of effort and support. ● Gain approval for requests for engineer augmentation to be sent to higher headquarters.
Orders production	● Provide input to the appropriate plans and orders. ● Ensure that all engineer forces and critical equipment are properly allocated in the task organization.
Rehearsal	● Coordinate and participate in combined arms rehearsals as appropriate.

ENGINEER RUNNING ESTIMATE

2-36. The engineer running estimate is a logical thought process and extension of the MDMP. It is conducted by the ENCOORD, concurrently with the planning process of the supported maneuver force, and is continually maintained throughout planning, preparation, execution, and assessment. This running estimate allows for early integration and synchronization of essential tasks for M/CM/S (discussed later in this chapter) into the combined arms planning process. It drives coordination between the engineer, supported commander, and other staff members in the development of engineer plans, orders, and annexes. An example of the engineer running estimate is found in appendix F and focuses on operations in support of a BCT. Table 2-3 shows the relationship between mission analysis during the MDMP and the engineer's running estimate, including identification of essential tasks for M/CM/S.

Table 2-3. Correlation of mission analysis and the engineer running estimate

Mission Analysis	*Engineer Running Estimate*
● Analyze higher headquarters order. ● Conduct IPB. ● Determine specified, implied, and essential tasks. ● Review available assets. ● Determine constraints. ● Identify critical facts and assumptions. ● Conduct risk assessment. ● Determine the CCIR. ● Develop an ISR plan. ● Plan for the use of available time. ● Write the restated mission. ● Conduct a mission analysis briefing. ● Approve the restated mission. ● Develop the commander's intent. ● Issue the commander's guidance. ● Issue a WARNORD. ● Review facts and assumptions.	● Analyze the higher headquarters orders, including the— ■ Commander's intent. ■ Mission. ■ Concept of operation. ■ Timeline. ■ AO. ● Conduct the IPB, including— ■ Terrain and weather analysis. ■ Enemy mission and M/CM/S capabilities. ■ Friendly mission and M/CM/S capabilities. ● Determine— ■ Specified M/CM/S tasks. ■ Implied M/CM/S tasks. ■ Essential M/CM/S tasks. ■ General engineering requirements. ● Review available assets, including— ■ Limitations. ■ Risk as applied to engineer capabilities. ■ Time analysis. ■ Essential tasks for M/CM/S. ■ Restated mission. ● Conduct risk assessment, including— ■ Safety. ■ Environment. ● Determine terrain and mobility restraints, OBSTINTEL, threat engineer capabilities, and critical infrastructure. ● Recommend CCIR. ● Integrate engineer reconnaissance effort.

2-37. The running estimate parallels the MDMP. The mission analysis, facts and assumptions, and analysis of the mission variables furnish the structure for running estimates. In the running estimate, the engineer staff continuously considers the effects of new information and updates the following:

- Facts.
- Assumptions.
- Friendly force status (assessment of M/CM/S capabilities to ongoing and planned operations).
- Enemy activities and capabilities (that can affect current operations and future plans).
- Civil considerations (effects on current engineer operations and future plans).
- Conclusions and recommendations.

2-38. During preparation, estimates continue to track resource status. The priority for assessment is on answering PIRs and FFIRs that fall within the engineer area of expertise. Assessing during preparation also includes confirming or disproving any assumptions that were made during planning.

2-39. During execution, estimates focus on identifying any variances, assessing their effect on achieving the end state, and recommending corrective actions to keep the operation within the commander's intent. Assessments also address the supportability of possible sequels and future operations. During operations, running estimates are usually presented orally, especially during preparation and execution. Written estimates may be prepared to support contingency planning during peacetime. Even then, they are normally prepared only at higher-level headquarters.

2-40. The running estimate provides the basis for action. When an estimate reveals a variance that requires correction, staff representatives act within their authority to correct it. When the decision required is outside their authority, they present the situation to the staff officer who has the authority to act or to the commander. When the estimate reveals information that answers an information requirement, especially a CCIR, engineer staff representatives send that information to the element requiring it. Engineer staff representatives do more than collect and store information; they process it into knowledge and apply judgment to get that knowledge to those requiring it.

ASSURED MOBILITY

2-41. *Assured mobility* is a framework of processes, actions, and capabilities that assure the ability of the joint force to deploy and maneuver where and when desired, without interruption or delay, to achieve the mission. (FM 3-34) Assured mobility is an integrating process for the warfighting functions similar to that of ISR synchronization, targeting, composite risk management (CRM), and IPB. As an integrating process, assured mobility provides linkage between the tasks associated with M/CM/S and their roles across the six warfighting functions. It strives to ensure freedom of maneuver and preserve combat power throughout the AO as it seeks to exploit superior SU. This construct is one means of enabling a unit to achieve the commander's intent. Assured mobility emphasizes proactive mobility and countermobility (and supporting survivability) actions and integrates all engineer functions in accomplishing this. Assured mobility is broader than the term "mobility" and should not be confused with the limited application of the mobility operations as described in FM 3-34.2.

2-42. While the ENCOORD plays a primary role in assured mobility, other staff members support its integration and also have critical roles. The ENCOORD or the assured mobility section leader (if designated) plays an integrating role in assured mobility that is similar to the role played by the S-2 in the IPB integrating process. Other staff members also integrate M/CM/S tasks as a part of assured mobility. Examples would include providing traffic regulation in the maneuver space or handling displaced persons.

2-43. The framework of assured mobility follows a continuous cycle of planning, preparing, and executing decisive and shaping operations. Achieving assured mobility rests on applying six fundamentals that sustain friendly maneuver, preclude enemy ability to maneuver, and assist in the protection warfighting function. The fundamentals of assured mobility are—

- **Predict.** Engineers and other planners must accurately predict potential enemy impediments to joint force mobility by analyzing enemy TTP, capability, and evolution. Prediction requires a constantly updated understanding of the OE.

- **Detect.** Using ISR assets, engineers and other planners identify the location of natural and man-made obstacles, preparations to create and emplace obstacles, and potential means for obstacle creation. They identify actual and potential obstacles and propose solutions and alternate COAs to minimize or eliminate their potential impact.
- **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.
- **Avoid.** If prevention fails, the commander maneuvers forces to avoid impediments to mobility, if this is viable within the scheme of maneuver.
- **Neutralize.** Engineers and other planners plan to neutralize, reduce, or overcome obstacles and impediments as soon as possible to allow the unrestricted movement of forces.
- **Protect.** Engineers and other elements plan and implement survivability and other protection measures that deny the enemy's 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.

MOBILITY, COUNTERMOBILITY, AND SURVIVABILITY

2-44. Increased engineer requirements in the OE may limit engineer resources immediately available to support the multitude of engineer tasks in support of BCT operations. Combat engineering (M/CM/S) and general engineering requirements are often in competition for the same engineer assets. As is the case with other reconnaissance capabilities, commanders must balance the application of engineer reconnaissance against the corresponding trade-off in primary capability. In the case of engineers, engineer units tasked to conduct a specified reconnaissance task may not be available for employment on other M/CM/S tasks. The maneuver commander must set priorities to allow the force to perform the most critical tasks first. The ENCOORD and other staff members assist the maneuver commander by identifying essential tasks for M/CM/S.

2-45. Essential tasks for M/CM/S support assured mobility in a similar fashion to how essential fire support tasks support targeting. An essential task for M/CM/S is a specified or implied M/CM/S task that is critical to combined arms mission success. These tasks are identified from the specified and implied tasks listed during mission analysis. From these tasks, combined with the maneuver commander's guidance, the ENCOORD and other staff representatives recommend essential tasks for M/CM/S to the maneuver commander during the mission analysis brief. At the conclusion of the mission analysis brief, the commander approves those essential tasks for M/CM/S.

2-46. After essential tasks for M/CM/S are approved, the ENCOORD and other planners integrate them into COA development. They develop associated methods to complete the essential tasks for M/CM/S by assigning resources and recommending priorities. The ENCOORD and other planners, in coordination with the maneuver planner, synchronize the methods to achieve the desired effects on enemy or friendly forces. A fully developed essential task for M/CM/S must be one in which—

- The task is one or more clearly defined and measurable activity that can be accomplished by the required individuals and organizations to achieve desired effects. (See FM 7-0.)
- The desired or intended result of the task is stated in terms relating to the purpose of the supported unit. This portion of the essential task for M/CM/S explains why it must be accomplished. It also provides intent to the engineer commander so that he can be reactive as the situation changes.

Note. Essential tasks are the most important M/CM/S tasks that must be accomplished. Often, the entire operation depends on completing these tasks; and without their successful completion, the operation is at risk.

2-47. Properly constructed essential tasks for M/CM/S provide subordinate units with clear priorities and facilitate the unity of purpose in planning, preparation, execution, and assessment. Essential tasks for M/CM/S also provide CBRN, military police, IO, CA, and other nonengineer elements that are clearly articulated and related to M/CM/S. The following are some examples of engineer-related essential tasks for M/CM/S:

- Essential Task for M/CM/S 1 (see FM 3-34.170).
  - Task: Conduct Engineer Reconnaissance of MSR Tigers from CP 1 to 2.
  - Purpose: Classify route, identify impediments to maneuver, and facilitate planning of route clearance operations.
- Essential task for M/CM/S 2 (see FM 3-34.170 and FM 3-90.12).
  - Task: Conduct Engineer Reconnaissance of Crossing Area White.
  - Purpose: Collect and confirm crossing site data and locate key BCT river-crossing locations.
- Essential task for M/CM/S 3 (see FM 3-34.170).
  - Task: Conduct an Infrastructure Reconnaissance of the Power Station at Grid ST231546.
  - Purpose: Assess the status of the power station to enhance the SU of critical infrastructure throughout the AO.
- Essential task for M/CM/S 4 (see FM 3-34.170).
  - Task: Conduct an Engineer Reconnaissance of Buildings at Grid ST234544.
  - Purpose: Determine if buildings are adequate to house BCT headquarters from a protection standpoint.
- Essential task for M/CM/S 5 (see FM 3-34.2).
  - Task: Conduct a Deliberate Breach at Point of Penetration (POP) 1 and 2.
  - Purpose: Facilitate the passage of BCT maneuver forces through obstacles and continue the attack to BCT Objectives Red and Green.
- Essential task for M/CM/S 6 (see FM 3-34.2).
  - Task: Conduct a Route Clearance of Route Dolphin.
  - Purpose: Clear the route of all obstacles and EHs to facilitate the uninterrupted movement of critical sustainment elements to allow the resupply of BCT elements.
- Essential task for M/CM/S 7 (see FM 5-103).
  - Task: Employ Sensored Scaleable Obstacles as Part of Base Camp Security.
  - Purpose: Provide early warning and a combination of nonlethal and lethal means of defeating intruders.
- Essential task for M/CM/S 8 (see FM 5-103).
  - Task: Support the Hardening of FOB Bears.
  - Purpose: Construct revetments and berms to protect key assets at the FOB.

CONTINUING ACTIVITIES AND INTEGRATING PROCESSES

2-48. Integrating processes and continuing activities contribute to the overall operations process that commanders direct during all operations and process activities. Their directions take different forms during planning, preparation, execution, and assessment. Commanders make decisions and direct actions based on their SU. They keep their SU current by continuously assessing the situation. Assessing provides input to all other processes and activities.

2-49. The following integrating processes occur during all operations process activities:

- IPB.
- Targeting.
- ISR synchronization.
- CRM.
- Knowledge management.

2-50. As discussed earlier, the engineer staff performs IPB as part of the combined arms team during the MDMP. The engineer areas of expertise within IPB are continually updated and integrated through the development and maintenance of the engineer running estimate. Engineers also continue to provide geospatial support and terrain analysis throughout the operations process as mentioned earlier in this chapter. Engineer participation in targeting is discussed in chapter 5.

2-51. The following activities continue during all operations process activities (they are synchronized with one another and integrated into the overall operation):

- ISR (see chapter 3).
- Security operations (see chapter 4).
- Protection.
- Liaison and coordination.
- Terrain management.
- IM.
- Airspace command and control (AC2).

ASSESSMENT

2-52. *Assessment* is the continuous monitoring and evaluation of the current situation (particularly the enemy) and progress of an operation. (FM 3-0) It is integral to the operations process and enables commanders and staff to effectively plan, prepare, and execute operations. Commanders and staff continuously observe the current situation which provides the foundation of SA and, with applied judgment, leads to SU. Assisted by the staff, commanders compare the current situation with forecasted outcomes using measures of performance (MOPs) and measures of effectiveness (MOEs) to judge progress toward success.

2-53. A *measure of performance* is a criterion to assess friendly actions that is tied to measuring task accomplishment (JP 3-0). MOPs answer the question, "Was the task performed as the commander intended?" A *measure of effectiveness* is a criterion used to assess changes in system behavior, capability, or OE that is tied to measuring the attainment of an end state, achievement of an objective, or creation of an effect. (JP 3-0) MOEs answer the question, "Is the force doing the right things?"

2-54. Based on their assessment, commanders make decisions to direct adjustments. Subordinates assess unit progress by comparing it with their mission and the commander's intent (one and two levels up), and adjust their actions to accomplish the mission and achieve the desired end state. The focus of assessment varies during the operations process. The operations process is as follows:

- **Planning.** Planning involves assessment focused on developing SU, establishing MOEs and MOPs, and evaluating COAs for the commander's decision.
- **Preparation.** Preparation involves assessment focused on determining the friendly unit readiness to execute the operation and any changes in the threat or civil considerations from those developed during planning.
- **Execution.** Execution involves assessment focused on identifying variances between the current situation and forecasted outcomes.

2-55. Commanders monitor the current situation for unexpected success, failure, or enemy action that can prevent the operation from progress toward the desired end state. As commanders assess progress, they look for opportunities, threats, or acceptable progress according to plan. They embrace risk, seize opportunities, mitigate threats, and adjust the plan as necessary.

2-56. Staffs analyze the situation in terms of the mission variables and/or operational variables to understand the mission and prepare running estimates. They continuously assess the effects of new information on the operation, update running estimates, and determine if adjustments are required. Commanders empower their staffs to make adjustments within their areas of expertise. This requires staffs to understand those aspects of operations that require the commander's attention as opposed to those that are delegated to their control.

2-57. Commanders avoid excessive analysis when assessing operations. The assessment process must be tailored to meet the needs of the commander. It must provide useful feedback on the progress of the operation that allows the commander to provide guidance and recommendations to the planning staff on potential course corrections. The focus should be on providing information in a means useful to the commander. Staffs should avoid developing systems that become all-consuming of resources and staff effort. Generally, the echelon at which a specific operation, task, or action is conducted should be the echelon at which such activity is assessed. This focuses assessment at each echelon and enhances the efficiency of the overall operations process.

PREPARATION

2-58. Preparation consists of activities performed by the unit before execution to improve its ability to conduct the operation. Preparation requires staff, unit, and Soldier actions. Mission success depends as much on preparation as planning. Key preparation activities include—

- Planning refinement based on IPB updates and answering IR from ISR assets.
- Conducting rehearsals such as confirmation briefs, combined arms rehearsals, and back briefs.
- Implementing the task organization to include coordinating the linkup of engineer units with the supported unit.
- Performing ISR operations.
- Moving troops.
- Performing precombat checks and inspections.
- Preparing for sustainment.
- Integrating new Soldiers and units.

2-59. In many cases, engineer units conduct these preparation activities integrated within the combined arms task organizations required by the operation. Combined arms rehearsals are critical to the success of a breaching, clearing, or gap-crossing operation. Rehearsals help staffs, units, and individuals to better understand their specific role in upcoming operations, practice complicated tasks before execution, and ensure that equipment and weapons function properly. The rehearsal is one of the most effective synchronization tools available to commanders. Commanders must ensure that subordinate units have enough time to conduct rehearsals.

2-60. Implementing the engineer task organization and linking up engineers with their supported unit is an important and challenging activity. The ENCOORD (in the headquarters directing task organization) initiates the coordination effort by ensuring that the necessary linkup instructions are in the maneuver unit fragmentary order (FRAGO) or OPORD. Information needed to conduct linkup includes the date-time group, primary and alternate linkup points, digital and voice communication procedures, and recognition signals (vehicle markings and panels). The parent unit or controlling headquarters (BSTB, engineer battalion, engineer company) conducts any required additional coordination with the gaining unit as early as possible and provides further instructions (not contained in SOPs) to the subordinate engineer unit on the linkup procedures in their unit FRAGO or OPORD.

2-61. The engineer unit conducting the linkup should report to their parent unit or controlling headquarters when they depart for linkup and when linkup with the gaining unit is completed. Executing task organization changes of critical engineer assets during mission execution may be required. This situation presents even more challenges, especially with regards to terrain management, as unit positions and fire control measures may have shifted. War-gaming these actions during mission planning and rehearsals and implementing the necessary control measures and coordinating instructions are critical in managing the risks of fratricide and the engineer unit effectively making the linkup. (See FM 3-90.5 and FM 3-90.6 for more information on linkup operations.)

2-62. The commander and staff continuously review IPB products against the current situation and redirect ISR assets to focus on the most important unknowns remaining, while emphasizing the CCIR. Plans are continually refined based on IPB updates and ISR results (OBSTINTEL).

EXECUTION

2-63. Execution is putting a plan into action by applying combat power to accomplish the mission and using SU to assess progress and make execution and adjustment decisions. It focuses on concerted action to seize, retain, and exploit the initiative. The effective application of mission-tailored engineer modules requires flexibility in task organization and the ability to shift engineer capabilities within the AO to meet mission requirements. The Army operational concept emphasizes executing operations at a tempo that enemies cannot match by acting or reacting faster than they can adapt. To achieve this type of flexibility, commanders use mission command (see FM 6-0) to focus subordinate commanders' initiative. Subordinates exercising initiative within the commander's intent can significantly increase tempo; however, they also may desynchronize unit warfighting functions. This may reduce the commanders' ability to mass the effects of combat power. Even relatively minor, planned actions by CP cells affect the areas of expertise of other cells and affect the overall synchronization of the operation.

2-64. Collaborative synchronization among subordinates is enabled and expected under mission command. Subordinates' successes may offer opportunities within the concept or develop advantages that make a new concept practical. In either case, the commander's intent keeps the force acceptably focused and synchronized. Subordinates need not wait for top-down synchronization. Mission command is especially appropriate for operations in which stability operations predominate. It allows subordinates to exploit information about enemies, adversaries, events, and trends without direction from higher echelons.

2-65. The staff, both the engineer unit commander's staff and the combined arms commander's engineer staff, assists the commander in execution through the integrating processes and continuing activities during execution. In addition, commanders assisted by the staff perform the following activities specific to execution:

- Focus assets on the decisive operation.
- Adjust CCIR based on the situation.
- Adjust control measures.
- Manage movement and positioning of supporting units.
- Adjust unit missions and tasks as necessary.
- Modify the concept of operations as required.
- Position or relocate committed, supporting, and reserve units.

2-66. During execution, the current operations cell strives to keep the warfighting functions synchronized and balanced between the initiative of subordinates and synchronized activities as the situation changes. The current operations cell follows and provides its own level of collaborative synchronization. To assist commanders in massing the effects of combat power at decisive times and places, the current operations cell considers the following outcomes when making synchronization decisions or allowing other collaborative synchronization to proceed:

- Combined arms integration.
- Responsiveness (proactive and reactive).
- Timeliness.

2-67. Execution involves monitoring the situation, assessing the operation, and adjusting the order as needed. Throughout execution, commanders continuously assess operation progress based on information from the COP, running estimates, and assessments from subordinate commanders. When the situation varies from the assumptions the order was based on, commanders direct adjustments to exploit opportunities and counter threats. Commanders and staffs use the rapid decision-making and synchronization process (RDSP) (described in FMI 5-0.1) to make those adjustments and rapidly resynchronize forces and warfighting functions.

RAPID DECISION-MAKING AND SYNCHRONIZATION

2-68. The RDSP is a decision-making and synchronization technique for commanders and staffs to use during execution (see FMI 5-0.1). The main difference from the MDMP is that an order already exists

when using the RDSP, and the RDSP seeks an acceptable solution whereas the MDMP seeks an optimal solution. Implementing the RDSP requires the following three skills:

- Leader ability to recognize when a variance requires an adjustment.
- Leader ability to visualize several possible COAs and quickly select an acceptable one.
- Leader knowledge of what actions are feasible in the time available.

2-69. For example, a situation RDSP might be appropriate when a subordinate maneuver unit reports the failure of a breaching operation. This situation would clearly be a change to the current plan. The five steps for the RDSP are as follows:

- **Step 1.** Compare the current situation to the current plan and determine if there is a change required to the current plan.
- **Step 2.** Determine if the current plan must be adjusted. If the change affects the CCIR, a decision is made to adjust the current plan. Someone must also be selected to make this decision.
- **Step 3.** Develop possible COAs. This is performed by CP cell chiefs.
- **Step 4.** Determine any effects the COAs would have on the mission. The appropriate functional cell chiefs and staff section leaders quickly determine any effects (based on their areas of expertise) the COAs would have on the mission, commander's intent, or concept of operations (especially the decisive operation). The COAs are presented to the decision authority, or the commander may direct a COA. The COA is presented to the current operations cell for validation (suitability, feasibility, acceptability). If the COA is acceptable, it is refined to resynchronize the warfighting functions.
- **Step 5.** Implement the chosen COA, ensuring that the warfighting functions are resynchronized (possibly through a huddle) and changes are disseminated.

2-70. The first two steps may be performed in any order, including concurrently. The last three steps are performed repeatedly until an acceptable COA is found. The S-3 may intuitively perform these steps or, if time is available, huddle CP cell chiefs and perform it in an open forum. When the COA is acceptable, it is presented to the commander or the decision authority for approval.

WORKING GROUPS, MEETINGS, AND BOARDS

2-71. The organization of the BCT staff into functional and integrating cells was discussed in chapter 1. Periodically or as required, commanders at each echelon may establish working groups, meetings, or boards to solve problems and coordinate specific actions. The engineer staff is a key member on many of these and may chair construction-related groups. These groups include representatives from within or outside a CP and their composition varies depending on the issue. Unit SOPs generally establish the purpose, frequency, required inputs, expected outputs, attendees, and agendas for—

- **Working groups.** A *working group* is a temporary grouping of predetermined staff representatives who meet to coordinate and provide recommendations for a particular purpose or function. (FMI 5-0.1) Working groups conduct staff coordination at the action officer level and are a major part of a CP battle rhythm. Generally, the BCT has the following three working groups:
  - ISR.
  - Targeting (discussed further in chapter 5).
  - AC2.
- **Meetings.** Meetings (sometimes called "huddles") are informal gatherings used to present and exchange information (see FMI 5-0.1). Cell chiefs and staff section representatives hold meetings, as needed, to synchronize their activities.
- **Boards.** A *board* is a temporary grouping of selected staff representatives with delegated decision authority for a particular purpose or function. (FMI 5-0.1) Boards establish policies, procedures, priorities, and oversight to coordinate the efficient use of resources. When the process or activity being synchronized requires command approval, a board is the appropriate forum.

PROJECT MANAGEMENT

2-72. Engineer planners use the project management system described in FM 5-412 (to be revised as FM 3-34.405) as a tool for the process of coordinating the skill and labor of personnel using machines and materials to form the materials into a desired structure. The project management process divides the effort into the preliminary planning, detailed planning, and project execution. Today, when engineer planners are focused on general engineering tasks, they rely extensively on the Theater Construction Management System (TCMS) to produce the products (design, activities list, logic network, critical path method [CPM] or Gantt chart, bill of materials) required by the project management system. Effective products produced during the planning phases assist during the construction phase. In addition to TCMS, the engineer has various other reachback tools or organizations that can exploit resources, capabilities, and expertise that is not organic to the unit that requires them. These tools and organizations include, but are not limited to USAES, Engineering Infrastructure and Intelligence Reachback Center (EI2RC), Engineer Research and Development Center (ERDC), TeleEngineering Operations Center (TEOC), 412th and 416th TECs, Air Force Civil Engineering Support Agency (AFCESA), and Naval Facilities Engineering Command (NAVFAC).

2-73. The project management process normally begins at the unit level with the construction directive. This gives the who, what, when, where, and why of a particular project and is similar to an OPORD in its scope and purpose. Critical to the construction directive are plans, specifications, and all items essential for project success. Units may also receive general engineering missions as part of an OPORD, FRAGO, WARNORD, or verbal order. When a leader analyzes a construction directive, he may need to treat it as a FRAGO in that much of the information required for a thorough mission analysis may exist in an OPORD issued for a specific contingency operation.

LIAISON OFFICER

2-74. A liaison officer (LNO) facilitates communication of COP-related information and execution information between the sending and receiving headquarters. LNOs convey information and its context by interpreting and explaining it. A LNO represents the commander or staff officer and can transmit information directly as necessary. LNOs can also expedite the passage of RI that answers CCIR and exceptional information. As an example, an LNO from an engineer battalion TF headquarters that is in GS to the BCT could be provided to the BCT engineer planning staff during certain portions of the planning phase to provide subject matter expertise on potential general engineering requirements in the BCT AO. (Refer to FM 6-0, appendix E, for detailed information on the roles and responsibilities of LNOs.)

This page intentionally left blank.

Chapter 3

Engineer Support to Intelligence, Surveillance, and Reconnaissance

Know your enemy and know yourself; in a hundred battles you will never be in peril.

—Sun Tzu

The BCT conducts ISR operations to produce intelligence that the commander needs to develop SU of the OE and make timely decisions. Engineer support to ISR operations is largely a function of two parts: (1) the engineer's role as an integral member of the combined arms staff in planning, synchronizing, and integrating ISR operations within the BCT and (2) the employment of engineer reconnaissance capabilities and the commitment of ERTs as valuable ISR assets for the BCT.

OPERATIONS

3-1. ISR operations are one of the continuing activities that occur during all operation process activities and are fundamental to information superiority. ISR operations support friendly operations through the four tasks of ISR synchronization and integration. Although ISR operations are part of the intelligence warfighting function, they require entire staff participation to facilitate planning, synchronization, and integration within the BCT. Engineers are integral members of the combined arms staff in collectively determining IR that focuses ISR operations in generating intelligence to support the BCT mission. (See FM 2-0, FM 3-20.96, FM 3-90.5, and FM 3-90.6 for more information on ISR operations.)

3-2. ISR operations synchronize and integrate the planning and operation of sensors; assets; and processing, exploitation, and dissemination systems in direct support of current and future operations. This is an integrated intelligence and operations function (see JP 2-01). For Army forces, this activity is a combined arms operation that focuses on PIR while answering CCIR.

3-3. Through ISR, commanders and staffs continuously plan, task, and employ collection assets and forces. These assets and forces collect, process, and disseminate timely and accurate information, combat information, and intelligence to satisfy the CCIR and other intelligence requirements. When necessary, ISR assets may focus on special requirements (personnel recovery).

3-4. The development of an integrated ISR plan requires the participation of the entire staff. ISR synchronization satisfies as many IRs as possible through staff coordination and RFIs. ISR integration assigns ISR tasks to the most suitable collector. All staff elements within a CP have the responsibility to satisfy IRs. Satisfying IRs through staff element coordination facilitates ISR planning by eliminating the necessity to task an asset to collect information that another unit or asset already observed in the course of operations. For example, an engineer unit conducting operations and reporting through engineer headquarters could provide important answers to questions about the AO.

3-5. As the staff officer responsible for coordinating engineer assets and operations, the ENCOORD must ensure that the following actions are taken regarding ISR synchronization and integration:

- Advise the S-2 and S-3 on the availability and capability of engineer reconnaissance assets.
- Ensure that the engineer elements assigned to collect information are suitable and recommend to the appropriateness of tasking those elements to the S-3.
- Maintain visibility on ISR tasks that are relevant to engineer operations and assist the S-2 as needed in evaluating information (especially obstacle information).

RECONNAISSANCE

3-6. Engineer reconnaissance can be an important part of ISR operations, providing data that contributes to answering the CCIR and impacting the final plan. Timely and effective engineer reconnaissance is essential to effective mission planning and execution. With regards to engineer missions, it can often provide information that clarifies or alters the need for engineer activities and allows for limited engineer resources to be applied elsewhere.

3-7. *Reconnaissance operations* are those operations undertaken to obtain (by visual observation or other detection methods) information about the activities and resources of an enemy or potential enemy. It also secures data concerning the meteorological, hydrographical, or geographical characteristics and the indigenous population of a particular area. (FM 3-90) Reconnaissance is a focused collection effort. It is performed before, during, and after other operations to provide information used in the IPB process and by the commander to formulate, confirm, or modify the COA.

3-8. The new modular BCT designs have more than doubled its reconnaissance capabilities and provided new surveillance and target acquisition capabilities. Each BCT is organized with a layered reconnaissance system consisting of an RS (with three ground troops each) and a scout platoon in each maneuver battalion. Despite these enhanced capabilities, commanders must know the capabilities and limitations of their reconnaissance assets. This ensures that the employment of these assets is within their capabilities and on missions for which they have been trained and equipped. Though reconnaissance primarily relies on the human dynamic rather than technical means, the situation may require the collection of a higher degree of technical information than nonspecialized units possess. Supporting units such as engineers, CBRN, EOD, military police, and others have specialized capabilities to collect technical information that complements the overall reconnaissance effort.

3-9. Engineer reconnaissance is instead a focused application of unique capabilities supporting reconnaissance operations and is applicable to all four forms of reconnaissance. The capabilities are generated from and organized by both combat and general engineer units with overarching support from geospatial means. These units, except the HBCT engineer company, do not have organized and dedicated engineer reconnaissance elements within their structure. Rather, combat and general engineers are task-organized, as required by the situation, based on mission variables and may be teamed separately or with other elements from across the engineer functions or even warfighting functions. (See FM 3-34.170 for additional discussion on the generation of engineer reconnaissance capabilities.) Another example of engineer reconnaissance is the intelligence gathered by an engineer unit conducting route clearance as they gather IED components. This intelligence is then used by the BCT to target the IED network.

3-10. The engineer functions provide a menu of reconnaissance capabilities varying in linkages to warfighting functions and varying in degree of technical expertise and effort applied to the assigned mission and tasks. Engineer reconnaissance generated from and organized by the engineer functions provides a range of technical reconnaissance capabilities. Each of the functions provides varying degrees of technical expertise and effort within the assigned mission and tasks. The tasks and levels of expertise provided overlap from function to function. For example, there is no clean dividing line between the technical effort required for the combat engineer task of classifying a route for combat vehicle traffic and the general engineer task of conducting a road reconnaissance to estimate the effort required for the upgrade of an MSR. The combat engineer task effectively addresses the classification of the route but also provides information useful in the general engineer's estimate. Similarly, the general engineer estimate effectively addresses the effort required for an upgrade, but also provides information useful in route classification. Geospatial engineering is employed in support of both, and in varying degrees, as required by the task and situation.

TACTICAL AND TECHNICAL CAPABILITIES

3-11. Combat engineers conduct tactical reconnaissance as described in FM 7-15 by Army tactical task (ATT), "Conduct Tactical Reconnaissance," which includes the following five subtasks:

- Zone reconnaissance.
- Area reconnaissance.

- Reconnaissance in force.
- Route reconnaissance.
- Reconnaissance patrol.

3-12. Most tactical engineer reconnaissance capabilities enable the collection of technical information in support of the combat engineer function. Reconnaissance in support of M/CM/S operations is conducted primarily by ERTs comprised of combat engineers and has a focus on the collection of tactical and technical information to support BCT freedom of maneuver and protection of friendly forces and facilities. FM 3-34.170 provides a detailed discussion of reconnaissance support of the five functional areas of mobility operations, obstacle integration and turnover in countermobility operations, fighting and other protective positions, and other tactical operations in the BCT. The specific combat engineer reconnaissance tasks include, but are not limited to—

- Obstacle reconnaissance focused on bypass or breach of obstacles to create OBSTINTEL.
- Route reconnaissance focused on route clearance operations.
- Area reconnaissance focused on EHs, such as mines and UXO, requiring area clearance operations.
- Crossing-site reconnaissance focused on determining requirements for a gap crossing.
- Route reconnaissance focused on establishing a combat road or trail.
- Reconnaissance of planned or existing sites and facilities supporting forward aviation operations.
- Obstacle reconnaissance (to include demolition obstacles) focused on establishing friendly obstacles integrated with fires.
- Obstacle reconnaissance in preparation for target turnover.
- Area reconnaissance focused on establishing vehicle fighting positions or protective works.
- Area reconnaissance in support of urban combat operations.
- Reconnaissance of tunnels and underground structures.
- Reconnaissance to establish an initial assessment of environmental factors.
- Reconnaissance to establish an initial assessment of infrastructure factors.
- Reconnaissance in complex terrain.
- Reconnaissance in conjunction with other engineer missions (route clearance, construction, and so forth).

3-13. General engineers augmenting the BCT can provide a range of technical reconnaissance capabilities that enable missions linked to BCT sustainment. General engineers may be teamed with ERTs, other BCT units, or in stand-alone organizations. These tasks are tactical missions that include the requirement to gather technical information needed for—

- MSR maintenance and upgrade.
- General engineering in support of airfields and heliports.
- Bridge construction or repair.
- General engineering in support of protection.
- Procurement and production of construction materials.
- General engineering in support of real estate support.

ENGINEER COORDINATOR

3-14. The ENCOORD is responsible for the application, coordination, and integration of engineer reconnaissance. In this role, the ENCOORD is a critical link in the commander's IM processes that provide the translation from the gaps identified by the commander in CCIR to the technical information focus of engineer reconnaissance. ENCOORD participation in the ISR working group facilitates a concerted effort in planning and integrating engineer reconnaissance. The ISR meeting is a critical event in the BCT battle rhythm. The ENCOORD or his representative must be prepared for each meeting to discuss the availability of engineer reconnaissance assets, capabilities, limitations, and IR related to engineer operations.

3-15. The formation of ERTs consequently degrades the capabilities of the organization from which the personnel and equipment are drawn. The ENCOORD must understand the compromise between using engineer assets in a reconnaissance role versus using them in a different M/CM/S role when making recommendations to the BCT commander.

3-16. The ENCOORD must work together with the engineer unit commander providing ERTs to understand specific unit capabilities, SOPs, and any augmentation they require (including integration within the security and evacuation plan for the overall reconnaissance effort). The ENCOORD and unit commander make the necessary coordination with the supported unit at the appropriate echelon to ensure that ERTs are augmented with the necessary assets to accomplish the mission.

3-17. The ENCOORD must ensure the timely exchange of critical information pertaining to ERT operations. Rapid information sharing between higher, lower, and adjacent units facilitates parallel planning to get reconnaissance assets into a mission as early as possible. The ENCOORD must ensure that the finalized ISR plan and other information provided to subordinate units in WARNORDs and OPORDs allow the ERT leader to clearly understand the commander's intent and know what is expected of the team in each phase of the operation. The commander's reconnaissance guidance, which is developed early in the MDMP, provides clarity to subordinates in planning and executing the reconnaissance mission. This guidance covers the following considerations (see FM 3-20.96 or FM 3-34.170 for further discussion):

- **Focus.** Information-gathering activities are concentrated by defining "where" and "what" and provide linkage to answering the CCIR and filling additional voids in the IR.
- **Tempo.** The tempo can be stealthy or forceful, deliberate or rapid. The tempo allows the commander to correlate time requirements for the reconnaissance with such factors as planning time, movement formations, and operational methods, which influence the depth of detail that the reconnaissance can yield.
- **Engagement criteria.** The engagement criteria can be aggressive or discreet. It describes restrictions regarding lethal and nonlethal engagements that are important deviations from the rules of engagement (ROE).

3-18. The ENCOORD must ensure that engineer-oriented ISR tasks are specific enough to facilitate effective decisionmaking. The S-2 has the lead on developing specific information requirements (SIR) based on IRs and indicators and works with the S-3 in translating them into ISR tasks. Though this process is primarily an S-2 and S-3 function, the ENCOORD should be aware of the process and provide the necessary engineer input when needed.

3-19. ERTs from adjacent engineer units operating within the BCT AO must coordinate their activities and address terrain management considerations. The ENCOORD on the BCT staff is best-postured to assist the engineer unit providing the ERT with the necessary coordination. The ENCOORD is also postured to assist with coordination for operational-level reconnaissance missions which must occur in the BCT AO. These missions may be assigned or identified by EAB units requiring specific information.

ENGINEER RECONNAISSANCE TEAM

3-20. An ERT is the baseline engineering reconnaissance element. The identified element may be a team, squad, platoon, or larger unit. Highly trained personnel are required for obstacle and other engineer tactical, reconnaissance operations. This not only requires the TTP necessary for tactical, reconnaissance operations, but also requires knowledge and experience in the specific technical IRs.

3-21. ERTs are generally employed at the tactical level and in support of the combat engineer function. ERTs conduct the basic tactical reconnaissance mission with an added focus on collecting the required technical information. The ERT usually employs the same techniques and forms for their reconnaissance mission as the supported reconnaissance or maneuver element. The technical information collected by an ERT is an embedded part of a tactical, reconnaissance mission, and the ERT is most effective as an integral part of (attached or under OPCON to) a tactical, reconnaissance element. Combat engineer units are more likely to provide the ERT, especially when it is attached or OPCON to a supported reconnaissance element. Combat engineer units organic to and typically augmenting the BCT, can more effectively integrate their ERT operations and coordinate for required support.

3-22. The ERT is normally task-organized for a specific mission, and its elements are drawn from the combat mobility platoons or the mobility support platoon. The ERT—

- Increases the supporting unit reconnaissance capabilities by providing detailed technical information on complex obstacles and enemy engineer equipment.
- Conducts an analysis of assets needed to bypass, breach, mark, or reduce any encountered obstacle.
- Provides detailed technical information on routes (including classification) and specific information on bridges, tunnels, fords, and ferries along the route.
- Provides the initial level of technical information required for an airfield assessment.
- Conducts tactical reconnaissance with a specified focus on the initial technical information required for environmental or infrastructure assessments.

3-23. An ERT conducts operations as part of a larger combined arms force, directly augmenting the reconnaissance element or operating as a discrete element within the plan. The team normally performs reconnaissance of one named area of interest (NAI) or multiple NAIs within the same vicinity on the battlefield. In most instances, the ERT conducts its reconnaissance dismounted. However, the team may arrive in the vicinity of the reconnaissance objective in many ways—including dismounted, air, or ground. If the team travels dismounted or is air-inserted, it should consist of at least three personnel. If the team uses an organic vehicle to arrive in the vicinity of its reconnaissance objective, it should consist of at least five personnel—three with the dismounted element and two with the team vehicle as the mounted element. Ideally, it travels in a vehicle that is similar to other reconnaissance vehicles to blend in and maintain comparable mobility, maneuverability, and vehicle protection. The dismounted element mission is to locate and report all necessary information required by the supported commander according to the ISR plan.

3-24. This information can be transmitted directly to the supported unit headquarters on the appropriate net (according to the SOP or the ISR plan) or relayed through the mounted element. The mission of the mounted element is to maintain communication with the dismounted element and the supported unit. The mounted element is responsible for relaying intelligence collected by the dismounted element to the appropriate C2 node and ensuring that the team vehicle is not discovered by the enemy. OBSTINTEL collected by a reconnaissance team is also sent to its parent engineer headquarters if possible. The secondary mission of the mounted element is to be prepared to go forward and complete the reconnaissance if the dismounted element is unsuccessful.

OTHER RECONNAISSANCE CAPABILITIES

3-25. Despite a lack of dedicated reconnaissance assets, engineer units can augment the supported BCT RS troops or maneuver battalion scouts with ERTs by accepting risk to other engineer support requirements. Engineers teamed directly with dedicated reconnaissance assets add a degree of technical skill to the team, increasing the tempo and effectiveness of the reconnaissance mission. Combat engineers are typically task organized directly to maneuver battalion scouts or RS troops to augment those units during tactical-reconnaissance operations. The reconnaissance unit conducts the overall mission, while the assigned engineer team focuses on the more technical information required (detailed information on a complex obstacle or a proposed crossing site). While various engineers are available to be task-organized into reconnaissance units, the teaming of engineers into the reconnaissance forces directly supporting the BCT is the most common application.

3-26. If required, the engineer company commander forms ERTs that range in size from a three-man team to a platoon. ERTs may operate independently; however, they normally augment one of the squadron troops or other maneuver units directly involved in reconnaissance operations. If an ERT augments a squadron element, the team must be task-organized with equipment that is compatible with mission requirements and the supported reconnaissance force.

3-27. General engineer reconnaissance capabilities, when not in direct support of combat engineers, are typically organized in the form of assessment or survey teams. These task-organized teams have a specific focus for the collection of technical information and are less likely to be teamed directly with reconnaissance units in the BCT. (Additional discussion on engineer assessment and survey teams is provided in FM 3-34.170.)

CAPABILITIES AND LIMITATIONS

3-28. The current engineer force structure does not provide personnel or equipment dedicated to reconnaissance efforts. However, engineer units that identify and train personnel, establish SOPs, and provide necessary equipment for the formation of task-organized reconnaissance teams have effectively employed ERTs (see FM 3-34.170). The successful employment of engineers in a tactical reconnaissance role requires a trained engineer staff at the BCT and in the engineer unit providing the capability.

3-29. ERTs have the capability to clear or reduce small obstacles that are not covered by fire or observation. An ERT's primary task (with regard to tactical and protective obstacles) is to reconnoiter obstacles and locate and mark bypasses around obstacles and restrictions. ERTs have the following limitations:

- The engineer company does not have personnel and equipment listed on the table(s) of organization and equipment (TOE) or the modified table(s) of organization and equipment (MTOE) specifically dedicated for reconnaissance activities.
- The team is extremely limited in its ability to destroy or repel enemy reconnaissance units and security forces.
- The distance the ERT can operate away from the main body is restricted by the range of communications, the range of supporting indirect fires, and the ability to perform sustainment operations.

3-30. The team has limited communications capability. Based on the radio configuration of the vehicle used during the reconnaissance and whether the ERT is working under maneuver element control, the dedicated monitoring of engineer nets may be difficult. However, with the Single-Channel, Ground and Airborne Radio System (SINCGARS), the ERT should be able to scan critical engineer nets or, at the very least, easily switch to the engineer net to report OBSTINTEL. Other communication means, including digital systems, may not be as capable of rapidly switching linkages to reflect task organization changes.

3-31. The ERT has a very limited obstacle creation and reduction ability because it normally carries a light basic load of demolitions. Obstacle reduction is normally limited to manually reducing obstacles not covered by enemy fires and observation.

TECHNICAL AUGMENTATION

3-32. The ERT can be augmented with general engineer capability if required to focus more specifically on detailed technical information supporting tactical sustainment missions, such as a road reconnaissance in preparation for MSR upgrade missions. The ERT can also use reachback capability to apply substantial additional technical resources in support of IR. In some cases, the ERT mission provides the initial technical information to plan or focus the employment of follow-on assessment or survey elements from the general engineer force. General engineer capabilities available to add technical expertise include—

- Vertical or horizontal construction specialists.
- Port or pipeline construction expertise.
- Power generation and distribution specialists.
- Water well-drilling and distribution specialists.
- Divers and underwater construction specialists.
- Real estate and facilities management expertise.
- Environmental engineer specialists.
- Structural engineering specialists.

3-33. ERTs may also be augmented with specialized capabilities from within the combat engineer function. Special training on EH is available for select combat engineers, such as a search advisor course and explosive ordnance clearance agent (EOCA) training. With EOCA-trained members or when augmented by EOCAs, the ERT can conduct limited UXO reconnaissance.

3-34. Engineer assessments and surveys are typically conducted at the operational level and in support of the general engineering function. (Assessments and surveys are discussed in greater detail in FM 3-34.170 as technical reconnaissance support.) The assessment or survey teams are generally not employed when direct contact with the enemy is likely. Rather, engineer assessment or survey is typically conducted in a relatively secure area and is focused on specific and detailed technical information required for a future engineer (or at least heavily engineered) mission. When operating within an assigned maneuver AO (BCT, MEB, division, corps, JTF) the assessment or survey team must fully coordinate their activity with the maneuver unit. However, the engineer team mission may or may not be an integrated part of the maneuver unit reconnaissance operation. While combat engineer units conduct an assessment in some situations, general engineer units are more likely to provide the required assessment or survey team. Additional specialized assistance may also be provided from assets not typically organized into tactical units (USACE, OGA, contractors, HN).

SUSTAINMENT CONSIDERATIONS

3-35. An engineer unit providing an ERT capability is likely able to provide only a limited amount of logistics support, especially after the ERT crosses the line of departure (LD). For this reason, it is essential that the supported unit understands and embraces the ERT requirements. The engineer unit must coordinate closely with the brigade, battalion, or TF for support that they cannot provide or that can be provided more effectively by the maneuver units. Examples include casualty evacuation, vehicle recovery, and maintenance support (vehicle, communications, and weapon repair). Security considerations may also require assistance from the supported unit.

3-36. For engineer units augmenting the BCT, staff coordination must be made at the appropriate battalion or brigade level so that the supporting unit requirements are included in sustainment planning. Sustainment planning at the battalion level is the primary responsibility of the battalion S-4. The battalion S-4 coordinates support for the attachments and verifies who is to provide this sustainment and how support for attachments is to be requested. In coordination with all company executive officers (XOs) and first sergeants (1SGs), the process is integrated into operations planning with the concept of logistics support synchronized with operations. The attached unit leader must coordinate with the battalion personnel staff officer (S-1), provide the S-1 a copy of his unit battle roster, and provide the battalion S-4 the status of all key elements of equipment. The unit SOP should be the basis for battalion level sustainment operations with planning to determine specific requirements and contingency preparation. The battalion and company orders should address any specific support matters that deviate from the SOP.

This page intentionally left blank.

Chapter 4

Engineer Support to Security Operations

Strategy is the art of making use of time and space. Space we can recover; lost time, never.
—Napoleon Bonaparte

The BCT conducts security operations to provide early and accurate warnings of threat operations, to provide the force being protected with time and maneuver space within which to react to the threat, and to develop the situation to allow the commander to effectively use the protected force. BCT units perform their security operations as an organization or with reinforcements (engineer units). Security operations are typically shaping operations and are an essential part of all offensive and defensive operations. Each of the three primary forms of security operations (screen, guard, and cover) provide differing levels of protection and early warning to the force or facility for which they are providing security. The type and level of engineer support also varies for each form of security operations. (Refer to FM 3-20.96, FM 3-90, and FM 3-90.6 for more information on security operations in the BCT.)

OPERATIONS

4-1. Security is essential to protect and conserve combat power. Security operations are conducted by a military unit, an activity, or an installation to protect itself against all acts designed to (or that may) impair its effectiveness. Security operations are inherent in every military operation. The purpose is to deny the enemy knowledge of what the friendly force is doing. Security may be achieved by establishing protective measures or by conducting deception operations that confuse and dissipate enemy attempts to interfere with the force being secured. Effective security prevents the enemy from gaining an unexpected advantage over friendly forces. Each commander is responsible for the security of his force. Security operations orient on friendly forces and focus on providing BCT forces reaction time, maneuver space, and protection. When properly task-organized, augmented, and supported, various elements assigned to or supporting a BCT may perform security operations.

4-2. The modular BCT design added an RS to each BCT to serve as the BCT commander's eyes and ears, with reconnaissance as its primary role. The current patterns of operations stress fighting noncontiguous battles over a larger AO. Battalions operate farther apart, presenting significant gaps on the battlefield. Given these conditions, the RS is called upon with increased frequency to perform security missions. Because the RS lacks organic engineers, augmentation may be required from EAB. However, organic engineer forces within the BCT may be task-organized internally to support the RS, but this requires commanders to accept a level of risk. Engineers in this role provide assured mobility to the RS (security force) through M/CM/S and geospatial support.

4-3. Security operations consist of five fundamentals that engineers supporting the security force must understand. (See FM 3-20.96, FM 3-90, and FM 3-90.6 for further details on these fundamentals.) The five fundamentals for security operations are—

- Provide early and accurate warning.
- Provide reaction time and maneuver space.
- Orient on the force, area, or facility to be protected.
- Perform continuous reconnaissance.
- Maintain threat contact.

PLANNING CONSIDERATIONS

4-4. In addition to the considerations applicable to the specific type of security mission, the commander assigning a security mission (along with the security force commander and his supporting engineer) must address special considerations. These considerations include, but are not limited to—

- BCT commander's intent, security guidance, and CCIR.
- Force or area to be secured.
- Location and orientation of the security area.
- Initial location and types of observation posts (OPs) if applicable.
- Time allocated to establish the security force.
- Criteria for ending the security mission.
- Task organization and augmentation of security forces.
- Augmentation of security forces.
- Intelligence support to security operations.
- Special requirements or constraints.
- FS planning.
- Integration of ground and air operations.
- Engineer effort plan, including—
  - Mobility (route reconnaissance and clearance).
  - Countermobility (situational and point obstacles).
  - Survivability (fighting, protective positions, hardening of C2 elements, key equipment and facilities).
  - Engineer reconnaissance.
  - Integration of fires with the situational obstacle plan.
  - Reports.
  - Positioning of C2 and sustainment assets.
  - Sustainment.

ENGINEER EFFORT

4-5. Planning for engineer support to security operations involves each of the engineer functions, although the focus remains on combat engineering (M/CM/S). The amount and type of combat and general engineering support varies according to the type of security mission and the mission variables. Geospatial engineering support also varies, but the requirement to include it for all operations remains a constant. The amount and type of engineer augmentation is critical since the organic engineer capabilities of each of the BCTs are limited and, in some cases, completely lacking necessary engineer equipment or focused expertise. A general list of engineer tasks supporting security operations include, but are not limited to—

- Provide geospatial support.
- Develop EAs.
- Develop the situational obstacle plan integrated with BCT decision points.
- Develop and execute the survivability plan.
- Plan and emplace tactical obstacles to support the security mission.
- Integrate fires with tactical obstacles and the situational obstacle plan.
- Occupy engineer-focused or specific OPs, over-watching bridges, ford sites, point obstacles, and reserve demolition targets.
- Ensure the mobility of the security force.
- Maintain mobility along key routes and trails (combat roads and trails).
- Provide tactical bridging.
- Support the identification of key enemy engineer equipment, to include breaching assets.

- Support the forward or rearward passage of lanes (open and close passage lanes, mark lanes and passage points, and provide guides through passage points).
- Breach enemy obstacles affecting the guard force.
- Breach obstacles as required.
- Fight as engineers.

SCREEN MISSION

4-6. A force providing a screen is tasked to maintain surveillance; provide early warning to the main body; or impede, destroy, or harass enemy reconnaissance within its capabilities without becoming decisively engaged. A screen may be stationary or moving and may be conducted to the front, flanks, or rear of a BCT or to the flanks or rear (but not in front) of a moving BCT. Generally, the BCT assigns screen missions to the RS, although any subordinate maneuver unit can conduct screens.

4-7. The screen is appropriate when operations have created extended flanks, when gaps exist between maneuver units that cannot be controlled, or when early warning is required in gaps that are not considered critical enough to require security in greater strength. This permits the protected force commander to maximize the security effort where contact is most expected.

4-8. A security force normally conducts a screen by establishing a series of OPs and patrols to ensure adequate surveillance of the assigned area. The commander uses reconnaissance patrols (mounted, dismounted, and aerial), relocates OPs, and employs technical assets to ensure continuous and overlapping surveillance. The commander also employs terrain database analytical support systems to ensure the integration of reconnaissance and surveillance assets to provide necessary coverage.

4-9. Unless the commander orders otherwise, a security force conducting a screen performs certain tasks within the limits of its capabilities. A unit can normally screen an AA two echelons larger than itself, such as a battalion scout platoon screening a battalion-size AA or a cavalry troop screening a regimental- or brigade-size AA. If a security force does not have the time or other resources to complete all of these tasks, the security force commander must inform the commander assigning the mission of the shortfall and request guidance on which tasks must be completed and their priority. If the security unit commander determines that he cannot complete an assigned task after starting the screen, such as maintaining continuous surveillance on all AAs into an AO, he reports and awaits further instructions. Normally, the main force commander does not place a time limit on the duration of the screen, as doing so may force the screening force to accept decisive engagement. Screen tasks—

- Deny enemy ground elements passage through the screen undetected and unreported.
- Maintain continuous surveillance of all AAs larger than a designated size into the area under all visibility conditions.
- Destroy or repel all enemy reconnaissance patrols within their capabilities.
- Locate the lead elements of each enemy advance guard and determine their direction of movement in a defensive screen.
- Maintain contact with enemy forces and report any activity in the AO.
- Maintain contact with the main body and any security forces operating on its flanks.
- Impede and harass the enemy within its capabilities while displacing.

4-10. Typical engineer tasks may include engineer reconnaissance, selected hardening to support survivability, the improvement of combat roads and trails to support mobility, and the emplacement of situational obstacles to support countermobility. Situational obstacles may be used to disrupt and delay the threat (in conjunction with indirect and direct fires) in EAs. (FM 90-7 [to be revised as FM 3-90.13] provides specific guidance for planning situational obstacles.)

GUARD MISSION

4-11. A unit performing a guard mission has the primary task of protecting the main force by fighting to gain time and allow freedom of maneuver for the protected force, while observing and reporting

information on enemy actions and changes to the terrain. A guard force prevents enemy ground observation of and direct fire against the main body by reconnoitering, attacking, defending, and delaying. Usually, the BCT assigns a guard mission to one of its maneuver units (such as a CAB or infantry battalion); however, when augmented, the RS can perform guard operations under certain conditions.

4-12. A guard mission differs from a screen mission in that a guard force may be offensive or defensive in nature, and the guard force is resourced with sufficient combat power to defeat, cause the withdrawal of, or fix the lead elements of a specific enemy ground force before it can engage the main body with direct fire. A guard force routinely engages enemy forces with direct and indirect fires. A screening force, however, primarily uses indirect fires or close air support (CAS) to destroy enemy reconnaissance elements and slow the movement of other enemy forces. A guard force uses all means at its disposal (including decisive engagement) to prevent the enemy from penetrating to a position where it could observe and engage the main body. It operates within the range of the main body FS weapons, deploying over a narrower front than a comparable-sized screening force to facilitate the concentration of combat power.

4-13. A guard mission is appropriate when—

- Contact is expected.
- There is an exposed flank or a threat force to the rear.
- The protected force is conducting a retrograde operation.
- There is a requirement for greater protection than a screen.

4-14. A unit conducting a guard mission performs the tasks below within its capabilities unless otherwise directed to alter this list. If a unit does not have the time or other resources available to complete all of these tasks, it informs the commander assigning the mission and requests guidance on how to adjust the task list. Guard tasks include the following:

- Destroy the enemy advance guard.
- Maintain contact with enemy forces and report activity in the AO.
- Maintain continuous surveillance of AAs into the AO under all visibility conditions.
- Impede and harass the enemy within its capabilities while displacing.
- Cause the enemy main body to deploy, and report its direction of travel.
- Allow no enemy ground element to pass through the security area undetected and unreported.
- Destroy or cause the withdrawal of all enemy reconnaissance patrols.
- Maintain contact with its main body and any other security forces operating on its flanks.

4-15. Whether the guard is for a stationary (defending) or moving (attacking) force, the various types of guard missions and the knowledge of the terrain and enemy dictate the specific task organization of the guard force. The guard force commander normally plans to conduct the guard mission as an area defense, delay, zone reconnaissance, or movement-to-contact mission within the security area. The three types of guard operations are as follows:

- **Advance.** An advance guard for a stationary force is defensive in nature. It defends or delays according to the main body commander's intent. An advance guard for a moving force is offensive in nature and normally conducts a movement to contact. The advance guard develops the situation so that the main body can use its combat power to the greatest effect. The advance guard is also responsible for clearing the axis of advance or designated portions of the AO of enemy elements. This allows the main body unimpeded movement, prevents the unnecessary delay of the main body, and defers the deployment of the main body for as long as possible.
- **Flank.** A flank guard protects an exposed flank of the main body. A flank guard is similar to a flank screen, except that the commander plans defensive positions in addition to OPs.
- **Rear.** The rear guard protects the exposed rear of the main body. This occurs during offensive operations when the main body breaks contact with flanking forces or during a retrograde operation. The commander may deploy a rear guard behind both moving and stationary main bodies.

4-16. Engineer augmentation is often required for the BCT to support a guard mission. In an offensive guard, the priority of engineer effort likely focuses on mobility. During a defensive guard, priority typically focuses on countermobility and survivability. Geospatial support to the BCT is required for all guard missions.

COVER MISSION

4-17. A cover mission is a type of security operation that protects the force from surprise, develops the situation, and gives commanders time and space in which to respond to enemy actions. A covering force accomplishes all the screening and guard force tasks. Additionally, a covering force is a self-contained force capable of operating independently of the main body, unlike a screening or guard force. Therefore, the covering force must have substantial combat power and engineer augmentation to engage the enemy and accomplish its mission.

4-18. Engineer considerations for a covering force mission are similar to those of a guard mission. Since a covering force operates independently from the main body, engineer augmentation of a task-organized engineer battalion is almost certainly required. It is critical during initial planning that the requirement for engineer augmentation be recognized and the task organization changed to reflect the necessary engineer augmentation to the unit performing the cover mission. Countermobility plays a critical role for the covering force. Properly integrated obstacles assist the security (cover) force in maintaining a mobility advantage over the enemy and reducing the tempo of enemy operations during offensive and defensive cover missions. In offensive cover, a commander can employ situational obstacles covered by fire on the flanks of an advancing force to provide additional security and assure the mobility of the force. For a defensive cover mission, the higher commander may decide to initially mass engineer support in the security area and then shift support to the main battle area (MBA) once those units are prepared to begin developing their respective EAs. Engineers enhance the mobility of the security force by identifying repositioning routes and task-organizing engineers to provide in-stride breaching capability against obstacles (enemy, friendly, and natural).

OPERATIONAL AREA SECURITY

4-19. Area security operations focus on protecting friendly forces, installations, routes, and actions within a specified area. This includes reconnaissance and security of the area specified for protection (personnel, airfields, unit convoys, facilities, MSRs, LOCs, terrain features, towns, equipment, critical points). Area security is conducted to deny the threat the ability to influence friendly actions in a specific area or to deny the threat use of an area for its own purposes. It may entail occupying and establishing a 360° perimeter around the area being secured or taking actions to destroy threat forces already present. Area security operations may require engineer augmentation (depending on METT-TC) to execute the wide variety of supporting operations and tasks.

TASKS

4-20. When conducting an area security mission, the BCT prevents threat ground reconnaissance elements from directly observing friendly activities within the area being secured. These missions may be conducted by the RS or subordinate elements of the BCT. They prevent threat ground maneuver forces from penetrating the defensive perimeter by employing a variety of techniques (OPs, BPs, ambushes, combat outposts). A reserve or quick-reaction force (QRF) is used to respond to unforeseen contingencies providing area security. Other missions or tasks that support area security may include the following:

- Establish a perimeter when the area being secured is not tied into an adjacent unit.
- Screen along zones of separation or other designated areas.
- Conduct route security of critical LOCs.
- Conduct checkpoint operations.
- Maintain an observable presence through demonstrations.

ENGINEER DUTIES

4-21. The type and amount of engineer support for area security missions depends on METT-TC and may require extensive engineer augmentation. Engineer requirements may span a wide range of engineer tasks. Mobility support requirements may include clearing areas to be occupied of EH and other obstacles. Engineer countermobility efforts support establishing perimeters and checkpoints (integration of hasty protective obstacles for local unit security). The level of required protection determines the degree of survivability effort and the type and amount of engineer augmentation required. Organic and augmenting combat engineers can provide lower-end hardening (CCD through the construction of protective positions [earth berms, dug-in positions]). Augmentation with general engineer units may be required, especially in hardening existing structures or protecting critical infrastructure. (See FM 5-103 for more information on survivability and integrating protection into the operations process.)

ROUTE SECURITY

4-22. Route security is a subset of area security. The purpose of route security is to prevent a threat from attacking, destroying, seizing, containing, impeding, or harassing traffic along the route. It also prevents the threat from interdicting traffic by emplacing obstacles on or destroying portions of the route. Route security operations are defensive in nature and, unlike screen or guard operations, are terrain-oriented.

4-23. Threat forces try to sever supply routes and LOCs by various methods. Roads, waterways, and railways may be mined; ambush sites may be located adjacent to the route being secured; or bridges and tunnels may be destroyed by demolitions. Because of the nature of this mission, long routes may be extremely difficult to secure; however, measures can be enforced to reduce the effect of threat forces on the routes.

TASKS

4-24. A route security force operates on and to the flanks of a designated route. Since most BCTs have only two maneuver battalions available for decisive operations, the RS may be used in an economy-of-force role to secure critical MSRs or other routes. To accomplish the route security mission, the force performs the following functions:

- Conduct continuous mounted and dismounted reconnaissance of the route and key locations along it to ensure that the route is trafficable.
- Conduct route clearance at irregular intervals to prevent the emplacement of EHs along the route.
- Identify sections of the route to search suspected threat locations.
- Establish roadblocks and checkpoints along the route and lateral routes to stop and search vehicles and persons on the route and entering the route.
- Occupy key locations and terrain along or near the route. If possible, establish a screen that is oriented to prevent threat direct-fire weapons and observation from influencing the route.
- Conduct ground and aerial patrols and surveillance aggressively to maintain route security.
- Establish OPs (covert, overt) or ambushes at critical points to watch for threat activity.

4-25. Route security is conducted by the following three methods:

- **Route reconnaissance.** Subordinate units of the BCT conduct route reconnaissance at irregular intervals to avoid developing a pattern that the threat may exploit. Companies or troops reconnoiter the route, including conducting zone reconnaissance, to a designated distance to either flank. Attached aviation assets may reconnoiter in advance of ground troops or assist in screening the flanks. In addition to reconnaissance, BCT elements may escort engineers conducting route clearance, improvement, or maintenance; clearing terrain at chokepoints or other potential ambush sites; or repairing damage caused by threat actions.
- **Cordon security.** Cordon security uses an economy-of-force technique to protect only critical sections along the route. The unit tasked to perform the mission establishes mutually supporting

combat outposts and provides roving security between them. The combat outposts are typically established at critical chokepoints or on high ground to prevent sabotage and to defend against (or respond to) attacks to interdict the route between the combat outposts. A troop or company can typically establish one or two combat outposts while a squadron or battalion can establish up to six combat outposts, based on mission variables. A squadron or battalion can provide route security by combining cordon security at two or more locations with periodic route reconnaissance conducted along the rest of the route. Combat outposts should include or be supported by FS assets (mortars, howitzer sections, and in select cases close air or gunship support) that are capable of massing fires in support of the combat outposts and the operations between them. Patrols are conducted at irregular intervals between the outposts based on threat trends and recent activities. Patrols must be organized with sufficient combat power to destroy near ambushes and to survive initial threat contact from far ambushes. Each combat outpost maintains a QRF to respond to threat activity or reinforce patrols. These QRFs maneuver to destroy threat forces or extract friendly forces.

- **Combat security.** Combat security requires a squadron or battalion to take actions to seize or secure the terrain necessary to secure the entire route. This is the most difficult route security method because it requires more resources. The tasked unit conducts an initial route reconnaissance, while follow-on units screen either flank, establish checkpoints at access points to control access, and establish combat outposts at critical choke points. As time and forces allow, defensive positions are established on key terrain with subsequent positions prepared to support OPs on the screen line. Checkpoints are established at intersections, start points (SPs), and release points (RPs) to monitor and control nonmilitary traffic. They may also be established at irregular intervals to stop and search vehicles and personnel. Checkpoints should be sited along the route or in terrain that does not allow travelers to observe them from a distance and thereby avoid the checkpoint holding area. As in cordon security, the combat outposts established at critical chokepoints include sensors to provide early warning from immediate and surrounding areas. All positions must be defensible with reinforced fighting positions that enable a defense until the element is relieved or reinforced. (See FM 5-103 for a discussion of entry control points and facilities.)

ENGINEER DUTIES

4-26. Engineers may be called upon to provide route reconnaissance, route clearance, and route maintenance in support of route security missions. Augmentation may be required for specialized engineer assets to clear the routes of EH or other obstacles. Engineers organic to the BCT focus on the mobility of the unit performing the mission. Engineers are also needed to assist with the hasty construction of checkpoints and for possibly constructing barriers that route traffic to designated search areas. The priority of engineer effort is generally focused on mobility first, then survivability, and finally countermobility. Engineer geospatial support assists in the planning, preparation, execution, and assessment of the mission. This includes supporting the analysis of potential ambush sites or locations where the enemy could affect friendly forces or local civilian traffic with obstacles or the emplacement of IEDs and other EHs. (See FM 3-34.2 and FM 3-90.119 for more information.)

CONVOY SECURITY

4-27. Convoy security operations are conducted to protect convoys when insufficient friendly forces are available to continuously secure LOCs in an AO. They may also be conducted in conjunction with route security operations. Figure 4-1, page 4-8, depicts an example of a CAB conducting a convoy security mission. A convoy security force operates to the front, flanks, and rear of a convoy element moving along a designated route. Convoy security missions are offensive in nature and orient on the force being protected. (See FM 3-90.)

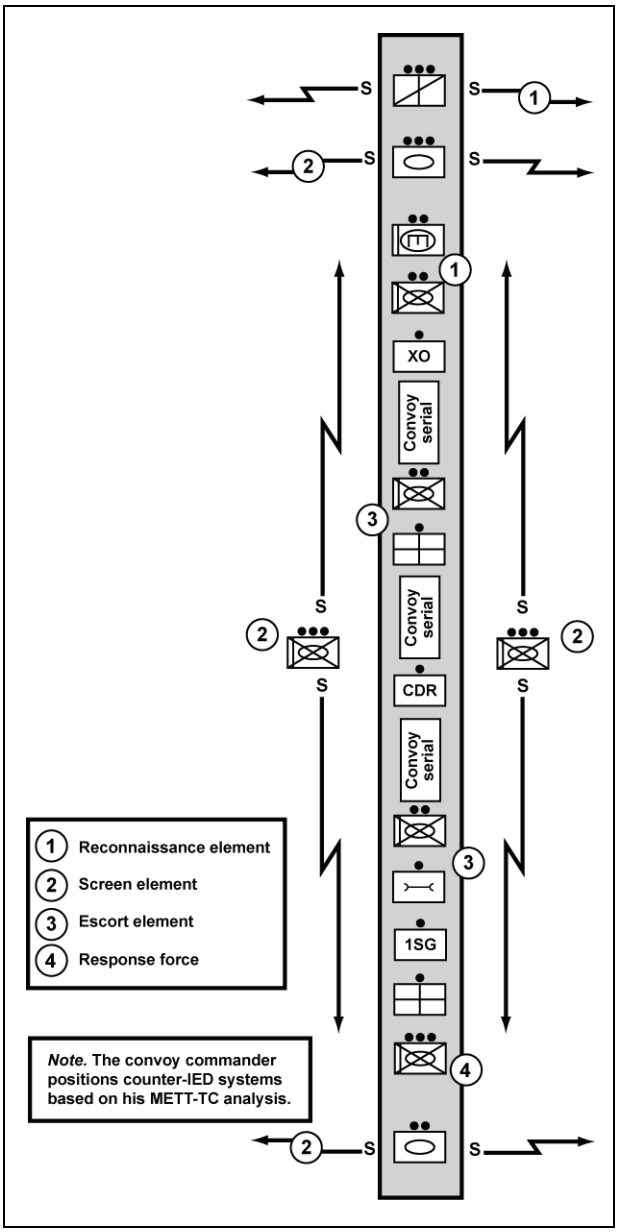


Figure 4-1. CAB conducting convoy security

CRITICAL TASKS

4-28. A convoy security mission has certain critical tasks that guide planning and execution. To protect a convoy, the security force must accomplish the following:

- Reconnoiter the convoy route.
- Clear the route of obstacles or positions from which the threat could influence movement along the route.
- Provide early warning and prevent the threat from impeding, harassing, containing, seizing, or destroying the convoy.

ORGANIZATION

4-29. The convoy security force consists of the following four elements:

- **Reconnaissance.** The reconnaissance element performs tasks associated with route reconnaissance forward of the convoy. It may also perform duties of the screen element.
- **Screen.** The screen element provides early warning and security to the convoy flanks and rear. It may also perform duties of the reconnaissance element.
- **Escort.** The escort element provides local protection to the convoy. It may also provide a response force to assist in repelling or destroying threat contact.
- **Response.** The response force provides firepower and support to assist the other elements in developing the situation or conducting a hasty attack. It may also perform duties of the escort element.

PROCEDURES

4-30. Commanders plan and execute all troop and supply movement as tactical operations. Because of the inherent dangers of convoy operations, emphasis is on extensive security measures, which include—

- Secrecy when planning and disseminating orders, strict noise and light discipline during movement, and varying routes and schedules.
- Coordination with FS or aerial support units to ensure that they understand how support is used to assist movement in enforcing preventive measures and in conducting close, continuous support of combat operations.
- Maneuver for counter-ambush actions, including contingency plans for immediate actions against an ambush and the use of formations, which allow part of the column to be in position to maneuver against an ambush force.
- Communications and coordination with supporting units and units along the route, adjacent HN forces, and higher headquarters (airborne radio relay assets).
- Coordination with the supported unit moving in the formation, including C2, locations for leaders, communications, medical support, and weapon systems.
- Intelligence information to be gathered from local civilians along the movement route (possible enemy ambush sites).

4-31. Convoy security missions generate unique requirements that the commander must consider when formulating a plan. The convoy security commander and his subordinates are briefed on the latest information regarding the threat situation and the area through which the convoy will pass. The commander formulates his plans and issues his orders, including commander's intent, assignment of troops as security force elements (reconnaissance, screen, escort, response), the movement formation, intervals between echelons and vehicles, rate of travel, and detailed plans for actions on contact. Immediate action drills (enemy ambush, obstacle, reaction to indirect fire) must be identified and rehearsed prior to movement and executed in case of contact.

ENGINEER DUTIES

4-32. Combat engineers have the capability to conduct convoy security operations. They are best-suited for the reconnaissance or escort element. Limited additional training may be required, but due to the nature of combat engineer operations, they can fulfill any or all of the tasks associated with convoy security when properly equipped. Geospatial support will help commanders identify choke points, potential ambush locations, or potential road condition concerns during the IPB.

This page intentionally left blank.

Chapter 5
Engineer Support to Lethal and Nonlethal Fires

The clever combatant imposes his will on the enemy, but does not allow the enemy's will to be imposed on him.

—Sun Tzu

The fires warfighting function is the related tasks and systems that provide collective and coordinated Army indirect fires, joint fires, and C2 warfare (including nonlethal fires) through the targeting process. It includes tasks associated with integrating and synchronizing the effects of these types of fires with the effects of other warfighting functions. Lethal and nonlethal fires (including C2 warfare) are integrated in the concept of operations during planning and targeting, based on targeting guidance. Engineer operations contribute significant combat power (lethal and nonlethal) to all elements of full spectrum operations. As part of the combined arms team, engineer planners participate in the targeting process for the use of lethal and nonlethal fires to ensure the integration of appropriate engineer capabilities. This chapter discusses the targeting process for planning and coordinating lethal and nonlethal fires within the BCT, along with prescriptive considerations for engineer planners.

FIRE SUPPORT PLANNING AND COORDINATION

5-1. FS is the collective and coordinated use of indirect-fire weapons, armed aircraft, and other lethal and nonlethal weapons in support of the commander's operational concept. The commander influences the battle by shaping with fires, with a focus on accomplishing the FS essential tasks that the BCT requires to accomplish the mission.

5-2. FS planning and coordination begins with mission receipt and continues throughout the operation. Its purpose is to synchronize all available FS into the BCT scheme of maneuver. This is done primarily through the inclusion of FS in the planning process. The BCT develops a concept of fires which is then translated into a scheme of fires by assigning FS tasks and allocating assets and effects to subordinate units. As part of the concept of fires, it is the BCT's responsibility to set conditions for and provide indirect fires to maneuver battalions engaged in the BCT decisive operation. The BCT provides fires in support of the maneuver battalion close fight for a specific period of time or for a specific purpose. The BCT must clearly specify the priority of fires. Refinements to the BCT scheme of fires from subordinate units are integrated by essential FS tasks. Finally, the BCT integrates the movement and positioning of artillery units with the scheme of maneuver.

LETHAL AND NONLETHAL FIRES

5-3. There is an inherent complementary relationship between the use of lethal force and the application of military capabilities for nonlethal purposes. Lethal and nonlethal actions used together complement each other and create dilemmas for the opponent, although each situation requires a different mix of violence and restraint. Lethal means are at the heart of offensive and defensive actions, and their application is critical to success in these operations. However, nonlethal means are becoming increasingly important. Today's threat operates from populated areas, wary of U.S. combat capabilities and welcoming the potential carnage to noncombatants when combat erupts. They use IO effectively to dramatize any harm inflicted on noncombatants by friendly forces. Nonlethal, constructive actions can persuade the local population to withhold support for adversaries and provide intelligence to friendly forces. This can force the enemy to choose between abandoning an area and exposing forces to lethal combat. Commanders analyze mission variables to achieve a balance between lethal and nonlethal actions.

5-4. IO are defined as the integrated employment of the core capabilities of electronic warfare (EW), computer network operations, psychological operations (PSYOP), military deception, and operations security (OPSEC) (in concert with specified supporting and related capabilities) to influence, disrupt, corrupt, or usurp adversarial human and automated decisionmaking while protecting U.S Soldiers (see FM 3-0). IO influence perceptions and engage enemies, adversaries, neutral groups and individuals, and supporters to affect actions and generate a range of effects that contribute to mission accomplishment.

5-5. Lethal fires attempt to destroy their targets through blast, penetration, and fragmentation. Nonlethal fires are any fires that do not directly seek the physical destruction of the intended target and are designed to impair, disrupt, or delay the performance of enemy forces, functions, and facilities. PSYOP, EW, and other C2 countermeasures are all nonlethal fire options.

5-6. Commanders consider the entire depth of their AOs, the enemy, the information environment, and civil considerations and act in the times and places necessary to achieve their objectives. Army forces increase the depth of their operations through combined arms, advanced information systems, and joint capabilities. Because Army forces conduct operations across large areas, enemies face many potential friendly actions. Depth is equally important in stability operations to preclude threats from operating outside the reach of friendly forces, where they can affect the operation. In civil support operations, depth gives the Army its ability to reach all citizens in an affected area, bringing relief and hope.

BRIGADE COMBAT TEAM FIRES CELL

5-7. The BCT FC is organic to the BCT headquarters and acts as the BCT CP functional cell for the fires warfighting function. The FC is the centerpiece of BCT-targeting architecture, focused on lethal and nonlethal target sets. It coordinates activities and systems that provide collective and coordinated use of Army indirect fires and joint fires. This includes tasks associated with targeting and the targeting process. The FC integrates lethal and nonlethal fires through the targeting process.

5-8. The FC is headed by the fire support coordinator (FSCOORD), and as shown in figure 5-1, includes an operations element, a plans and targeting element, and a U.S. Air Force (USAF) tactical air control party (TACP). The operations element tracks and maintains SU of all FS assets in the BCT. Its main function is to execute current operations focused on the decisive fight. The principal functions of the plans and targeting element are planning for future operations and targeting and shaping the BCT. The primary mission of the TACP is to advise the shaping BCT commander on the capabilities and limitations of air power and to assist in planning, requesting, and coordinating for CAS.

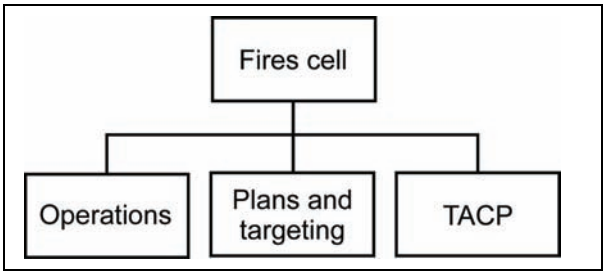


Figure 5-1. FC in the BCT

TARGETING PROCESS

5-9. The targeting process synchronizes the effects of fires and IO with the effects of other warfighting functions. The targeting process determines what targets to attack to achieve the BCT commander's desired effects and how, where, and when to attack them.

5-10. The targeting process is based on the four functions of decide, detect, deliver, and assess (D3A). Like other integrating processes, the targeting process is cyclical and occurs continuously throughout an operation. Its steps mirror those of the operations process (plan, prepare, execute, and assess). Targeting

occurs within the MDMP and continues after the order is published, validating previous D3A decisions while planning for future decisions. Table 5-1 provides an overview of targeting-process functions and their relationship to the MDMP. (See FM 5-0, appendix H, for more detailed information on the targeting process.)

Table 5-1. MDMP targeting process

Targeting-Process Function	*MDMP Step*	*Targeting Task*
Decide	Mission analysis	• Perform a TVA to develop FS- and IO-related high-value targets (HVTs). • Provide FS and IO input to targeting guidance and objectives.
	COA development	• Designate potential HPTs. • Deconflict and coordinate potential HPTs.
	COA analysis	• Develop the HPTL. • Establish TSS. • Develop the AGM. • Determine MOP and MOE for BDA requirements.
	Orders production	• Finalize the HPTL. • Finalize TSSs. • Finalize the AGM. • Submit IRs and RFIs to the S-2.
Detect		• Execute the ISR plan. • Update PIRs and IRs as answered. • Update the HPTL and AGM.
Deliver		• Execute attacks according to the AGM. • Execute IO tasks.
Assess		• Assess task accomplishment (as determined by MOP). • Assess effects (as determined by MOE). • Monitor targets attacked with IO.

DECIDE

5-11. During MDMP, the decide function is primarily performed. The major targeting-related products of mission analysis are HVTs and the commander's targeting guidance. During IPB, the S-2, S-3, and FSCOORD collaborate and conduct target value analysis (TVA) for each enemy COA to identify high-value targets (HVTs). The following are produced after performing the decide function:

- **High payoff target list (HPTL).** The HPTL is a prioritized list of targets (by target set) whose loss to an enemy contributes to the success of the mission.
- **Targeting input to the intelligence synchronization plan (ISP).** The ISP allows the S-2 (with staff input) to synchronize the entire collection effort. This includes all assets the commander controls, assets of lateral units, higher echelon units and organizations, and intelligence reach to answer the CCIR.
- **Target selection standards (TSSs).** These establish criteria for deciding when targets are located accurately enough to act on.
- **Attack guidance matrix (AGM).** This lists which targets or target sets to act on, how and when to act on them, and the desired effects.
- **Target synchronization matrix (TSM).** This combines data from the HPTL, ISP, and the AGM. It lists high payoff targets (HPTs) by category and the agencies responsible for detecting them, attacking them, and assessing the effects of the attacks.

5-12. The FSCOORD and information operations staff officer (S-7) work together to ensure that the BCT nonlethal targeting effort is integrated and properly coordinated with higher, adjacent, and subordinate units. BCTs can conduct two distinct targeting processes (one for lethal [FS] and another for nonlethal [IO]

attack) or merge both processes into one. In either case, the targeting process (D3A) works equally well. Although targeting objectives and effects may differ between IO and conventional targets, the main difference is that IO targets are generally soft targets (frequently, civilian personnel) as opposed to conventional targets (normally, enemy units or equipment) to be destroyed or damaged. The S-2 and the S-7 work together to identify enemy IO capabilities and vulnerabilities, which become IO-related targets. The IO cell or the IO working group analyze these targets and provide the targeting working group with IO-related HVTs for consideration.

DETECT

5-13. The detect function involves locating HPTs accurately enough to engage them. Characteristics and signatures of the relevant targets are determined and then compared to potential attack system requirements to establish specific sensor requirements. Information needed for target detection is expressed as PIR or IR to support the attack of HPT and associated essential tasks for FS. As target acquisition assets gather information, they report their findings back to the commander and staff. Detection plans, priorities, and allocations change during execution, based on the mission variables.

DELIVER

5-14. The deliver function occurs primarily during execution, although some IO-related targets may be engaged while the command is preparing for the overall operation.

ASSESS

5-15. The assess function occurs throughout the operations process but is most intense during execution.

RESPONSIBILITIES

5-16. The following are responsibilities of commanders and staff:

- **BCT commander.** The BCT commander's intent focuses and drives the targeting process. He approves the recommendations of the targeting working group.
- **BCT XO.** The BCT XO usually chairs the targeting meeting. Although the BCT commander must approve the initial targeting products that accompany an OPLAN or OPORD, the XO or deputy commanding officer (DCO) may be the approval authority for modifications to targeting products.
- **FSCOORD.** The FSCOORD is the special staff officer (field artillery [FA] lieutenant colonel permanently assigned as a full-time FS staff advisor to the BCT commander and staff) responsible for BCT fires, which include Army indirect fires and joint fires. He advises the BCT commander and staff on all aspects of indirect fires planning, coordination, and execution in support of BCT operations. The FSCOORD also facilitates the targeting working group meeting.
- **BCT S-7.** The BCT S-7 is responsible for planning, coordinating, integrating, and synchronizing IO. Working with the FSCOORD, he advises the commander on IO effects in the context of planned lethal and nonlethal fires in support of tactical operations. Advice is focused on the capabilities and vulnerabilities of friendly, neutral, and adversarial IO systems.
- **BCT S-2.** The BCT S-2 prepares the ISR plan and maintains information on the current enemy situation and provides assessment of possible enemy actions, conducts analyses, and identifies targets based on the commander's guidance. The S-2 also provides enemy capabilities and COAs, provides IPB products, and develops HVTs.
- **BCT S-3.** One of the BCT S-3's primary-targeting responsibilities is providing a detailed interpretation of the commander's concept of the operation to help in deciding when and where targets should be attacked. The S-3 also chairs the targeting meeting in the absence of the XO and DCO.
- **Air liaison officer (ALO).** The ALO is a special staff officer responsible for coordinating USAF support of BCT operations, including CAS, air interdiction, air reconnaissance, airlift,

and joint suppression of enemy air defenses (SEAD). The ALO is a senior USAF officer, usually a major. The ALO directs the BCT TACP, supervises forward air controllers (FACs), and processes air support requests for the BCT.

- **Targeting officer.** The targeting officer in the FC facilitates the exchange of information between the BCT S-2 and subordinate fires cells. The targeting officer's primary responsibilities are to help the S-2 and S-3 develop the ISR plan, develop the AGM, produce the TSS, and manage target lists.
- **Electronic attack officer.** The electronic attack officer's targeting responsibilities include determining HPTs to engage with electronic attack and coordinating tasking requirements for electronic attack assets.
- **Public affairs officer (PAO).** The PAO is on the commander's personal staff, but often participates in targeting, especially those with nonlethal effects. The primary duty of the PAO is advising the commander of the public affairs (PA) impacts and implications of planned or current operations. The PAO monitors media and public opinion and facilitates media efforts to cover operations by expediting the flow of complete, accurate, and timely information.
- **BCT PSYOP officer.** The BCT PSYOP officer is responsible for planning, integrating, and monitoring all tactical PSYOP within the BCT AO. The PSYOP officer advises the BCT commander and staff on the psychological effects of BCT operations on the indigenous population and serves as the commander's resident staff expert on culture and psyche. As a member of the FC, the PSYOP officer coordinates, synchronizes, and deconflicts PSYOP with IO. The PSYOP officer plans, coordinates, and monitors BCT operations that focus on influencing, informing, deceiving, disrupting, delaying, degrading, or destroying adversary INFOSYS.
- **BCT civil affairs staff officer (S-5).** The BCT S-5's targeting responsibilities include providing advice on the effects of friendly actions on the civilian population, providing input to the restricted target list, and providing assessments on the effectiveness of CA activities.
- **Brigade judge advocate (BJA).** The BJA serves as both a personal and special staff officer. As a personal staff officer, the primary duty of the BJA is to advise the commander on operational, military, administrative, and fiscal law and all other areas of the law as required. As a special staff officer, the BJA (or the operational law judge advocate or trial counsel) provides legal advice regarding ROE, targeting, and other legal aspects of the operation.
- **ENCOORD.** The ENCOORD plays a vital role in targeting lethal and nonlethal fires. The ENCOORD's major role is ensuring that lethal fires are integrated with obstacles to provide desired effects and planning and coordinating artillery-delivered and tactical aircraft-delivered SCATMINES. The ENCOORD ensures these obstacles meet the BCT commander's intent and are placed in the most advantageous location with reinforcing terrain. The ENCOORD also—
  - Participates in the targeting working group and attends targeting meetings (discussed further in the following text).
  - Coordinates for establishing critical friendly zones (CFZs) at planned breach and crossing sites.
  - Coordinates the survivability effort to protect critical FS assets (radars).
  - Advises the BCT commander and FC on environmental considerations (as the integrator) that may be affected by lethal fires.
  - Advises the staff on possible damage to local infrastructure (as the integrator) which could adversely affect the attitude of the local population.
  - Advises the commander of impacts on assured mobility caused by lethal fires.

MEETINGS

5-17. During the execution phase of operations, the targeting working group (chaired by the XO) continually assesses the current situation, tracks decision points, prepares update briefs for the commander, and looks toward the future (generally 24 to 36 hours at the BCT level, depending on the mission). The

targeting meeting provides a forum for the BCT to extend the FS planning that was conducted during the MDMP throughout the operation, allowing the targeting working group to reconsider "who kills whom" decisions and modify or initiate actions to implement those decisions.

5-18. The targeting meeting is an important event in the BCT battle rhythm. It focuses and synchronizes BCT combat power and resources toward finding, tracking, attacking, and assessing HPTs. The following occur during the targeting meeting:

- The HPTL is verified and updated.
- Available collection assets for each HPT are verified, updated, and retasked.
- Delivery systems to engage each target (lethal and nonlethal) are allocated.
- The assets tasked to verify the effects on a target after it has been attacked are confirmed.
- Lethal and nonlethal actions (including IOs) are synchronized.
- FS and IO assets to generate the desired lethal and nonlethal effects are synchronized.

Engineer Coordinator Participation in Targeting Meetings

5-19. Preparation and focus are keys to successful targeting meetings. Each representative must come to the meeting prepared to discuss available assets, capabilities, and limitations related to their staff area. Much of this preparation requires time-consuming, detailed planning and coordination with other staff elements well in advance. Prior to attending the targeting meeting, the ENCOORD—

- Gathers technical information available on enemy engineer units or equipment that are potential HPT nominations, to include their relative location on the battlefield.
- Gathers technical information on the employment of SCATMINEs.
- Has recommendations for air-tasking order nominations (normally based on a 72-hour cycle) for tactical air-emplaced SCATMINES.
- Updates the engineer portion of the intelligence update based on new information on enemy engineer units, activities, or obstacles (known or predicted) based on results of ISR or engineer reconnaissance.
- Provides updates on the effects of terrain based on engineer analysis, GEOINT, or reconnaissance.
- Provides additional geospatial products, as necessary, to support targeting decisions.
- Is prepared to provide input to the restricted target list based on environmental considerations.

Engineer Considerations for Information Operations Targeting

5-20. If the BCT elects to conduct a separate IO targeting meeting or the IO cell conducts an internal IO cell meeting prior to the BCT-targeting meeting, the ENCOORD or his representative participates. Engineer participation in IO-targeting provides a medium for integrating the nonlethal effects of certain engineer capabilities. It also provides the ENCOORD with an excellent opportunity to implement engineer requirements into the prioritization of IO, PA, and psychological operations (PSYOP) (tactical PSYOP teams [TPTs]) activities and the tasking of those limited assets within the BCT.

5-21. Although the PAO is not part of the IO cell, the PAO coordinates with nonlethal operations to ensure that disseminated information is not contradictory. The ENCOORD coordinates with PAO for the inclusion of engineer operations within BCT PA programs, which includes HN and U.S. media coverage of engineering projects.

5-22. The ENCOORD coordinates with the BCT PSYOP officer for PSYOP surveys in local communities to compare pending engineering projects with local population desires. PSYOP can also support PA programs by helping to convince the general population of the credibility of the information that is being provided by HN and U.S. forces, especially with regards to engineering projects. PSYOP can also reduce civilian interference with friendly military operations.

5-23. The engineer knowledge of public works and HN infrastructure (derived from their participation in infrastructure reconnaissance and surveys) can assist the S-7 in identifying IO-specific HVTs. Engineer planners also provide current information regarding the status and plans for engineer projects throughout the AO and AI. (See FM 3-34.170 for more information on infrastructure reconnaissance.)

5-24. Restoring the basic needs of the population is critical to winning the support of the HN. Engineering projects executed by the BCT help set conditions to achieve many of the desired nonlethal effects. These projects can facilitate positive targeting of local leaders or communities. An example of positive targeting could be the execution of a priority project that has been requested by a local political or tribal leader. When the project is accomplished, the population perceives that it was done for the local leader and legitimizes his position. The target (local leader) then becomes more favorable to friendly force operations, followed by more favorable reactions by the local population. As friendly forces receive more local support, successful operations increase. (See FM 3-13 for more information on IO.)

This page intentionally left blank.

Chapter 6
Engineer Support to Combat Operations

The tactician determines his solution by a thorough mastery of doctrine and existing TTP, tempered and honed by experience gained through training and operations. He uses his creativity to develop solutions for which the enemy is neither prepared, nor able to cope.

—FM 3-90

The modular engineer force provides mission-tailored capabilities to the BCT and ACR in all combat operations. The organic engineer company in the BCT and ACR and the organic geospatial engineering team within the BCT (or supporting the ACR) provide the minimum combat and geospatial engineering capability and some very limited and selected general engineering capability to support BCT and ACR combat operations. Based on the maneuver commander's essential tasks for M/CM/S identified early in the planning phase, the BCT and ACR are augmented by EAB modular engineer units to provide the necessary combat, general, and other specialized engineering capabilities to fulfill mission requirements. This chapter provides an overview of BCT offensive and defensive operations and discusses engineer considerations for the associated tactical requirements of each. (See FM 3-90, FM 3-90.5, and FM 3-90.6 for detailed information on offensive and defensive operations.)

TACTICAL ENABLING OPERATIONS

6-1. Tactical-enabling operations are specialized missions that units plan and conduct to achieve or sustain a tactical advantage. Units execute these operations as part of an offensive, defensive, stability, or civil support mission. Alone, enabling operations cannot assure success; however, neglecting them can result in mission failure. The fluid nature of the OE likely increases the frequency with which engineers, as part of a combined arms team, must execute tactical enabling operations.

BREACHING

6-2. Obstacle breaching is the employment of tactics and techniques to project combat power to the far side of an obstacle. Breaching is a synchronized, combined arms operation under the control of a maneuver commander. Combined arms forces apply the breaching fundamentals of suppress, obscure, secure, reduce, and assault (SOSRA) when breaching against a defending enemy.

6-3. Breaching operations begin when friendly forces employ suppressive fires and end when battle handover has occurred between a unit conducting the breaching operation and follow-on forces. Breaching is an inherent part of maneuver. Effective breaching operations allow friendly maneuver in the face of obstacles. (See FM 3-34.2 for more information on combined arms breaching operations. See appendix C for potential augmentation to this type of operation.)

GAP CROSSING

6-4. The purpose of any gap crossing is to project combat power across an obstacle to accomplish a mission. There are a number of similarities to combined arms breaching operations. A river crossing is a special type of gap-crossing operation that requires specific procedures for success because a significant amount of water is part of the obstacle that prevents normal ground maneuver. Gap crossing typically requires unique technical support and more detailed planning and control measures than normal tactical

breaching operations. The nature and size of the obstacle, the threat situation, and the available crossing assets limit the commander's options. More than likely, augmentation is required. As a result, the ENCOORD must coordinate for EAB augmentation well in advance.

6-5. The types of gap crossings are hasty, deliberate, and covert. Regardless of the type of crossing, the planning requirements and engineer technical support are similar. (See appendix E and FM 3-90.12 for more information on combined arms gap-crossing operations.)

CLEARING

6-6. *Clearing operations* are designed to clear or neutralize all EHs and other obstacles from a route or area. (FM 3-90.11) Like breaching operations and gap-crossing operations, clearing operations are a combined arms tactical enabling mission. They may include a combined arms breach, but are not limited to reducing a lane or lanes through identified obstacles.

6-7. There are two types of clearing operations: route clearance and area clearance. Combat engineers supporting clearing operations are task-organized to conduct route or area clearance. If a combined arms breach is required as part of the clearing operation, selected combat engineers and other forces are task organized specifically for the breaching operation. Bypassing or otherwise avoiding the obstacle may be preferred over a combined arms breach; however, in clearing operations the objective is to eliminate the enemy force or organized resistance within an assigned area or along an assigned route. Combat engineers within the task-organized clearance force detect and mark EHs. They then either clear the route or area (within their capability) or allow an EOD unit to respond appropriately based on the mission variables and commander's guidance. Only the EOD team is capable of eliminating or "rendering safe" an IED. (See appendix C, appendix D, and FM 3-34.2 for more information.)

IMPROVISED EXPLOSIVE DEVICE DEFEAT

6-8. With the proliferation of technology and access to explosive materials, many enemy groups have come to rely on IEDs as a primary means of attack. With a focus on clearing IEDs, the IED defeat framework is derived from the fundamentals of assured mobility (predict, detect, prevent, avoid, neutralize, and protect the force from IED attacks). Parallel to the framework of assured mobility, IED defeat framework enables commanders and staffs to exploit (proactive defeat) IED networks and associated operations before they occur.

6-9. Route clearance is a key enabling task in IED defeat. It provides the maneuver commander the capability to employ a combined arms force of combat engineers, EOD, and other units task-organized, equipped, and trained to neutralize the IED threat along critical routes. (See FM 3-90.119 for more information.)

RECONNAISSANCE

6-10. Reconnaissance operations are conducted to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy or to secure data concerning the meteorological, hydrographical, or geospatial characteristics and indigenous population of a particular area.

6-11. Engineers participate in reconnaissance and enable other reconnaissance elements by enhancing the quality of the reconnaissance. (The employment of engineer reconnaissance capabilities in support of BCT operations is discussed in chapter 3. See FM 3-34.170 for detailed information on engineer reconnaissance. See FM 3-20.96, FM 3-90, FM 3-90.5, and FM 3-90.6 for a further discussion of reconnaissance operations.)

OFFENSIVE OPERATIONS

6-12. Offensive operations aim at defeating, destroying, or neutralizing the enemy. A commander may conduct offensive operations to deprive the enemy of resources, seize decisive terrain, develop intelligence,

hold an enemy in position, or facilitate other friendly operations. Offensive operations tend to highlight the assured mobility imperatives and attack the enemy's ability to influence operating areas and maintain mobility and momentum. Engineer operations in support of offensive operations focus on enabling movement and maneuver.

6-13. The engineer running estimate (discussed in chapter 2 and appendix F) provides the framework for the ENCOORD to synchronize and integrate engineer support into offensive operations. Conducting parallel planning is vital in allowing engineer units to position critical assets and to establish linkup and task-organize to their supported units. Early linkup with supported maneuver units provides critical time for combined arms planning and rehearsals. ENCOORDs at the appropriate echelon coordinate engineer reconnaissance to support the collection of necessary OBSTINTEL and other technical information. They also coordinate the movement and positioning of any required engineer augmentation assets (combat and general engineering). Although general engineering assets can be placed in command or support relationships with the maneuver force, task-organizing these assets directly to the combat engineering unit being augmented may be more effective. General engineering assets require added time for movement with their heavy and wheeled equipment. Though the focus of supporting offensive operations is on mobility, there may be requirements for protective positions for artillery systems, ADA systems, logistics positions, and stationary C2 facilities, especially during halts in the advance. During the early planning stages, terrain analysis teams can provide information on soil conditions, vegetative concealment, and terrain masking along march routes to facilitate survivability for the force. (More planning considerations for offensive operations are discussed in chapter 2.)

CHARACTERISTICS

6-14. Surprise, concentration, audacity, and tempo characterize successful offensive operations. Maneuver commanders sustain the initiative by committing their forces aggressively against enemy weaknesses. Attacks are force or terrain-oriented and facilitate the defeat of the enemy or the continuation of the attack. Maneuver commanders extend their attacks in time and space by engaging the enemy in depth and destroying key elements of the enemy force.

Surprise

6-15. Surprise denies the enemy the opportunity to focus and synchronize combat power against the attacking force. It prevents the enemy from massing forces or fires at a critical (possibly decisive) place and time. In place of cohesive resistance, surprise can produce confusion, fear, and piecemeal resistance. Factors that contribute to surprise include the tempo and intensity in executing the attack plan and employing unexpected factors (selecting a less than optimal COA), varying operational tactics and methods, conducting deception operations, and ensuring OPSEC. An enhanced COP and terrain visualization enable engineer commanders to achieve surprise because they better understand enemy defensive preparation. Engineers achieve surprise through obstacle reduction and the use of situational obstacles. They enable surprise by rapidly overcoming obstacles, thus increasing the force tempo.

Concentration

6-16. Concentration is the massing of overwhelming effects to achieve a single purpose. The massing of effects does not necessarily mean the physical massing of forces. With advancements in ground and air mobility, target acquisition, and long-range precision fires, the concentration of effects can occur more rapidly. The concentration of reduction assets and the negative influence from the presence of fortifications and obstacle effects directly impact the maneuver unit's ability to concentrate the terminal effects of its fires. Concentration requires careful prior coordination within the combined arms team and with other Services and multinational partners as required. Engineers begin the concentration planning by integrating geospatial products and predicting threat obstacles. This effort is further enhanced with the employment of engineer reconnaissance which can provide the necessary OBSTINTEL and other technical information essential for detailed planning. This allows the maneuver force and the engineers that support them to concentrate reduction assets and overcome obstacles or other impediments at the POP as part of the maneuver unit breaching plan.

Audacity

6-17. Audacity is a simple plan of action that is boldly executed. The audacious commander is quick, decisive, and willing to take prudent risks. Engineers operating in a decentralized role, who comprehend the commander's intent, can enable the commander to see the OE and anticipate future operations. With enhanced SU, commanders can be more audacious.

Tempo

6-18. Tempo is the rate of military action. Controlling or altering this rate is a necessary means of retaining the initiative. An enhanced COP and extended operational reach allow the friendly unit to maintain a faster tempo than the enemy. Engineer speed and flexibility are crucial to the attack. Rapid mobility operations by engineers keep the maneuver force tempo. The ability to quickly reduce, mark, and guide the supported maneuver unit through an obstacle is the engineer's hallmark. The imperative of maintaining mobility and momentum is highlighted as forces focus on achieving the fundamentals of avoid, neutralize, and protect.

TYPES

6-19. The four types of offensive operations are—

- **Movement to contact (MTC).** Forces conduct an MTC to develop the situation and establish or regain contact with the enemy. On contact, the commander has five options: attack, defend, bypass, delay, or withdraw. MTCs include search and attack and cordon and search operations. (See FM 3-06.20 for more information on cordon and search operations.)
- **Attack.** An attack destroys or defeats enemy forces; seizes and secures terrain, or both. Attacks incorporate coordinated movement supported by direct and indirect fires. They may be decisive or shaping operations. Attacks may be hasty or deliberate, depending on the time available for planning and preparation. Commanders execute hasty attacks when the situation calls for immediate action with available forces and minimal preparation. They conduct deliberate attacks when there is time to develop plans and coordinate preparations along with suitable intelligence.
- **Exploitation.** Exploitation continues a successful attack to the point where enemy forces have no alternatives but surrender or flight. Commanders of exploiting forces receive the greatest possible latitude to accomplish their missions. They act with great aggressiveness, initiative, and boldness.
- **Pursuit.** Pursuits are offensive operations that follow successful attacks or exploitations. They occur when the enemy fails to organize a defense and attempts to disengage. If it becomes apparent that enemy resistance has broken down entirely and the enemy is fleeing, a force can transition to a pursuit from any offensive operation. Pursuits require rapid movement and decentralized control.

Note. See FM 3-90, FM 3-90.5, and FM 3-90.6 for more information.

Movement to Contact

6-20. Forces executing MTC seek to make contact with the smallest friendly force possible, leveraging the use of electronic and unmanned means when possible. A unit conducting an MTC normally organizes into a security force, advance guard, main body, flank guard, and rear guard. The priority for combat engineering support is typically mobility, although it may rapidly shift to countermobility in anticipation of an enemy attack. Figure 6-1 shows engineer support of an MTC. Considerations for engineers are based on mission variables. The task organization of engineers for an MTC must balance task-organizing mobility capabilities with the lead element to optimize response time and tempo without increasing the risk to the mobility of the main body or limiting the ability to mass breaching assets against complex obstacles. Time and distance factors (based on the terrain) for employing engineer assets and the potentially extreme challenges of task-organizing on the move and linking up engineers with maneuver units that may be in contact are significant considerations used in determining the ultimate task organization and positioning of combat engineer assets within maneuver formations. (See FM 3-90, FM 3-90.5, and FM 3-90.6 for more information.)

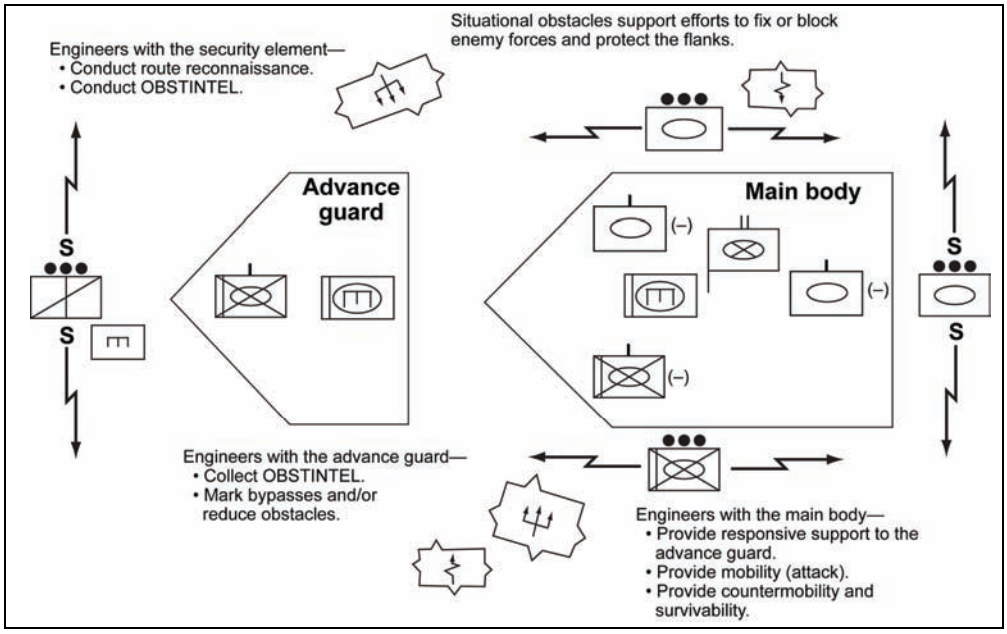


Figure 6-1. Engineer support to an MTC

Security Force

6-21. Engineers may augment the security force to reconnoiter obstacles and assist in gathering OBSTINTEL to refine breaching planning operations for follow-on forces. (See FM 3-34.170 for information on conducting engineer reconnaissance.)

Advance Guard

6-22. The composition of the advance guard is based on mission variables. Engineers may augment or follow the lead elements to locate, bypass, or breach obstacles along the main body axis of advance to ensure the uninterrupted advance of the main body. Engineers use OBSTINTEL and combat information from the security force to facilitate breaching operations. The advance guard is usually the main effort until the main body is committed. Situational obstacles support efforts to fix or block enemy forces and must be carefully executed to avoid affecting friendly maneuver. (See FM 90-7 for more information on situational obstacles.)

Main Body

6-23. The main body contains the bulk of force combat elements and is arrayed to achieve all-around security. It keys its movement to the advance guard. Engineers located within the main body are poised to support its deployment and rapid maneuver to the decisive point on the battlefield to destroy the enemy.

Flank and Rear Guard

6-24. These elements remain at a distance from the main body to prevent the enemy from surprising the main body with direct fires. Situational obstacles are used to help secure the flank. Obstacle control measures and clearly defined triggers are critical in effectively employing situational obstacles.

Attack

6-25. The success of an attack depends on skillfully massing the effects of all warfighting functions. A unit normally organizes into a security force, a main body, a reserve, and a sustainment organization. The task organization of engineers depends on the factors of METT-TC and should occur early enough to ensure

adequate time for rehearsals with the gaining or supported unit. The employment of engineer reconnaissance (discussed in chapter 3) as part of the ISR effort helps generate OBSTINTEL, which provides the necessary detailed picture of the enemy situation. If breaching operations are anticipated, the breaching organization is established based on detailed reverse planning (see appendix C). Engineer priority of effort is toward mobility, with the priority of support to the main effort. Countermobility effort, primarily through the employment of situational obstacles, is initially directed at supporting the isolation and fixing of enemy forces and protecting the flanks. Upon seizure of the objective and depending on the follow-on mission, engineers are prepared to conduct countermobility and survivability operations in support of a defense, while mobility operations center on clearing obstacles or improving lanes to support friendly movement. (See FM 3-90, FM 3-90.5 and FM 3-90.6 for more information.)

Exploitation

6-26. An exploitation rapidly follows a successful attack to take advantage of a weakened or collapsed enemy and seeks to expand an attack to the point where enemy forces have no alternative but to surrender or flee. It is normally not conducted below the BCT level. The BCT (or higher-level unit) attacks rapidly over a broad front to prevent the enemy from establishing a defense, organizing an effective rear guard, withdrawing, or regaining balance. The BCT secures objectives, severs escape routes, and destroys all enemy forces. The exploitation mission demands a force with a significant mobility advantage over the enemy.

6-27. Engineers support an exploitation by breaching obstacles to facilitate the maneuver of ground forces, keeping supply routes open and emplacing situational obstacles to protect the flanks. (See FM 3-90, FM 3-90.5, and FM 3-90.6 for more information.)

Pursuit

6-28. A pursuit is designed to catch or cut off a hostile force attempting to escape with the aim of destroying it. Pursuits often follow successful exploitations, but can develop at any point when enemy forces are beginning to disintegrate or disengage. Unlike an exploitation, which may focus on seizing key or decisive terrain instead of the enemy force, the pursuit always focuses on destroying the fleeing enemy force. A pursuit is normally not conducted at the BCT level unless it is augmented with additional aviation assets or ground maneuver units. When conducted, the goal of a pursuit is to fix the enemy between the direct-pressure and encircling forces, then, destroy it.

6-29. The direct-pressure and encircling forces require engineers to be forward in movement formations to quickly breach any obstacles that cannot be bypassed, thus ensuring unimpeded movement. Engineers also conduct countermobility and survivability tasks in support of the encircling force. Normally, the commander does not organize specifically for a pursuit ahead of time, although he may plan for a pursuit as a branch or sequel to his offensive operation. (See FM 3-90, FM 3-90.5, and FM 3-90.6 for more information.)

FORMS OF MANEUVER

6-30. The maneuver commander selects the form of maneuver based on analysis of mission variables. An operation may contain several forms of offensive maneuver. For example, a frontal attack to clear enemy security forces is followed by a penetration to create a gap in enemy defenses, which in turn is followed by an envelopment to destroy a counterattacking force.

6-31. The five forms of maneuver are—

- Envelopment.
- Turning movement.
- Frontal attack.
- Penetration.
- Infiltration.

ENVELOPMENT

6-32. Envelopment is the preferred form of offensive maneuver. It seeks to strike the enemy on an assailable flank or from the rear and forces the enemy to fight in a direction from which it is least prepared. Enemy defensive positions, obstacle systems, and the terrain (not the march direction) define the flank. The four types of envelopment are single, double, encirclement, and vertical. Figure 6-2 is an example of engineer support to a single envelopment. Engineer support priorities for envelopment include enabling the mobility of the enveloping force and providing protection for its extended flanks. Engineers plot known and predicted enemy obstacles to determine if there is an assailable flank. Breaching an obstacle system can provide the maneuver commander with the flank he needs; therefore, enemy obstacles and terrain must be adequately studied.

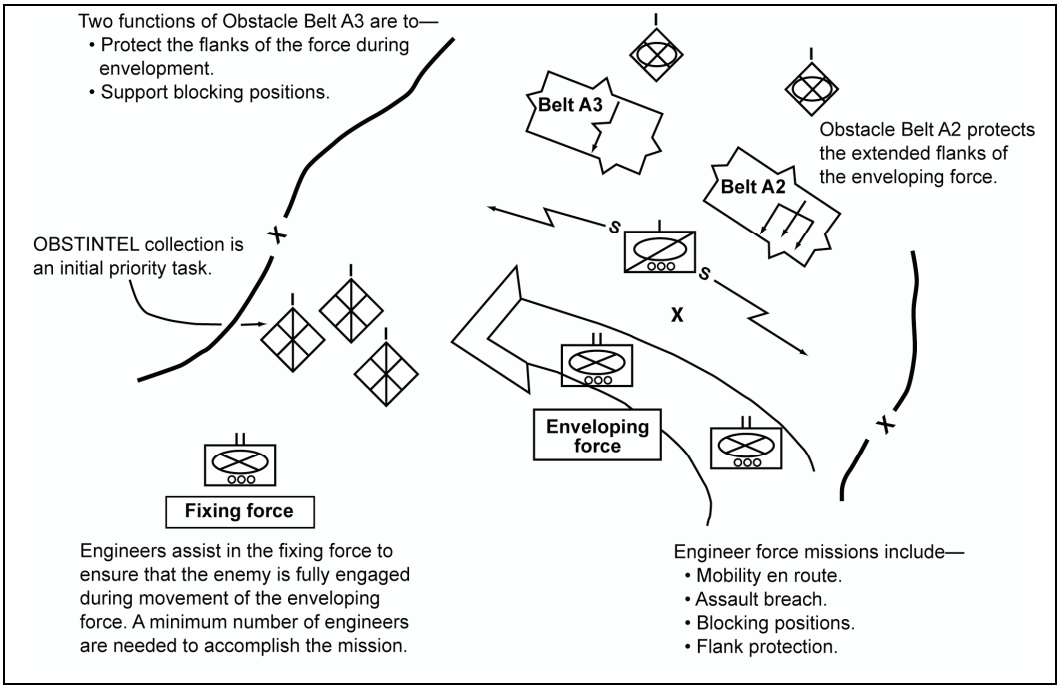


Figure 6-2. Example of engineer support to a single envelopment

6-33. The maneuver force that makes up the enveloping force normally organizes for breaching operations. Once committed, the enveloping force must have the capability to breach unforeseen obstacles with minimal delay and maneuver. The following are critical to this ability:

- **OBSTINTEL gathered before the enveloping-force mission.** The ENCOORD must ensure that engineers are totally integrated into the brigade ISR plan and within the RS and battalion scouts as applicable.
- **Engineers task-organized to the enveloping force.** They provide responsive, rapid obstacle reduction capabilities and the ability to further task-organize forces to accomplish the mission.

6-34. Engineer task organization must provide flexibility and redundancy. The main effort cannot afford to wait for low-density equipment or units to be brought forward or replaced. Engineer planners can utilize the reverse-planning process for determining engineer task organization requirements in support of combined arms breaching operations. (See appendix C for further discussion on reverse planning.)

Main Effort

6-35. Engineer support to the main effort is broken into two separate areas that require dedicated engineer forces to—

- Provide mobility for the enveloping force.

- Protect enveloping-force extended flanks.
- Provide engineer support to protect enveloping-force flanks centers on situational obstacles, which are planned at the brigade level.

Note. SCATMINE systems are key components for this support.

6-36. A key aspect of mobility support to the main effort is maintaining the enveloping-force LOC. In envelopment, the LOC for the main effort can quickly become extended, shifted in response to the attack, or threatened by enemy units that have been bypassed. Engineers organic to the BCT have limited sustainment capability and rely on EAB assets for augmentation, which should be determined early in the planning phase.

Actions on the Objective

6-37. To provide engineer support to actions on the objective, the ENCOORD must understand the enveloping-force mission. Fundamental to this understanding is the engineer's involvement with the S-2 in the IPB process. Determining the task organization of engineer units to the enveloping force centers on the IPB process and the subsequent collection of information.

6-38. The mission of the enveloping force may be to attack and defeat or destroy a defending enemy force or reserve. The priority of engineer effort is still mobility. The task organization must provide attacking battalions with the capability to breach protective obstacles. However, the mission may be to secure key terrain that denies the enemy's use of LOCs. The enveloping force may then establish blocking positions. Therefore, engineer support to actions on the objective may also require countermobility and survivability operations. The organic engineer units can provide only limited survivability support. In these cases, the ENCOORD, through wargaming, ensures that the enveloping force has the assets to maintain its mobility during the attack, protect its flanks, and establish effective blocking positions.

Fixing Force

6-39. Providing the necessary assets to the fixing force is the greatest challenge of the ENCOORD. While the main effort of engineer support and concentration of the engineer force is with the enveloping force, engineer requirements for the fixing force must not be discounted. When the envelopment is successfully executed, the fixing force is likely to be the only force required to breach extensive obstacles. More importantly, the success of the main effort may depend on the ability of the fixing force to penetrate the prepared defenses and fix the enemy during the movement of the enveloping force. This causes the enemy to fight in two directions.

6-40. The engineer role in the fixing force is normally limited in scope because of support priorities to the enveloping force. The ENCOORD carefully analyzes the requirements of the fixing force. This may require focusing on the maneuver plan two levels down through close coordination with the engineer and maneuver force commanders. The ENCOORD often recommends that the maneuver commander accept a degree of risk and allocate the minimum force necessary to accomplish mobility requirements. However, the ENCOORD can reduce the risk by initially focusing OBSTINTEL collection to confirm or deny assumptions made about the enemy situation facing the fixing force. Adequate engineer augmentation reduces the need to accept certain types of risk.

TURNING MOVEMENT

6-41. A turning movement (see figure 6-3) is a form of maneuver where the attacking force seeks to avoid principal enemy defensive positions by seizing objectives to the enemy rear. The result should cause the enemy to abandon their current positions or divert major forces to meet the new threat. This form of offensive maneuver frequently transitions from the attack into an exploitation or pursuit. A turning movement differs from envelopment because the force conducting a turning movement seeks to make the enemy displace from the current location, whereas an enveloping force seeks to engage the enemy in the current location from an unexpected direction.

6-42. The commander directing a turning movement task-organizes resources into a turning force, a main body, and a reserve. Each of these forces conducts security and reconnaissance operations. The turning force or the main body can conduct the echelon decisive operation, given the appropriate mission variables. The BCT is not likely to conduct a turning movement by itself, but it may be one of the components for a training operation.

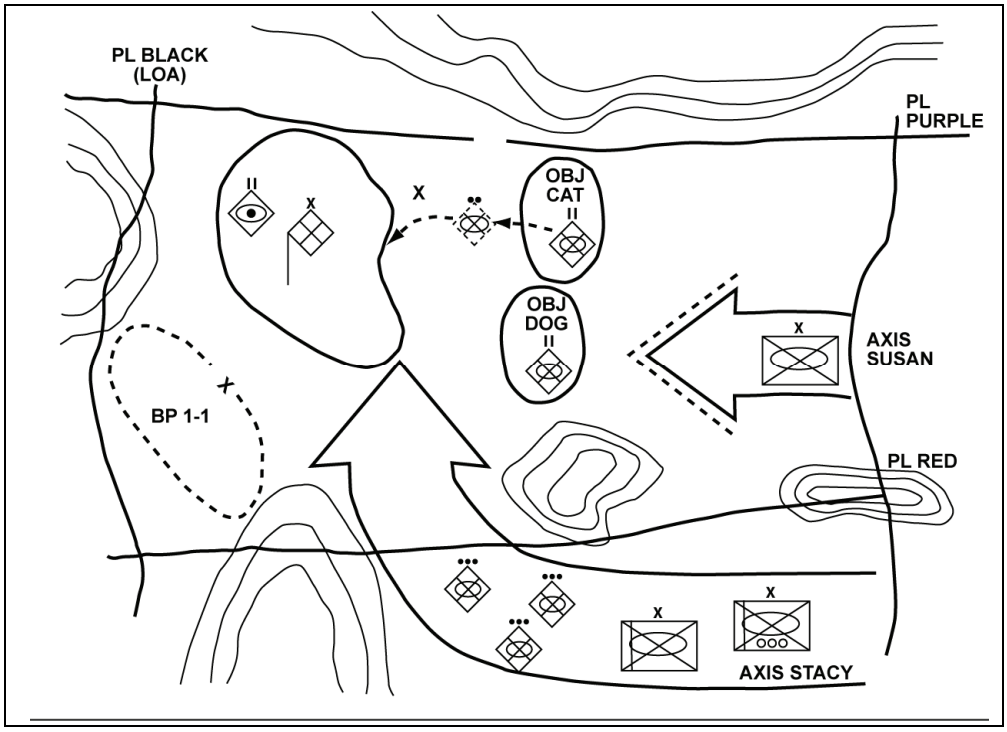


Figure 6-3. Example of a turning movement

Main Effort

6-43. Engineer support to the main effort requires dedicated engineer forces to—

- Conduct engineer reconnaissance and provide geospatial support.
- Provide mobility including the reduction of obstacles.
- Protect the flanks.
- Provide countermobility and survivability on the objective.

6-44. A key aspect of mobility support to the main effort is maintaining the turning-force LOC. In a turning movement, the LOC for the turning force can quickly become extended, shifted in response to the attack, or threatened by bypassed enemy units. Engineers organic to the BCT have limited sustainment capability and rely on EAB assets for augmentation, which should be determined early in the planning phase.

Actions on the Objective

6-45. To provide engineer support to actions on the objective, the ENCOORD and staff must understand the scheme of maneuver. Fundamental to this understanding is ENCOORD involvement with the S-2 in the IPB process. Determining the task organization of engineer units to the turning force centers on the IPB process and the subsequent collection of information. Success of the turning movement implies the potential requirement to transition to the defense to support the maneuver force fight against counterattacking enemy forces.

6-46. If the BCT is the turning force, the supporting attack may be more in the nature of the follow-and-assume or follow-and-support force within the BCT axis of attack. As such, the possibility of shifting engineer assets is more possible than in a form of maneuver like a frontal attack. Instilling flexibility within the task organization of engineer assets always presents a challenge to the engineer planner. The ability to transition from a focus on mobility to one of countermobility and then back to mobility is critical.

FRONTAL ATTACK

6-47. A frontal attack (see figure 6-4) is a form of maneuver where an attacking force seeks to destroy a weaker enemy force or fix a larger enemy force in place over a broad front. A maneuver force may conduct a frontal attack to rapidly overrun a weak enemy force. A commander commonly uses a frontal attack as a shaping operation in conjunction with other forms of maneuver. Normally, a frontal attack is employed to—

- Clear enemy security forces.
- Overwhelm a shattered enemy during an exploitation or pursuit.
- Fix enemy forces as part of a shaping operation.
- Conduct a reconnaissance in force.

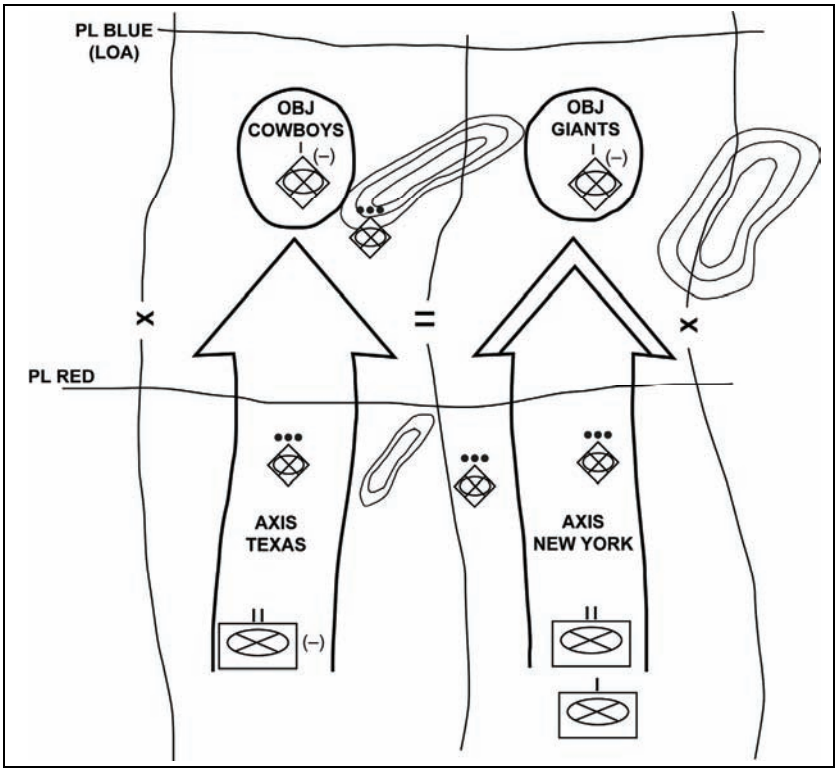


Figure 6-4. Example of a frontal attack against a stationary enemy force

6-48. It is also necessary to conduct a frontal attack when assailable flanks do not exist. Where a penetration is a sharp attack designed to rupture enemy position, the commander designs a frontal attack to maintain continuous pressure along the entire front until a breach occurs or the attacking forces succeed in pushing the enemy back. Frontal attacks conducted without overwhelming combat power are seldom decisive. Consequently, the commander's choice to conduct a frontal attack in situations where he does not have overwhelming combat power is rarely justified, unless the time gained is vital to the success of the operation. Engineers are involved with ensuring the mobility of the force, with little opportunity to shift engineer assets once committed. A commander conducting a frontal attack organizes the unit into an element for reconnaissance and security operations, a main body, and a reserve. The mission variables dictate the specific task organization. A frontal attack should almost always include significant combat engineer augmentation.

Main Effort

6-49. Engineer requirements are associated with each of the elements of this force, but are likely to be massed to ensure success of the decisive action. This is generally in support of the main effort. Engineer support to the main effort is broken into several areas that require dedicated engineer forces to—

- Conduct reconnaissance and provide geospatial support.
- Provide mobility, including the reduction of obstacles.
- Participate in a combined arms breach as required.
- Protect the flanks.

Actions on the Objective

6-50. To provide engineer support to actions on the objective, engineers must understand the frontal attack mission. When the attacking unit can no longer advance, it adopts a defensive posture. Whether on the objective or not, engineers must be able to rapidly transition in support of maneuver element defensive operations. Determining the task organization of engineer units for the frontal assault centers on the IPB process, the subsequent collection of information, and an understanding of the intended scheme of maneuver for the force. Reverse planning (see appendix C) should be applied for any anticipated combined arms breaching operation.

Considerations

6-51. Providing the necessary assets to the supporting attack remains a challenge for the ENCOORD. The main effort of engineer support and concentration of the engineer force may be with the elements performing the decisive operation, though the engineer requirements for the supporting attack must not be discounted. Given the nature of a frontal attack, engineers are hard-pressed to simultaneously support across the broad frontage typically associated with frontal attacks. The supporting attack is likely to have many of the same engineer requirements as the main attack (reducing obstacles). More importantly, the success of the main effort may depend on the ability of the supporting attack to fix the enemy and keep the majority of their force fully engaged.

PENETRATION

6-52. The purpose of a penetration is to rupture enemy defenses on a narrow front and disrupt the defensive system (see figure 6-5, page 6-12). Units penetrate when enemy flanks are not assailable or time does not permit some other form of maneuver.

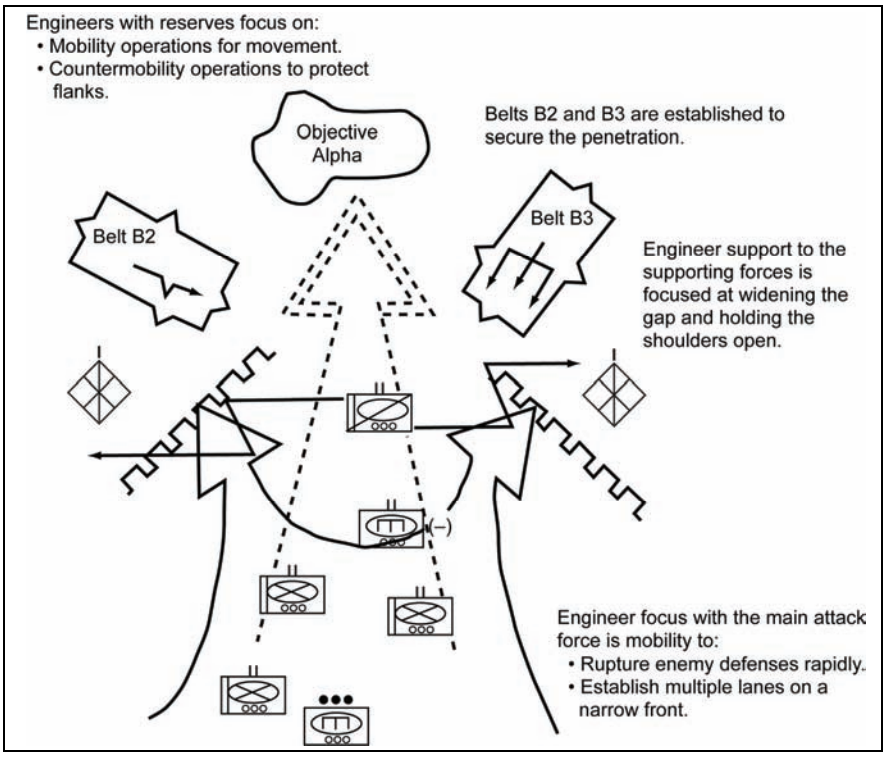


Figure 6-5. Example of a penetration

6-53. Penetrations create assailable flanks and provide access to enemy sustainment areas. Because penetrations frequently attack in the front of the enemy defense, they risk significantly more friendly casualties than during an envelopment, turning movement, or infiltration. Augmentation of combat engineer assets typically supports a brigade penetration.

6-54. A successful penetration requires the concentration of all combat multipliers, including the use of night, stealth, and covered and concealed terrain. Penetrations have the following three stages:

- Breaching enemy main defensive positions.
- Widening the gap created to secure the flanks by enveloping one or both of the newly exposed flanks.
- Seizing the objective with its associated subsequent exploitation.

6-55. The main attack is used to rupture enemy defense. Supporting forces protect the flank of the main effort and widen the gap by defeating adjacent enemy forces. The reserve is positioned to assist the main attack and exploit success. Follow-and-support forces are used to—

- Destroy enemy forces remaining in the zone.
- Widen the penetration.
- Secure the lodgment from counterattack.

Main Effort

6-56. Engineers support a penetration by providing the main effort with overwhelming mobility to rupture enemy obstacles. This remains the engineer priority of support until a penetration is achieved. It requires the ENCOORD to mass obstacle reduction assets in the main effort. Penetration requires the rapid projection of combat power to maintain the momentum of the attack and quickly divide the enemy force. To do so requires creating more lanes along a narrower front than normally associated with breaching operations. Therefore, mass and redundancy drive engineer task organization to the main effort. Mass is commonly achieved by weighting the main effort with task-organized EAB engineer augmentation, based on the generally high number of essential tasks for M/CM/S associated with the main effort.

6-57. The maneuver unit may use supporting forces or follow-and-support forces to widen the penetration and improve the breach lanes. The ENCOORD must understand the commander's intent to ensure that forces have enough engineer support. When a follow-and-support force is employed, it assumes the responsibility for widening the POP and improving the lanes. This may require a smaller, more centralized engineer organization to accomplish that task.

Countermobility

6-58. Depending on the enemy situation, countermobility may quickly become the priority of effort to help defeat counterattacks against lodgment. Follow-and-support forces are normally used to secure lodgment and defeat counterattacks. Therefore, engineers must—

- Anticipate the size of the counterattack force.
- Analyze likely AAs.
- Allocate the countermobility assets needed to disrupt or fix counterattack forces.

6-59. Engineer planners must design obstacle belts that permit the use of tactical and situational obstacles. Normally, these obstacle belts are developed and passed to the battalions for planning, but are only active on the order of the brigade commander. Forces securing lodgment require flexible, responsive obstacle capabilities, such as SCATMINEs (Volcanos, Gators, Modular-Pack Mine Systems [MOPMs]) and intelligent munitions.

Exploitation

6-60. Once the objective is secured, the engineer priority shifts to assisting the force in exploiting its success by ensuring the mobility of the exploiting subordinate units. To facilitate the exploitation, the ENCOORD must ensure that the scheme of engineer operations allows for rapid development of a lane network within the penetration. The lane network must support the uninterrupted forward passage of the reserve to subsequent objectives and the flow of sustainment to forces in the penetration. Once the force has passed through the lanes, responsibility is passed to outside forces to improve and maintain the lane network.

INFILTRATION

6-61. Infiltration (see figure 6-6, page 6-14) is a form of maneuver where the attacking force conducts covert movement through or into an area occupied by enemy forces. This is done to occupy a position of advantage in the enemy rear, while exposing only small elements to enemy defensive fires. This form of maneuver is the preferred form of infantry maneuver because it permits a smaller force (not larger than a battalion) to use stealth and surprise to attack a larger or fortified force. Infiltrations are normally carried out on foot or by air, but they can be executed by selected vehicles or watercraft. Infiltration is most feasible in the following instances:

- During limited visibility.
- Over rough terrain.
- Through areas unoccupied by the enemy.
- With dismounted elements.
- Through areas not covered by enemy observation and fire.

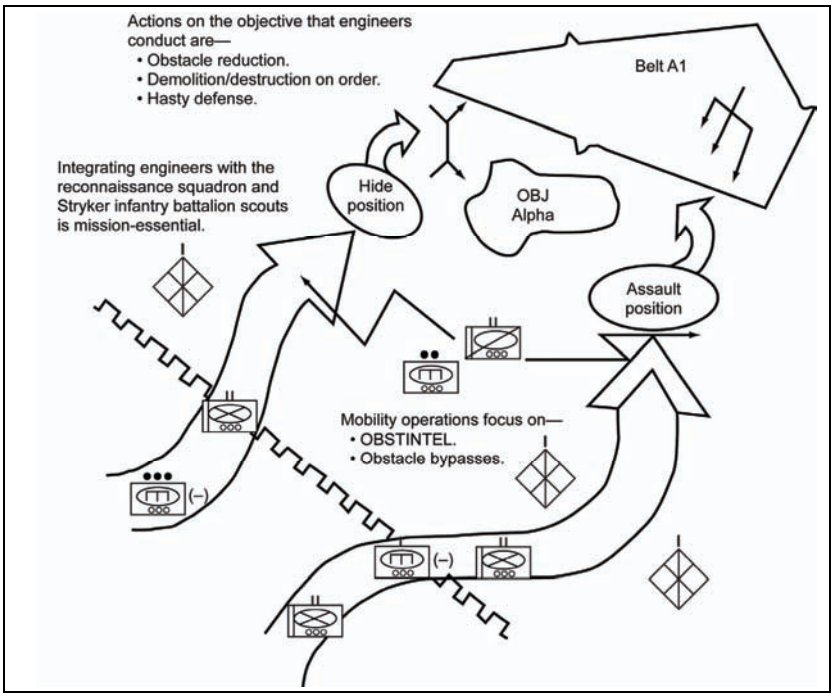


Figure 6-6. Example of an infiltration

Intelligence Preparation of the Battlefield

6-62. Infiltrations require extensive reconnaissance to be successful. This reconnaissance includes—

- Identifying the enemy disposition across the area to be infiltrated.
- Identifying infiltration lanes.
- Locating assault positions for the attacking force.
- Identifying enemy weaknesses.
- Observing enemy activity.

6-63. Engineer reconnaissance assists the commander in determining the method of infiltration, the task organization, and the size of the infiltrating units. OBSTINTEL is critical. Reconnaissance is also vital in determining actual routes and whether single or multiple infiltration lanes are used. Successful engineer support to an infiltration is predicated by careful, detailed terrain analysis by the ENCOORD and engineer unit commanders.

6-64. Existing gaps in the enemy defensive system and the locations of enemy security elements must be identified. Natural obstacles and predicted enemy obstacles must also be considered. Engineers infiltrating with the RS and battalion scouts verify, report (OBSTINTEL), mark, and (as required) reduce obstacles along the infiltration lanes.

6-65. The ENCOORD develops IR for inclusion in the S-2 collection plan. In addition to the IR developed in support of the infiltration itself, others are identified specifically at the objective area (especially OBSTINTEL). ERTs may be identified to support selected reconnaissance requirements. Examples of IR include the—

- Location, type, density, and employment method of obstacles in and around the objective.
- Recommended location for the POP.
- Potential breach lanes for attacking units and the level of survivability of the enemy forces on the objective.

- Possible enemy counterattack routes in support of the objective.
- Critical infrastructure that needs protection.

Mobility

6-66. Mobility is the main focus of engineer units during an infiltration, with priority of support to the main effort along the infiltration lane. Due to the decentralized nature of the maneuver, providing task-organized engineer support to each infiltrating unit may not be feasible. Maneuver units must be trained and capable of executing the mobility operations anticipated on infiltration lanes. The requirement for dedicated support during the infiltration is minimized through the following:

- Detailed predictive analysis by staff planners, represented on an enemy situational template (SITEMP).
- Accurate and timely intelligence updates provided by engineers working with scouts during reconnaissance.
- Detailed combined arms rehearsals.

Actions on the Objective

6-67. To provide adequate support to maneuver battalions and the RS during actions on the objective, detailed engineer planning at the brigade centers on war-gaming likely contingencies and transitions. Engineers may be task-organized to one or more maneuver battalions or the RS in a command relationship during the infiltration and for subsequent actions on the objective. This ensures the maneuver commander's flexibility to further task-organize engineers and establish absolute control during breaching operations that follow actions on the objective. Subsequent, on-order missions (defense) may dictate a change in the task organization of engineer units. They may need to change from a command relationship to a support relationship with maneuver battalions or the RS. This is done to speed up the response of engineer units and ensure responsive sustainment support.

Sustainment

6-68. Infiltrations often require clearing extended MSRs from the LD to the attacking force. MSRs become particularly vital when the objective is secured and the attacking force requires support (Class V resupply, ground medical evacuation [MEDEVAC], barrier materials, engineer equipment, or situational-obstacle material) for a hasty defense. The infiltrating force bypasses obstacles and focuses on those enemy forces that may interdict high-speed AAs and MSRs. Therefore, the clearance of MSRs commonly resembles small-scale linkup operations and is planned and resourced accordingly. Breaching operations are common during MSR clearance. The BCT may need to rely on EAB engineer augmentation assets to provide the assets necessary to execute them.

DEFENSIVE OPERATIONS

6-69. Defensive operations are a prelude to the offense. Defense plans should not be designed simply to resist enemy attack. Rather, they should aim at reverting to the offense and decisively defeating the enemy. Defensive operations defeat an enemy attack, buy time, economize forces, or develop conditions favorable for offensive operations. Engineer focus is on attacking the enemy's ability to influence operating areas (countermobility through combined arms obstacle integration) and on assuring mobility for friendly repositioning or counterattacking forces.

6-70. Planning for defensive operations is inextricably linked to offensive operations, and for planning purposes, must consider the transition from offensive operations to follow-on offensive operations. Many planning considerations for the offense also apply to the defense. The engineer running estimate provides the framework for synchronizing and integrating engineer support into defensive operations. (See chapter 2 for more planning considerations for defensive operations.)

CHARACTERISTICS

6-71. The defending force arrives first on the battlefield and, with the help of engineers, shapes the OE to its advantage. Based on the higher-commander's intent, maneuver commanders and their fire support officer (FSO) and engineer support site tactical obstacles to enhance the effects of direct and indirect fires on the enemy. Engineers provide technical expertise and advice to the commander on tactical obstacle emplacement. Fortifications allow fires from positions that best disrupt and destroy the attacker. Because of defending-force survivability, the defender can postpone the commitment of major forces until the attack develops and then strike the extended enemy over selected, prepared terrain.

6-72. Engineers provide essential combat engineering support to the defense. With this support, the force can position itself and fight from terrain where it otherwise could not survive. EAB engineer augmentation is typically required to support the intensive requirements for engineer support in the defense.

6-73. Preparation, security, disruption, massed effects, and flexibility characterize successful defensive operations. The mission of the ENCOORD and engineer commanders is to plan and execute engineer missions that enhance the maneuver unit's ability to combine fires, obstacles, and maneuver to destroy an attacking enemy. Developing an effective defensive plan requires the use of sequential planning and an understanding of defensive characteristics. (See table 6-1 for enhanced-technology impacts.)

Table 6-1. Enhanced-technology impacts to defensive characteristics

Defensive Characteristic	*Impacts*
Preparation	● Enhanced, decentralized integration and execution ● Automated tracking and planning of engineer requirements ● Enhanced terrain visualization to identify survivability and obstacle requirements ● Improved ability to conduct parallel planning and warfighting function integration
Security	● Enhanced SA of the OE ● Simultaneous coordination and synchronization of the defense ● Sensor munitions that disrupt enemy attacks, protect flanks, and protect otherwise undefended portions of the AO
Disruption	● Rapid obstacle emplacement capability to attack an enemy forward of EAs
Massed effects	● Enhanced INFOSYS and intelligence that facilitate C2 and the concentration of forces, obstacles, and fires
Flexibility	● Rapid adjustment and simultaneous dissemination of engineer plans through digital FRAGOs, updated graphics, and situation updates ● Facilitated C2 and task organizing for transition to the offense ● Increased flexibility with improved sensors and munitions

Preparation

6-74. Preparation of the defense includes planning and plan refinement, positioning of forces, constructing obstacles and fighting positions, preparing other survivability requirements, planning and synchronizing fires, positioning logistics, and conducting inspections and rehearsals. (See FM 90-7 for detailed information on obstacle planning and resourcing and FM 5-103 for information on preparing fighting and protective positions.)

6-75. To prepare for the defense, the commander must be familiar with the capabilities and limitations of the enemy. The terrain must be analyzed in detail from all perspectives and then verified from the ground. The commander then organizes the defense with a mixture of direct- and indirect-fire weapons (directed at the enemy main threat). Capabilities of these weapons are enhanced by the terrain.

6-76. Engineers play an essential role in preparing the defense. Based on the commander's intent, engineers emplace tactical obstacles to produce specific effects on the enemy. They also construct survivability positions that allow the maneuver unit to sustain the fight and protect critical C2 nodes.

6-77. Engineer success in the preparation phase depends on the ability of the ENCOORD to conduct integrated planning with the combined arms staff. The ENCOORD must identify the full range of engineer requirements in support of decisive and shaping operations, understand the capabilities of engineers and equipment on the battlefield, and determine the resources (manpower, equipment, and material) required and available to meet the demand. As described in FM 90-7 (to be revised as FM 3-34.13), obstacle control, intent, and resourcing are top-down driven (initiated by the higher headquarters), whereas the process of integrating the actual obstacle location with fires is bottom-up driven (initiated by the subordinate or emplacing unit).

6-78. Engineer focus in the preparation phase is not limited to close combat in the MBA. Each element of the defensive framework must be considered during engineer mission analysis and accounted for in the scheme of engineer operations.

6-79. A critical planning piece during defensive operations is EA development. (The results of the engineer running estimate described in chapter 2 and appendix E support the steps of EA development.) The following seven steps represent a way to build an EA:

- **Step 1. Identify likely enemy AAs.** Engineers analyze the terrain, weather, civil considerations, and enemy M/CM/S capabilities and estimate their effects on mobility. Engineers integrate geospatial products into tactical decision aids (such as the MCOO) to help commanders and staff visualize important aspects of the terrain to support planning and decisionmaking.
- **Step 2. Determine the likely enemy concept of operations.** Engineers analyze the enemy mission and M/CM/S capabilities to determine and create a template of enemy engineer activities.
- **Step 3. Determine where to kill the enemy.** Geospatial products (such as line-of-sight [LOS] overlays) help commanders and staff design EAs.
- **Step 4. Plan and integrate obstacles.** The combined arms integration of fires and tactical obstacles is crucial to achieving success in the defense. Obstacles are integrated into the defense based on the terrain, obstacle intent (target, location, and obstacle effects), and fires. Methods for employing situational obstacles and their associated triggers are coordinated and synchronized. Obstacle emplacement begins after the final determination is made on the location of friendly weapon systems and fire control measures. Engineers mark obstacles and lanes to prevent fratricide. (See FM 90-7 for detailed information on obstacle coordination and obstacle-siting procedures.)
- **Step 5. Emplace weapons systems (includes preparation of fighting positions).** Geospatial products can display the suitability of areas for preparing fighting positions based on LOS and the soil or ground conditions. Engineers incorporate priorities for survivability and manage survivability tasks using execution matrices and timelines based on the commander's intent. (FM 5-103 provides information on preparing fighting positions.)
- **Step 6. Plan and integrate indirect fires.** Engineers ensure that obstacles are included in the FS plan and coordinate for situational obstacles, lane closure, and breached-obstacle repair. Engineers coordinate to ensure that the FS plan is refined based on the actual location and orientation of emplaced obstacles.
- **Step 7. Rehearse the execution of operations in the EA.** Engineers emplacing obstacles and constructing survivability positions rehearse contact actions and movement to assembly areas or the occupation of fighting positions when defense preparation is complete. Engineers supporting security, counterattack, and reserve forces conduct combined arms breaching rehearsals and precombat checks on breaching systems.

Note. Although listed sequentially, Steps 4, 5, and 6 should be performed concurrently.

Security

6-80. The security of the force is provided principally through deception and physical means. In the defense, the friendly unit deceives the enemy by concealing its strengths and weaknesses. Normally, a security force positioned between the enemy and the main body secures the main body. The purpose of this measure is to provide early warning and disrupt or delay the enemy attack. Engineers task-organized with the RS or the security forces operating under the control of the RS focus on providing situational obstacles and sensors with the intent of disrupting or delaying the enemy attack and providing early warning.

Disruption

6-81. Commanders use all available means to disrupt enemy forces. They disrupt attackers and isolate them from mutual support to defeat them in detail. Disruption in the defense is achieved by—

- Defeating or misleading enemy reconnaissance forces.
- Impeding enemy maneuver.
- Disrupting enemy reserves.
- Neutralizing enemy FS.
- Interrupting enemy C2.
- Engaging enemy lead elements and affecting their rate of advance.

6-82. Disruption counters enemy initiative and prevents it from concentrating combat power against a single part of the defense. The general goal of disruption is to—

- Force the enemy to fight in more than one direction.
- Keep the enemy under direct and indirect fires.
- Prevent enemy penetrations.

6-83. The method a commander chooses to achieve disruption varies with the situation, but the ultimate goal is to spoil the attacker's coordination. The ENCOORD and engineer commanders work closely with BCT and maneuver battalion staffs to ensure that combat engineering (M/CM/S) functions are integrated into disruption activities, leveraging the capabilities of geospatial engineering to optimize their effects. Enemy reconnaissance efforts and probing attacks must be defeated without disclosing the defensive scheme of maneuver. Tactical obstacles are designed and emplaced to disrupt enemy formations and cause the enemy to move into desired EAs. This prevents the enemy from effectively concentrating mass against any portion of the defense.

Massed Effects

6-84. In the defense, the commander masses effects to exploit or create an enemy weakness. This is achieved by designating the main effort with all other efforts and actions supporting and sustaining this effort. To mass effects during the battle, the maneuver unit may—

- Economize in some areas.
- Retain a reserve.
- Maneuver repeatedly.
- Alter the terrain in the AO.

6-85. Engineers support the massing of effects by employing obstacles, constructing fortifications, and providing mobility to counterattack or reserve forces. The principal role of the engineer in massing effects is to ensure that tactical obstacles are integrated with defender fires to disrupt, turn, fix, or block enemy forces and create effective EAs where the maneuver commander intends to kill the enemy. These efforts, combined with fortifications (augmentation required) and protective obstacles, enhance the defense. The defending force must be able to direct its actions at the enemy from a survivable position. (See figure 6-7 for obstacle effects.)

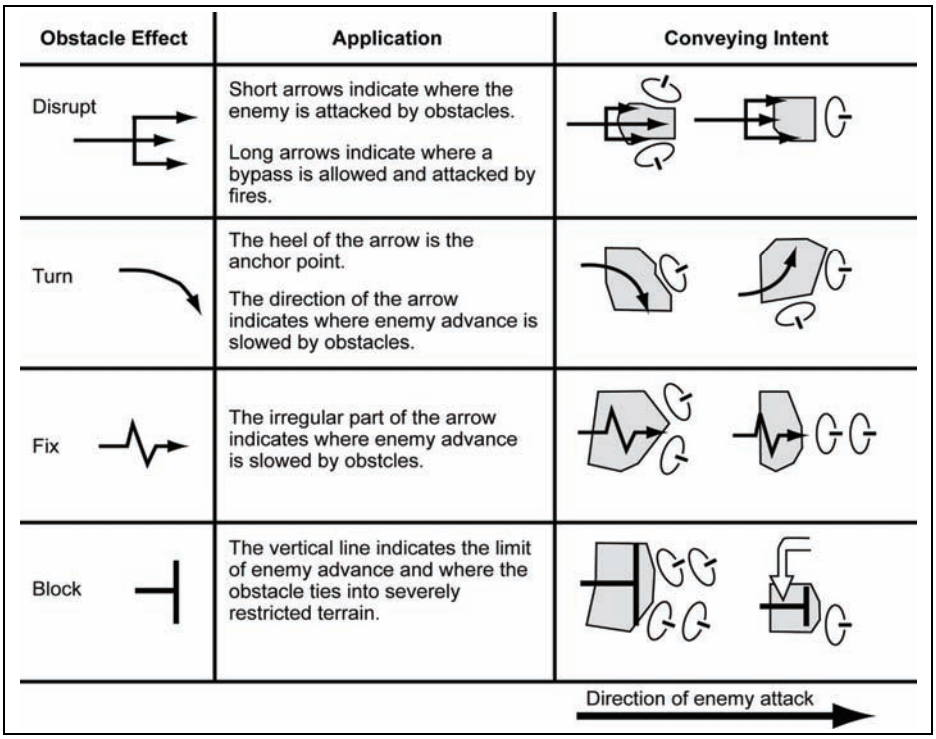


Figure 6-7. Obstacle effects

Flexibility

6-86. The commander maintains flexibility through—

- Detailed planning.
- Sound preparation.
- In-depth task organization.
- Reserve forces.
- Continuous reconnaissance.
- C2.

6-87. Ultimately, flexibility requires that the commander visualize the AO to determine the enemy scheme of maneuver in adequate time to integrate the effects of fires and maneuver against it. Commanders must be able to counterattack and employ reserve forces at any time. Engineers assist in maintaining flexibility by—

- Using situational obstacles.
- Task-organizing for rapid transition to the offense.
- Providing necessary mobility and countermobility support to reserve and counterattacking forces.
- Improving or maintaining routes needed to reposition forces within the defense.

TYPES

6-88. The three types of defensive operations are mobile defense, area defense, and retrograde operations. The three types are significantly different and must be dealt with differently during planning and execution. (See FM 3-90, FM 3-90.5, and FM 3-90.6 for more detailed information.)

Mobile Defense

6-89. Mobile defense focuses on defeating or destroying the enemy by allowing advancement to a point where it is exposed to a decisive counterattack by the striking force. Mobile defense uses a combination of offensive, defensive, and delaying actions. It is characterized by relatively small, fixing forces forward and the use of maneuver supported by obstacles to take the initiative. Mobile defense requires a large striking force with mobility equal to or greater than that of the enemy to counterattack and defeat the enemy force.

6-90. Engineer support to a mobile defense focuses on using obstacles to attack enemy maneuver and providing mobility to the striking force and reserve. Most countermobility and survivability assets support the fixing force, while most mobility assets support the striking force. Obstacle zone planning received from the division and obstacle belt planning at the brigade level are directed at the most likely enemy COA rather than the terrain. Belts are aimed at enemy maneuver in the brigade AO to support its destruction by counterattack. Therefore, obstacle belt planning is more restrictive to assure the mobility of the striking force. Situational obstacles are advantageous in the mobile defense by allowing the commander to exploit enemy vulnerabilities, exploit success, separate follow-on forces, and provide flank protection.

6-91. The survivability effort is uniquely tailored in a force-oriented defense. To create the conditions for a counterattack, battalions may need to fight throughout the depth of their AO using multiple primary and subsequent BPs. Protective obstacle effort may occur at any point within the mobile defense, though minimal protective-obstacle effort may be required forward as the defense is geared toward a proactive fight. The protective-obstacle effort and, typically, the supporting fighting-position effort are concentrated where enemy penetration must be stopped to allow the counterattack to take place. Obstacle control measures ensure that battalion obstacle efforts do not affect strike force ability to maneuver.

Area Defense

6-92. Area defense denies enemy access to specific terrain for a specific time. It is organized to absorb the enemy into an interlocked-series of positions from which it can be destroyed. Area defense differs from mobile defense in that most defending forces are committed to defending positions while the rest is kept in reserve. To accomplish this, forces use a combination of defensive positions and small mobile reserves. Commanders organize the defense around the static framework provided by defensive positions, seeking to destroy enemy forces with interlocking fires or local counterattacks that are focused on EAs.

6-93. The commander organizes an area defense by designating his MBA and assigning AOs, BPs, or both to subordinate units located within the MBA. He also creates a security area in front of the MBA. In planning an area defense, the commander can organize a defense in depth or a forward defense based on where defensible terrain is within assigned AO (terrain characteristics), the chosen enemy COA estimate, and the other METT-TC factors. (See FM 3-90, FM 3-90.5, and FM 3-90.6 for more information.)

6-94. A defense in depth is the preferred option when the tactical conditions allow. It limits the enemy's ability to exploit a penetration through additional defensive positions employed in-depth. Alternate and supplementary positions, combat outposts, and mutually supporting strong points forward of the perimeter extend the depth.

6-95. The intent of a forward defense is to prevent enemy penetration of the defense. Due to its inherent lack of depth, the forward defense is the least preferred option. Commanders use a forward defense, when directed, to retain forward terrain or when the terrain (strong natural obstacles) favors a defense in that part of the AO.

6-96. The focus of the engineer effort is on providing the maneuver commander with the ability to hold terrain while enabling maneuver units to concentrate fires from static positions. During area defense, engineer involvement in terrain analysis is vital. Engineers help identify key and decisive terrain that supports the commander's concept of the operation, with a focus on where the commander wants to kill the enemy. During obstacle planning, obstacle control measures are designed to give maximum flexibility to subordinate units, while focusing the tactical obstacle effort on terrain retention. The ENCOORD must advise the maneuver commander of the resource requirements of each subordinate unit based on its assigned essential tasks for M/CM/S and must coordinate through the appropriate channels to ensure that the units are resourced accordingly.

6-97. The survivability effort in area defense must—

- Enhance the ability of the force to accurately concentrate fires from static positions into designated EAs.
- Provide the force with an increased level of protection from the sustained effects of enemy fires.
- Deceive the enemy as to the exact location of the defense.

6-98. If the construction and implementation of EAs are successful, the enemy is forced to conduct assaults on the defensive positions in an effort to suppress or defeat maneuver force concentrated fires into the EAs. Survivability positions and protective obstacles must provide necessary protection for maneuver forces to continue engaging the enemy successfully from primary or alternate positions. Effective defensive positions and mobile reserves are key components for a successful area defense.

6-99. The ENCOORD enables each of these through proper planning and preparation. The ENCOORD must also understand the tactical-obstacle effort of subordinate units and coordinate their effort to ensure that they are mutually supporting. The ENCOORD tracks preparation by monitoring subordinate unit status reports and specific progress on obstacle emplacement and survivability timelines, anticipating and resolving problems that may occur.

Retrograde Operations

6-100. A retrograde operation is an organized, orderly movement of forces away from the enemy. The basic types of retrograde operations are delay, withdrawal, and retirement. All three are usually combined in simultaneous or sequential action. For example, a battalion TF may conduct a delay to facilitate the withdrawal or retirement of the remaining elements of the brigade. The basic types are—

- **Delay.** A force that is under pressure trades space for time. The intent is to—
  - Slow the enemy.
  - Cause enemy casualties.
  - Stop the enemy (where possible) without becoming decisively engaged.

Note. A delaying force accomplishes this by defending, disengaging, moving, and defending again. The concept of the operation for a delay frequently requires offensive operations (counterattacks and spoiling attacks) on the part of the delaying force. (See FM 3-90 for more information.)

- **Withdrawal.** A withdrawal allows a unit to disengage from the enemy and reposition for some other mission. The mission may be to delay the enemy, defend another position, or attack at another place and time. The following are the two types of withdrawals:
  - **Under pressure.** A unit disengages and moves to the rear while in contact with the enemy.
  - **Not under pressure.** A unit disengages and moves to the rear while the enemy is not attacking.
- **Retirement.** The force moves to the rear in an organized manner and is not in contact with the enemy. Tactical movement techniques and foot and vehicular road marches are employed. A retirement may follow a withdrawal or begin before contact is made with the enemy.

6-101. Mobility and countermobility operations are normally the focus of engineer support to retrograde operations. The actual priority of effort depends on whether or not the unit is in contact with the enemy. The underlying purpose of engineer support to retrograde operations is twofold. The steps are as follows:

- **Step 1.** The mobility of the force must be maintained, regardless of the type of retrograde operation being conducted. Mobility operations focus on maintaining the ability of the force in contact to disengage while preserving the main body's freedom of maneuver.
- **Step 2.** The force must be protected because they are particularly vulnerable to enemy actions during retrograde operations. Consequently, retrograde operations are normally conducted under limited-visibility conditions. Engineers support units left in contact and extend the time available to the commander by reducing enemy mobility through obstacles, fires, and terrain optimization.

6-102. Engineer involvement in combined arms planning for a retrograde operation is critical. The level of detail developed by the staff and the ENCOORD affects resourcing, task organization, and execution. Because of the tempo required during the operation, all contingencies must be addressed, war-gamed, prioritized, and resourced before execution. The tactical situation does not normally facilitate any significant changes to a plan once the operation is underway. Engineer involvement is of special importance during the IPB process. Input into the MCOO highlights the terrain effects on the attacking enemy. Once determined, this product of the terrain analysis impacts the—

- Obstacle positions.
- Required lane locations.
- Decision point positions (to cause lane closure or the execution of situational and reserve obstacles).
- Counterattack planning.

6-103. The ENCOORD coordinates with the S-2 on engineer-specific IR. The IR are aimed at facilitating and maximizing the efforts of engineers supporting units conducting the counterreconnaissance fight and retrograde operation. Considerations include predicting enemy reconnaissance efforts on the SITEMP and main-body attack routes into the AO. These considerations aid in planning and executing obstacle belts and groups that support the retrograde operation.

6-104. The identification of routes that the force uses is vital to all retrograde operations. Mobility must be maintained along these routes. While conducting terrain analysis during the IPB process, the ENCOORD works closely with the S-2 to determine feasible routes. Once this planning is complete, the routes are coordinated with the S-3 and the commander to determine which routes are required to meet operational requirements. With these routes identified, route reconnaissance can be conducted to verify their trafficability and suitability for the force. Information gained on the reconnaissance is critical during COA development and analysis. Route selection also affects countermobility planning and execution. Once the routes are finalized, engineer unit commanders ensure that they are upgraded and maintained as directed. LOC maintenance typically requires EAB augmentation. Lanes through friendly obstacles must be established and marked. Every Soldier in the unit must clearly understand the unit lane-marking system. Guides are frequently left at obstacle lane locations to ensure safe passage. Because of the critical nature of the mission, commanders must assume the responsibility of providing guides if the mission variables allow.

6-105. A major component in countermobility planning and execution during a retrograde operation is the synchronization of the warfighting functions. Countermobility missions can only be executed with a clear understanding of the commander's intent and concept of the operation. Situational obstacles are a key combat multiplier to the commander. Situational obstacles, like other engineer operations in retrograde operations, are normally centrally controlled.

6-106. The maneuver unit may only have limited assets to use for survivability, given the critical requirements for mobility and countermobility. The survivability that is provided typically focuses on supporting the protection of key C2 and other critical systems. Selected fighting positions may also be developed to support key EAs supporting the retrograde. Existing fighting positions that support the scheme of maneuver of the withdrawal may also be used, but most survivability depends on the effective use of terrain and other measures (CCD).

6-107. C2 of lane closure is vital to retrograde operations. Normally, lane closure is centrally planned and executed by the BCT to ensure that mission execution conforms to the commander's intent and the scheme of maneuver. Frequently, obstacles identified for closing lanes become brigade reserve obstacles. Lane closure depends on—

- Enemy and friendly activities.
- Level of contact.
- Size of the force left in contact.
- Engineer forces available.
- Time available.

6-108. Lane closure parties (engineers if the mission variables allow) close lanes upon notification from the commander to whom execution authority was delegated (the maneuver force over watching the obstacle). Synchronization is critical to prevent the trapping of friendly forces between the obstacle and the enemy. Target turnover becomes important when reserve targets are prepared by engineers and turned over to maneuver units for execution. Target turnover and its execution must be detailed so that the receiving unit (platoon or squad leader) can execute the mission according to the brigade commander's intent. All lane closure operations must be rehearsed. (See FM 90-7.)

6-109. If aviation augmentation is available to support the rapid repositioning of units and to attack enemy forces, engineers may need to conduct FACE operations and obstacle emplacement. Detailed planning between aviation units and the ENCOORD is critical to synchronizing this effort.

6-110. Deception operations target the enemy's ability to be decisive and prevent the concentration of combat power against friendly force weakness. The ENCOORD coordinates with the S-2 and S-3 during initial planning to determine what battlefield deception assets are available. For example, a mobile gun system (MGS) or tank silhouette that is partially dug-in may cause the enemy to think the friendly force is defending a retrograde operation instead of conducting one. In addition to shaping the battlefield, countermobility operations can also deceive the enemy as to what mission the unit is actually conducting. For example, using engineer equipment forward gives the appearance of preparing for a hasty defense while covering the withdrawal of a force. Battlefield deception is part of CCD. (See FM 20-3.)

6-111. Even though the unit is conducting a retrograde operation, some engineer assets and supplies may be moving forward. Other equipment may require specialized support. The ENCOORD is responsible for resolving these issues. This is accomplished by coordinating with the S-3 or S-4 on the following:

- Transportation support for selected engineer equipment found in EAB units that require assistance due to their slow speed. To meet this requirement, transportation assets may have to come from higher headquarters and be pre-positioned to support this movement.
- Movement of engineer Class V supplies and the specific locations required for delivery. Some Class V supplies may need to be positioned forward to facilitate the execution of lane closure.
- Fuel requirements of engineer equipment, factored into the decision on the quantity of fuel that remains forward.

TECHNIQUES

6-112. Maneuver units usually defend using one or more defense techniques. The five basic techniques are—

- **Defend an AO.** This provides the greatest degree of freedom for subordinates to plan fires, maneuver, and obstacles. When the BCT assigns a defense in the AO to subordinate battalions, the ENCOORD provides obstacle control measures that are commensurate with the battalion AO and provide maximum latitude for subordinate engineer planners. The BCT ENCOORD must ensure that subordinate obstacle plans are mutually supporting of flank units and tied in along common boundaries.
- **Defend a BP.** This reduces the instructions needed to move a force. A BP is normally associated with an assigned EA or a specific enemy AA. The commander must look two levels down when assigning BPs to ensure adequate space for primary, supplementary, and alternate positions of key weapons.
- **Defend a reverse slope.** The commander organizes a reverse-slope defense on the portion of a terrain feature or slope with a topographical crest that masks the main defensive positions from enemy observation and direct fire. It is generally useful at lower tactical levels (battalion and below). The goal is to make the enemy commit his forces against the forward slope of the defense, resulting in an uncoordinated attack across the exposed crest. The topographical crest normally marks the far edge of the EA. Engineers are challenged in shaping the battlefield with obstacles that can be covered by fire. Some of the best locations for obstacles may only be covered from positions on the forward slope.

- **Defend a strong point.** A strong point is a heavily-fortified BP that must be tied to a natural or reinforcing obstacle. It requires significant engineer effort, roughly requiring a one-day effort from an engineer unit the same size as the unit defending the strongpoint.
- **Defend a perimeter.** A perimeter defense is a defense oriented in all directions used by a unit for self-protection or to protect other units located within the perimeter. The commander can employ the perimeter defense as an option when conducting an area or mobile defense. A successful perimeter defense relies on aggressive patrolling and security operations. Engineers employ tactical obstacles (including the integration of hasty protective obstacles) in support of the established perimeter. (Similar engineer considerations are discussed in chapter 4 in support of an area security mission.)

Note. See FM 3-90, FM 3-90.5, and FM 3-90.6 for more information.

URBAN AREAS AND COMPLEX TERRAIN CONSIDERATIONS

6-113. Offensive and defensive operations may be conducted in urban areas, jungles, forests, mountainous areas, deserts, extremely hot areas, and arctic and cold regions. Each environment presents its own challenges to planning and conducting engineer operations and may require engineers to employ specialized knowledge, skills, techniques, and equipment. The following paragraphs present characteristics of five special environments that impact engineer operations. They are intended only as an overview of those environments. For additional information, see FM 3-34.170 and FM 5-103. Each has sections on urban areas and complex terrain that are focused on reconnaissance and survivability, respectively.

URBAN AREAS

6-114. Engineers are enabled and challenged when operating in urban areas. When forces are required to operate in urban areas, significant engineer augmentation is likely required. Engineers provide unique geospatial products for the complex terrain of cities (3-D terrain and subterranean visualization products). Assured mobility is an important framework for maneuver commanders to consider in determining how to shape and dominate in urban terrain. Considerations for minimizing collateral damage during the reduction of EHs (IEDs and UXOs) are especially important in an urban setting. General engineering tasks are prevalent throughout all operations, especially during the transition to stability or civil support operations. (See appendix H, FM 3-06, and FM 3-06.11, for additional information on operations in urban terrain. FM 3-06 provides a new framework (understand, shape, engage, consolidate, and transition) for visualizing UO.)

JUNGLES AND FORESTS

6-115. Jungles are humid, tropic areas with a dense growth of trees and vegetation. Visibility is typically less than 100 feet, and areas are sparsely populated. Mounted infantry and armor operations are limited in jungle areas, and jungle vegetation provides excellent concealment from air and ground observation. Vegetation does not provide adequate cover from small-caliber weapons, direct fire, artillery, or indirect fire fragments. Adequate cover is available using the natural ravines and gullies produced by erosion from the high annual rainfall of the area. Few natural or locally procured materials are available in jungle areas. Other considerations that often require aboveground protective construction are high water tables, dense undergrowth, and tree roots. (For more information on operations in this special environment, see FM 90-5.)

MOUNTAINOUS AREAS

6-116. Characteristics of mountain ranges include rugged and poorly trafficable terrain, steep slopes, and altitudes greater than 1,600 feet. Irregular mountain terrain provides numerous places for cover and concealment. Because of rocky ground, it is difficult and often impossible to dig belowground positions; therefore, boulders and loose rocks are used in aboveground construction. Construction materials used for

both structural and shielding components are most often indigenous rocks, boulders, and rocky soil. Often, rock formations are used as structural-wall components without modification. Conventional tools are inadequate for preparing individual and crew-served weapons fighting positions in rocky terrain. Engineers assist with light equipment and tools (pneumatic jackhammers) delivered to mountain areas by helicopter. Explosives and demolitions are used extensively for positions requiring rock and boulder removal. (FM 3-97.6 and FM 3-97.61 provide detailed information on mountain operations.)

DESERTS AND EXTREMELY HOT AREAS

6-117. Deserts are extensive, arid, treeless environments that suffer from a severe lack of rainfall and possess extreme daily temperature fluctuations. The terrain is sandy with boulder-strewn areas, mountains, dunes, deeply eroded valleys, areas of rock and shale, and salt marshes. Effective natural barriers are found in steep-slope rock formations. Wadis and other dried up drainage features are used extensively for protective position placement. Camouflage, concealment, light, and noise disciplines are important considerations in desert terrain. Target acquisition and observation are relatively easy in desert terrain. (FM 90-3 provides detailed information on the considerations associated with desert operations.)

ARCTIC AND COLD REGIONS

6-118. Cold regions of the world are characterized by deep snow, permafrost, seasonally frozen ground, frozen lakes and rivers, glaciers, and long periods of extremely cold temperatures. Digging in frozen or semifrozen ground is difficult with equipment and virtually impossible for a Soldier with an entrenching tool. Construction fighting and protective position in snow or frozen ground takes up to twice as long as positions in unfrozen ground. Operations in cold regions are affected by wind and the possibility of thaw during warming periods. An unexpected thaw causes a severe drop in the soil strength, which creates mud and drainage problems. Positions near bodies of water must be carefully located to prevent flood damage during the spring melting season. Wind protection greatly decreases the effects of cold on Soldiers and equipment. (FM 31-70 provides detailed information on the considerations associated with arctic and cold region operations.)

FOCUSED SUPPORT TO OTHER UNITS WITHIN AND AUGMENTING THE BRIGADE COMBAT TEAM

6-119. Engineers provide focused and specific support to various units within and augmenting the BCT. Much of the following discussion has to do with the hardening aspects of survivability (see FM 5-103) and the requirement for engineer support to properly protect vital equipment and personnel. Another significant aspect may be engineer reconnaissance (see FM 3-34.170). Most often, organic engineers are focused on and dedicated to the tactical mission in support of maneuver units within the BCT. Many of the tasks are performed by augmenting engineer units, although combat engineers organic to the BCT may also perform them.

ARTILLERY

6-120. Most engineer missions in support to FA units and assets are through survivability operations. Artillery units often require engineer support to construct survivability positions for individual howitzers, fire direction centers (FDCs), and radars. These survivability positions are built to protect Soldiers and equipment from the effects of direct and indirect fires.

6-121. Q36 and Q37 radars are used by artillery units to facilitate counterfire missions. These are valuable assets to the BCT commander and often a high priority for protection. Most often, berms are used around radars to protect them from enemy fires. These radars are HVTs for enemy forces and have no armor or self-protection capability. During operations, engineer planners must consider survivability for these assets.

AIR DEFENSE ARTILLERY

6-122. Engineer support to ADA units and assets is focused on hardening and other survivability tasks. ADA assets may include radars used to detect incoming aircraft or tactical ballistic missiles. These radars and firing systems may require the construction of berms to protect them from enemy action. Though the BCT does not have any organic ADA units, it can expect to be routinely augmented with ADA capabilities. The BCT can also expect to have corps- and division-controlled ADA assets positioned with the BCT AO, which may require survivability effort from the BCT task-organized engineer force.

6-123. In heavily wooded or jungle terrain, ADA units may require engineers to clear fields of fire to facilitate missile launch or direct-fire engagements by avengers. Augmenting engineer equipment and capabilities may be required to meet these tasks. When static, these weapon systems may require survivability positions that protect Soldiers and the system, but also allow the full use of the air defense components of the vehicle.

AVIATION

6-124. Engineer support to aviation units and assets focuses on FACE tasks. These tasks can often be met by organic BCT engineers, but most likely require augmenting engineers for many of the general engineering tasks. (See FM 3-34.2 for details on FACE operations.)

6-125. Organic engineers within the BCT can quickly berm temporary aviation revetments to protect aircraft from the effects of enemy fires. When aircraft parking areas become more permanent, general engineering support is required to emplace HESCO Bastion Concertainers®. These HESCO Bastion Concertainers provide proper survivability and protection to aircraft. (See FM 5-103 for details on constructing aircraft revetments.)

6-126. Combat engineers may support aviation units in the use of forward arming and refueling points (FARPs) during combat operations. Organic engineers can provide some support, but augmenting engineers bring capabilities not found in the organic engineer companies. FARPs may require survivability support most often by berming. This berming may include the aircraft and ammunition or fuel being stored nearby. Locations chosen to establish a FARP may require preparation (clearing and grubbing). The armored combat earthmover (ACE) and deployable, universal combat earthmover (DEUCE) can do many of these tasks, but bulldozers are better-suited for heavy vegetation. It may also be necessary for engineers to construct small trenches in which to place fuel hoses. This prevents damage to the hoses by vehicular traffic.

6-127. Organic combat engineers can provide clearing and leveling for launch and recovery sites for the tactical unmanned aerial system (UAS) found at the BCT level and below. General engineering augmentation is required to support operational-level UAS which are larger and require an airstrip for takeoff and landing. If paving is required, engineer planners must ensure coordination for paving and concrete augmentation.

MILITARY POLICE

6-128. Engineer support to military police units and assets within the BCT include the potential requirement to support the construction of temporary and permanent detainment facilities. These facilities may range in size, based on special requirements and the tactical situation. Combat engineers can assist in the construction of temporary facilities using concertina and other barrier materials. Temporary facilities may require sustainment and improvement, and permanent facilities require support from augmenting engineer vertical and horizontal construction units. When a permanent facility is constructed, power generation support from prime power units may also be required.

6-129. Military police and HN police headquarters may require survivability support. Combat engineers can provide lower-end hardening of facilities by constructing berms or emplacing HESCO Bastion Concertainers. More permanent hardening requires augmentation by construction units.

6-130. Military police may also require support when constructing vehicle checkpoints and traffic control posts (TCPs). Engineer planners coordinate with planners from the PM cell for this and similar types of support. (See FM 5-103.)

MILITARY INTELLIGENCE

6-131. Engineer support to military intelligence (MI) units may include engineer reconnaissance assets and survivability support for specific intelligence sites and assets (UAS launch and recovery sites). Tactical UAS found at the BCT level and below require smaller, less advanced launch and recovery sites to conduct operations. Organic engineers may be required to assist detachments in clearing and preparing launch and recovery areas. This includes clearing vegetation and leveling sites to meet UAS detachment needs, most of which can be done by an ACE or DEUCE. Larger UAS found at the operational level of command may require extensive engineer augmentation support, such as an airstrip (some UASs under Air Force control actually require a paved runway. When supporting these units in the BCT AO, augmentation by general engineering units is required to construct and maintain runways. If paving is necessary, engineer planners must ensure coordination for paving and concrete detachment augmentation.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR

6-132. Engineer support to CBRN units and assets may be extensive if the BCT faces a significant CBRN threat. When CBRN decontamination is required, organic engineer companies may be tasked to assist in the construction of decontamination sites. Most often, engineer support includes digging sumps and drainage ditches to control wastewater runoff associated with decontamination. Engineers may also be tasked to construct combat roads and trails to improve access to the site. Engineer units coordinate with decontamination units to construct the decontamination site and ensure that site standards are met. For large-scale decontamination operations, general engineering units may be required to meet the demands.

SIGNAL

6-133. Engineering support to signal units consist primarily of geospatial and survivability support. Terrain visualization products help signal planners plot communication coverage. Survivability support is aimed at protecting critical signal sites and assets.

CIVIL AFFAIRS

6-134. Engineer support to CA units and assets may be significant and linked to the CA plan (see chapter 7). (See FM 3-34.170 and FM 3-34.400 for additional, in-depth discussion of infrastructure reconnaissance and its relationship to CA operations.)

SUPPORTING SUSTAINMENT OPERATIONS

6-135. Engineer support to sustainment within the BCT typically requires significant engineer effort to facilitate operations. Most often, these tasks require general engineering units to augment the BCT. Engineer planners must be constantly aware of the necessary requirements of supporting sustainment operations, and the engineer assets providing this support typically come from EAB engineer organizations. The following paragraphs are intended as a reminder to engineer planners of sustainment considerations when conducting the engineer running estimate and developing orders. (See FM 3-34.400 for information on general engineering construction support that may be conducted in support of sustainment operations in general.)

Heliports

6-136. One or more LZs or heliports may be required to support operations. When operating in austere environments, rotary-wing aircraft are used for transport, MEDEVAC, and resupply. The brigade support medical company (BSMC) of the brigade support battalion (BSB) requires an LZ close to its Role 2 medical treatment facility (MTF) to facilitate medical evacuation by air ambulance. Engineers can utilize geotextile materials or dust-inhibiting fluids to reduce the effects of erosion and dust.

Airfields

6-137. The BSB may position on or near airfields capable of landing larger, fixed-wing aircraft. Airfield maintenance and construction may be required to continue air operations from the brigade support area (BSA). General engineering units are required to accomplish these tasks.

Supply Routes

6-138. The use of dedicated supply routes is critical for the sustainment of the BCT. Engineer units may be required to repair and maintain MSRs to ensure mobility for sustainment elements. These requirements are typically large-scale tasks and require general engineering units to meet the demand. Depending on the condition of supply routes, it may be necessary to have multiple engineer units supporting this operation. When multiple engineer units are employed, it becomes necessary for an engineer headquarters to oversee these operations and provide the necessary C2. Engineer planners should consider augmentation by an engineer battalion (or even a brigade) when supporting significant MSR requirements. Bridging support may be required to continue uninterrupted sustainment along MSRs.

Ammunition Supply Points

6-139. Ammunition supply points (ASPs) within the BCT require berming or trenching to protect resources. Large trenches may be constructed where ammunition can be stored and protected. These trenches and berms also mitigate the effects of blast if they receive an enemy direct hit.

Fuel Sites

6-140. Locations where bulk fuel is stored must be protected. In recent operations, fuel sites have been high-priority targets for enemy attack.

Survivability

6-141. The headquarters of most units supporting sustainment have limited protection and require survivability support. Initially, organic engineer units may be able to provide limited berming and emplace HESCO Bastion Concertainers for protection, but maneuver tasks most likely take precedence. General engineering organizations augmenting the BCT are best-suited to support the BSB and the BCT sustainment area. Sustainment area units may require vertical and horizontal construction support, especially as the sustainment area becomes more permanent.

POWER GENERATION

6-142. The augmentation of power generation support may be necessary, especially if the BCT is responsible for the construction or maintenance of a base camp or FOB. Prime power teams are uniquely designed to provide this support, especially if the nature of the base camp or FOB includes multiple collocated sustainment units. General engineering is required to facilitate and assist in the creation of a power distribution system.

PIONEERING

6-143. Combat and general engineering units have the ability to construct a variety of lifting devices and other enablers through the use of their pioneering skills. This includes the construction of gin poles, shears, timber trestle bridges, ramps, and other devices that assist with lifting and loading heavy objects. These are especially useful in maintenance areas where forklifts and cranes may be under intensive use or other bridging is not available or appropriate. (See FM 5-34 for details on constructing these and other supporting items and capabilities.)

Chapter 7
Stability and Civil Support Operations

Dominance on the battlefield will be squandered if the United States does not have the tools to win hearts and minds and secure lasting peace out of its military engagements.

—Robert C. Orr

Full spectrum operations include stability operations as a part of joint campaigns and civil support operations as a part of HLS. Stability and civil support operations have become more important and an acknowledged part of full spectrum operations due to events across the globe and recent major disasters within the United States. The ENCOORD and engineer company commander must have a fundamental understanding of the missions and special engineer requirements associated with stability and civil support operations. The planning effort for both operations requires the same degree of planning for offensive and defensive operations. The same fundamental processes and procedures discussed in previous chapters for planning, integrating, and controlling engineer operations in support of combat operations apply to stability and civil support operations. This chapter provides an overview of stability and civil support operations and some of the associated engineer tasks and special considerations for each. (See FM 3-0, FM 3-07, FM 3-34, FM 3-90.5, and FM 3-90.6 for more detailed information.)

STABILITY OPERATIONS

7-1. Stability operations are part of full spectrum operations. They are intended to promote and protect U.S. interests by influencing threat, political, and information dimensions of the OE through a combination of peacetime developmental, cooperative, and coercive actions in response to a crisis. The focus for most stability operations is on sustaining the outcome achieved from combat operations to prevent the threat or the conditions for a threat to return and realize strategic results. (See FM 3-0 for more information.)

7-2. In recent years, Army forces have conducted stability operations more frequently than any other kind of operation. Stability operations are inherently complex and place great demands on small-unit leadership. From an engineer perspective, the range of potential requirements and mission roles can be very broad. Junior leaders are required to develop skills associated with noncombat and nation-building issues while maintaining essential warfighting skills. Capable, trained, disciplined, and high-quality leaders, Soldiers, and teams are essential to the success of stability operations. Soldiers and units at every level must be flexible and adaptive. Stability operations often require the mental and physical agility and capability to shift from noncombat to combat operations and back again. Engineers have always been required to plan for the transition between offensive and defensive operations and the phases of an operation.

7-3. Stability operations demonstrate U.S. resolve through the commitment of time, resources, and forces to establish and reinforce diplomatic and military ties. As stated in FM 3-0, the purpose of stability operations includes—

- **Providing a secure environment.** By providing security and assisting the local authorities with controlling civilians, Army forces begin the process of separating adversaries from the general population. Physical isolation is complemented by operations that persuade the population to support an acceptable, legitimate government, isolating the adversaries politically and economically.

- **Securing land areas.** Effective stability operations help secure land areas by developing HN capabilities. Areas of population unrest often divert forces that are urgently needed elsewhere.
- **Meeting the critical needs of the population.** Stability operations are often required to meet the critical needs of the population. Army forces can provide essential services until the HN government or other agency can do so.
- **Gaining support for the HN government.** All stability operations ultimately depend on the legitimacy of the HN government and its acceptance by the population as the governing body. All stability operations are conducted with that aim.
- **Shaping the environment for interagency and HN success.** This is achieved by providing the security and control necessary for the HN and interagency elements to function.

7-4. Army forces perform the following five primary stability tasks:

- **Civil security.** Civil security includes protecting the population from external and internal threats.
- **Civil control.** Civil control includes regulating the behavior and activity of individuals and groups. Control limits population activity to allow security and essential services. A curfew is an example of civil control.
- **Essential services.** Essential services include emergency lifesaving medical care, veterinary services, epidemic disease prevention, food and water provisions, emergency shelter provisions, and basic sanitation provisions (sewage and garbage disposal). This is an area that typically receives significant engineer focus.
- **Governance support.** Governance support is the provision of societal control functions that include the regulation of public activity, rule of law, taxation, security maintenance, control and essential services, and normalizing means of succession of power.
- **Economic infrastructure development support.** Economic and infrastructure development support is direct and indirect military assistance to local, regional, and national entities to provide an indigenous capacity and capability for continued economic and infrastructure development.

BRIGADE COMBAT TEAM

7-5. While the BCT is designed for combined arms combat, it also participates in stability operations. When conducting combat operations, the BCT may be required to rapidly shift its focus to stability operations. The ability of Army forces to stabilize a crisis is not limited to their ability to attack and defend. The very presence of a BCT may help promote a secure environment in which diplomatic and economic programs designed to eliminate root causes of instability may flourish. The BCT and other Army forces can establish and maintain a credible presence as long as necessary to achieve desired results. As with combat operations, all three engineer functions (them) apply to stability operations.

7-6. The BCT performs many familiar core tactical missions and tasks during stability operations. Stability operations typically differ from other operations (offense and defense) in the—

- Purpose of operations.
- Special constraints placed on commanders and Soldiers.
- Level of interaction with OGAs and NGOs.
- Unique missions and tasks conducted.

7-7. These operations follow and focus on broad imperatives that help guide commanders in execution. These imperatives are—

- Protecting the force.
- Conducting active information operations.
- Maximizing joint, interagency, and multinational cooperation.
- Presenting the clear ability to apply force without threatening its use.
- Applying force as precisely and selectively as possible.

- Understanding the potential for grave consequences originating from Soldier and small-unit actions.
- Acting decisively to prevent the escalation of violence.

ENGINEERS

7-8. In stability operations, most engineer effort is focused on theater infrastructure repair and restoration to reconstruct or establish services that support the population. Given the nature of stability operations, the risks associated with environmental hazards may have a greater importance and impact in stability operations than in offensive or defensive operations. Stability operations tend to be long compared to offensive, defensive, and civil support operations. As such, the level of engineer effort is very high at the onset and gradually decreases as the theater matures and support requirements transfer to civilian contractors, such as those who operate under the logistics civilian augmentation program (LOGCAP).

7-9. Within the BCT, the missions performed by organic and augmenting engineer forces in stability operations are linked directly to the BCT mission and responsibility. While combat engineer route clearance and other close support capabilities may be critical tasks applied through the movement and maneuver warfighting function, a larger portion of engineer requirements within the BCT AO are likely met with general engineering and other specialized engineer capabilities. The BCT ENCOORD must be prepared to coordinate the simultaneous execution of these engineer capabilities throughout the depth of the BCT AO and in synchronization with warfighting functions. When the required engineer augmentation is unavailable to the BCT, the ENCOORD must rely on contracted engineering support, reachback, or collaborative planning with another engineer element for the necessary technical support to enhance BCT organic engineer capabilities. (The integration of engineer operations into stability operations is discussed later in this chapter.)

7-10. In analyzing engineer requirements in stability operations and determining BCT essential tasks for M/CM/S, the ENCOORD considers the following factors:

- Terrain in the AO.
- Type of obstacles in the AO.
- Engineer assets and available capabilities.
- Operation duration.
- Water supply and location.
- Sewage and garbage facilities.
- Local power facilities.
- Firefighting capability.
- Base support requirements.
- Demining center issues.
- Basic country infrastructure (road, bridge, rail, airfield, port capability) and contracted engineering support.

TYPES

7-11. Stability operations typically fall into ten broad types that are neither discrete nor mutually exclusive. For example, a force engaged in a peace operation may also find itself conducting arms control or a show of force to set the conditions for achieving an end state. This section provides an introductory discussion of the types of stability operations. (For more detailed information, see FM 3-0 and FM 3-07.)

7-12. The ten types of stability operations are—

- Peace operations.
  - Peacekeeping.
  - Peace building.

  - Peacemaking.
  - Peace enforcement.
  - Conflict prevention.
- Foreign internal defense.
- Security assistance.
- Humanitarian and civic assistance.
- Support to insurgencies.
- Support to counterdrug operations.
- Combating terrorism.
  - Antiterrorism.
  - Counterterrorism.
- Noncombatant evacuations.
- Arms control.
- Show of force.

Peace Operations

7-13. Peace operations are the broadest type of stability operations. Peace operations support strategic and policy objectives and the diplomatic activities that implement them. They are performed unilaterally or as part of a United Nations (UN), North Atlantic Treaty Organization (NATO), or multinational force. Army forces conduct the following types of peace operations:

- Peacekeeping.
- Peace building.
- Peacemaking.
- Peace enforcement.
- Conflict prevention.

Peacekeeping

7-14. Peacekeeping operations are military operations undertaken to a dispute with the consent of all major parties. They are designed to monitor and facilitate the implementation of an agreement (cease-fire, truce) and support diplomatic efforts to reach a long-term political settlement (see JP 3-07.3). In peacekeeping operations, the BCT must use all capabilities, short of coercive force, to gain and maintain the initiative. The BCT may be assigned a variety of missions designed to monitor peace and stability and to improve the humanitarian environment. The following are examples of peacekeeping missions:

- Deter violent acts at critical locations.
- Conduct liaison with disputing parties.
- Verify the storage or destruction of military equipment.
- Verify disarmament and demobilization of selected disputing forces.
- Negotiate and mediate.
- Investigate alleged cease-fire violations, boundary incidents, and complaints.
- Collect information about the disputing forces, using all available assets.
- Contend with ambiguous, tense, or violent situations without becoming a participant, in compliance with the ROE, rules of interaction (ROI), and preparatory training.
- Provide security for enemy prisoner of war (EPW) exchanges.
- Supervise disengagements and withdrawals.
- Assist civil authorities.
- Support local elections.
- Provide relief to refugees and internally displaced persons.
- Restore emergency and basic infrastructure functions.
- Transition to peace enforcement or combat operations.

Note. The BCT must train the force to ensure that they have the ability to respond to a contingency plan requiring an increase in the use of force.

7-15. During peacekeeping operations, engineer forces (organic or augmenting the BCT) may be used for many missions. Engineers participate as part of a combined arms force conducting combat engineering tasks. They may also conduct a broad range of general engineering tasks. High-frequency engineer missions related to peacekeeping may include—

- Constructing CPs, bunkers, and OPs.
- Constructing protection structures (earth revetments, wire obstacles, defensive positions).
- Clearing fields of observation.
- Demolishing fortifications.
- Establishing a mine action center or explosive hazards coordination cell (EHCC).
- Clearing or marking minefields (and maintains minefield fences).
- Clearing mines and booby traps, but not demining.
- Providing backup support for identifying, marking, removing, and destroying explosive ordnance.
- Constructing and maintaining roads.
- Emplacing bridges.
- Repairing or upgrading airfields and LZs.
- Constructing and maintaining internment/resettlement facilities.
- Providing base camp construction and power generation.
- Providing emergency restoration of critical public services and facilities.
- Providing infrastructure reconnaissance, technical assistance, and damage assessment.
- Providing temporary bridge construction.

7-16. The removal of mines by engineers during peacekeeping operations is based on tactical necessity. Humanitarian mine action (HMA) organizations provide the preponderance of mine clearance, but it is ultimately an HN responsibility. U.S. Army participation in HMA focuses on training HN personnel to conduct all aspects of HMA (demining training, the establishment of national mine action centers, mine risk education). U.S. military personnel may assist and train others in demining techniques and procedures, but are prohibited by federal statute from detecting, lifting, or destroying land mines unless done for the concurrent purpose of supporting a U.S. military operation. HMA training missions are normally conducted by special operations forces (SOF) and assisted by EOD. SOF and EOD serve as primary trainers for demining and UXO clearance operations. CA personnel help establish national mine action centers, and PSYOP personnel provide mine risk education. CA teams, PSYOP teams, and other specialists are further trained to execute HMA programs.

Peace Building

7-17. Typical peace-building activities include restoring civil authority, rebuilding physical infrastructures, providing structures and training for schools and hospitals, and helping to reestablish commerce. Peace building provides the reconstruction and societal rehabilitation in the aftermath of conflict that offers hope to the HN population. When executing peace-building operations, BCT efforts should complement those of nonmilitary agencies and local governments. (See FM 3-07 and JP 3-07.3 for more information on support to peace-building operations.)

Peacemaking

7-18. Peacemaking is primarily a diplomatic process aimed at establishing a cease-fire or an otherwise peaceful settlement of a conflict. The BCT may support peacemaking by performing military-to-military relations, exercises, peacetime deployments, and security assistance. (See FM 3-07 and JP 3-07.3 for more information on peacemaking support.)

Peace Enforcement

7-19. Peace enforcement operations apply military force or the threat of its use, normally pursuant to international authorization, to compel compliance with resolutions or sanctions designed to maintain or restore peace and order. Peace enforcement operations are generally coercive in nature and rely on the threat or use of force. The impartiality with which the peace force treats all parties and the nature of its objectives separate peace enforcement from war. The purpose of peace enforcement is not to destroy or defeat an enemy, but to use force or the threat of force to establish a safe and secure environment for peace building to succeed.

7-20. In peace enforcement operations, the BCT may use force to coerce hostile factions into ceasing and desisting violent actions. These factions usually have not consented to intervention and may be engaged in combat activities. The nature of peace enforcement operations dictates that Army forces assigned a peace enforcement mission must be capable of conducting combat operations. The BCT conducting a peace enforcement operation must be ready to fight to achieve—

- Forcible separation of belligerents.
- Establishment and supervision of protected areas.
- Sanction and exclusion zone enforcement.
- Movement denial and guarantee.
- Restoration and maintenance of order.
- Protection of humanitarian assistance operations.
- Relief to refugees and internally displaced persons.
- Support for the return of refugee operations.

7-21. Engineer support to the BCT in peace enforcement operations includes the engineer missions previously mentioned for peacekeeping operations; however, in peace enforcement operations, there is an increased likelihood of close combat and the resulting combat engineering tasks. Engineers may also participate in disarming (seizing ammunition, collecting and destroying weapons and supplies, closing weapons and ammunition factories, and preventing resupply).

Conflict Prevention

7-22. Conflict prevention is primarily diplomatic actions taken in advance of a crisis to prevent or limit violence, deter parties, and reach an agreement short of conflict. Military activities are tailored to meet the political demands and may require deploying forces to contain a dispute or prevent it from escalating into hostilities. (See JP 3-07.3 for more information on conflict prevention.)

Foreign Internal Defense

7-23. Foreign internal defense (FID) is a program that supports friendly nations operating in or threatened with potential hostilities. It promotes regional stability by supporting a HN program of internal defense and development. These national programs free and protect a nation from lawlessness, subversion, and insurgency by emphasizing the building of viable institutions that respond to society needs. FID can include direct or indirect support and combat operations. Direct support provides direct assistance to the HN civilian population or military (CA operations, intelligence and communications sharing, logistics). Indirect support emphasizes the principles of HN self-sufficiency and builds strong national infrastructures through economic and military capabilities. Security assistance programs, multinational exercises, and exchange programs are examples of indirect support. Combat operations include offensive and defensive operations conducted by U.S. forces to support a HN fight against insurgents or terrorists. BCT forces conduct FID operations according to FM 3-07 and JP 3-07.1.

Security Assistance

7-24. During security assistance, the United States provides defense articles, military training, and other defense related services to eligible foreign governments or international organizations via grants, loans, credits, or cash sales to further U.S. national policies and objectives. These programs include foreign

military sales and international military education and training. Security assistance is a group of programs, not a mission assigned specifically to Army units. However, Army units and Soldiers participate in security assistance programs through peacetime engagement activities and by training, advising, and assisting allied and friendly armed forces.

Humanitarian and Civic Assistance

7-25. Humanitarian and civic assistance (HCA) provides support to the local population with military operations and exercises by predominantly U.S. forces. Such assistance must fulfill unit training requirements that incidentally create a humanitarian benefit to the local population. The assistance that engineers may provide under HCA is limited to the—

- Construction of rudimentary surface transportation systems.
- Well drilling and construction of basic sanitation facilities.
- Rudimentary construction and repair of public facilities.

7-26. U.S. forces (including engineer headquarters) may be tasked to provide the C2 support necessary to plan and execute the ground portion of any humanitarian assistance operation. Engineers may also be tasked to provide the logistics support necessary to relieve human suffering or provide forces to secure an area and allow the humanitarian relief efforts of other agencies to proceed. Due to the limited capability of engineers organic to the BCT, engineer augmentation is required to provide even rudimentary assistance (constructing and repairing surface transportation systems, sanitation facilities, public facilities and utilities). Engineer assistance may also include constructing feeding centers and disposing of human wastes and hazardous wastes (HW).

Support to Insurgencies

7-27. An *insurgency* is an organized movement aimed at the overthrow of a constituted government through subversion and armed conflict. (JP 1-02) The following seven elements are common to all insurgencies:

- Leadership.
- Ideology.
- Objectives.
- Environment and geography.
- External support.
- Phasing and timing.
- Organizational and operational patterns.

Note. See FM 3-07 for more information on the seven elements.

7-28. On order from the Secretary of Defense, Army forces support insurgencies that oppose regimes which threaten U.S. interests or regional stability. While any Army force can be tasked to support an insurgency, SOF usually receive these missions. Engineer support to insurgency forces is generally limited to providing geospatial products and constructing SOF operating bases located outside the AO.

7-29. A *counterinsurgency* is those military, paramilitary, political, economic, psychological, and civic actions taken by a government to defeat insurgency. (JP 1-02) Army forces help the supported government police, paramilitary, and military forces perform counterinsurgency, area security, or local security operations while respecting the rights and dignity of the people. They provide advice and assistance in finding, dispersing, capturing, and destroying insurgent forces. They emphasize the training of national, state, and local forces to perform essential defense functions. The BCT most often conducts counterinsurgency operations by providing security for an HN. Security operations include the security of facilities and installations, defensive operations, and protection of the local population. Organic and augmenting engineer support to the BCT is similar to that for HCA and may include—

- Water supply and sanitation improvements.
- Road, airfield, and port construction.
- Multinational training.

Note. See FM 3-24 for more information on counterinsurgency operations.

Support to Counterdrug Operations

7-30. Counterdrug operations are always conducted in support of one or more governmental agency. These include the U.S. Coast Guard, U.S. Customs Service, Department of State (DOS), Drug Enforcement Agency (DEA), and the Border Patrol. When operating inside the United States and its territories, counterdrug operations are considered civil support operations and are subject to restrictions under Title 18, United States Code (USC), Section 1385 (popularly known as the Posse Comitatus Act). Whether operating in the United States or in a HN, Army forces do not engage in direct action during counterdrug operations. Units that support counterdrug operations must be fully aware of legal limitations regarding the acquisition of information about civilians, (U.S. and foreign). Typical support to counterdrug operations include—

- Detection and monitoring.
- HNS.
- INFOSYS.
- Intelligence, planning, sustainment, training, and selected M/CM/S tasks.

Combating Terrorism

7-31. *Terrorism* is the calculated use of unlawful violence or the threat of unlawful violence. (JP 3-7.02) It is intended to coerce or intimidate governments or societies in the pursuit of goals that are generally political, religious, or ideological. Combating terrorism involves opposing terrorist actions across the threat spectrum. These actions include defensive (antiterrorism) and offensive (counterterrorism) components.

Antiterrorism

7-32. Antiterrorism measures are primarily aimed at reducing the vulnerability of personnel, equipment, and facilities. Antiterrorism is always a mission consideration and a component of protection. Engineer leaders develop protection measures whenever they conduct engineer missions. Typical antiterrorism actions include—

- Coordination with local law enforcement/HN military.
- Hardening of facilities such as FOBs.
- Physical security actions designed to prevent unauthorized access or approach to facilities (checkpoints and roadblocks).
- Crime prevention and physical security actions that prevent the theft of weapons, munitions, identification cards, and other materials.
- Policies regarding travel, size of convoys, breakage of routines, HN interaction, and off-duty restrictions.
- Protection from weapons of mass destruction (WMD) (dispersion).

Counterterrorism

7-33. Counterterrorism measures are taken to prevent, deter, and respond to terrorism. Counterterrorism actions include strikes and raids against terrorist organizations and facilities. Although counterterrorism is a specified mission for selected SOF, BCTs may also contribute. When employed in this role, BCTs are conducting offensive operations. Engineer support and planning considerations in this case are the same as described in chapter 6.

Noncombatant Evacuations

7-34. Army forces (including BCTs) may be required to conduct noncombatant evacuation operations. These operations support the DOS by evacuating noncombatants and nonessential military personnel from locations in a foreign nation to the United States or an appropriate safe haven. Usually, these operations involve U.S. citizens whose lives are in danger from the threat of hostilities or from a natural disaster. They may also include selected HN citizens or third world country nationals. Noncombatant evacuation operations may take place in a permissive, uncertain, or hostile environment and can be unopposed or resisted by hostile crowds, guerrillas, or conventional forces. Noncombatant evacuation operations usually involve the swift insertion of a force, temporary occupation of an objective, and planned withdrawal upon mission completion. (JP 3-68 provides TTP for conducting noncombatant evacuation operations.)

7-35. Engineers who support noncombatant evacuation operations generally operate as part of a joint force and may conduct a wide variety of tasks, such as—

- Constructing temporary facilities and protective structures inside or outside the country for U.S. forces or evacuees.
- Providing needed geospatial products and data for the operation.
- Conducting route reconnaissance and mobility operations for land evacuation.
- Repairing airfields and clearing helicopter LZs for use in air evacuation operations.

Arms Control

7-36. Army forces can play a vital role in arms control. Brigade elements may be involved in supporting the inspection, protection, and destruction of WMD after hostilities, as they were after Operation Iraqi Freedom. Other actions include escorting authorized deliveries of weapons and materiel (such as enriched uranium) to prevent loss or unauthorized use, inspect and monitor production and storage facilities, and train foreign forces in the security of weapons and facilities. Arms control operations are usually conducted to support arms control treaties and enforcement agencies. The BCT may conduct arms control during combat or stability operations to prevent the escalation of the conflict and reduce instability. This could include the mandated disarming of belligerents as part of a peace operation. The collection, storage, and destruction of conventional munitions and weapons systems can deter belligerents from reinstigating hostilities. Specific BCT capabilities (engineers and augmenting EOD personnel) are particularly suited to these operations. Engineers can provide geospatial products to help verify treaty compliance and construct logistics support facilities. Additionally, the engineer company may fill the role as an additional maneuver company and provide engineer expertise to other elements of the BCT.

7-37. Maneuver companies, including the organic combat engineer company in the BCT, conduct checkpoints and patrols and assist in controlling, seizing, and destroying weapons. Arms control assists in protection and increases security for the local population. Among other tasks, BCT personnel conducting arms control may—

- Supervise or facilitate the implementation of a treaty or agreement.
- Enforce restrictions on weapons.
- Establish areas of limited armaments.
- Inspect weapons production facilities, demilitarized zones, storage sites, and belligerent forces and facilities.
- Seize WMD and other arms.
- Disarm belligerent forces.
- Secure confiscated weapons.
- Escort and transport sensitive items.
- Dismantle, destroy, or dispose of designated weapons and HM when augmented.

Show of Force

7-38. A show of force is an operation designed to demonstrate U.S. resolve. It involves the increased visibility of U.S. deployed forces in an attempt to defuse a specific situation that may be detrimental to

U.S. interests. The BCT may participate in a show of force as part of a temporary buildup in a specific region by conducting a combined training exercise or by demonstrating an increased level of readiness. The United States conducts shows of force for the following three principal reasons:

- To bolster and reassure allies.
- To deter potential aggressors.
- To gain or increase influence.

7-39. Army units are not usually assigned the mission to conduct a show of force. They usually conduct other operations to show force. Shows of force are usually executed as—

- The permanent forward deployment of military forces.
- Multinational training exercises.
- The introduction or buildup of military forces in a region or area.
- An increase in the readiness status and activity level of designated forces.

7-40. The BCT commander must be prepared for an escalation to combat. Commanders must organize their units as if they intend to accomplish the mission by the use of force. Units assigned a show-of-force mission assume that combat is not only possible, but also probable. All actions ordinarily associated with the projection of a force to conduct combat operations pertain to show-of-force deployments.

7-41. Engineer support to demonstrations and shows of force are normally joint and multinational efforts. Engineer tasks are very similar to those described in peace operations.

7-42. Stability operations encompass all planning considerations of combat operations, but the nature of stability operations tends to include enhanced consideration for issues such as protection, ROE, ROI, and environmental impacts. These and other considerations give stability operations a flavor of their own, and each particular operation has its own unique considerations. (See FM 3-07 and FM 3-90.6 for more information on stability planning considerations.)

CIVIL SUPPORT OPERATIONS

7-43. The overall purpose of civil support operations (see figure 7-1) is to meet the immediate needs of U.S. citizens in times of emergency until civil authorities can accomplish these tasks without assistance. Civil support operations are similar to stability operations, but differ because they are conducted within the United States and its territories and are executed under U.S. law. For example, National Guard forces under state control have law enforcement authorities when operating within the United States that are not granted to Regular Army units. In addition to legal differences, operations conducted within the United States are conducted in support of OGAs. These agencies are trained, resourced, and equipped far more extensively than counterpart agencies involved in many stability operations overseas. In stability operations, multinational operations are typical; and in civil support operations, they are the exception. Army civil support operations include the following three primary tasks:

- Provide support in response to a disaster or terrorist attack.
- Support civil law enforcement.
- Provide other support as required.

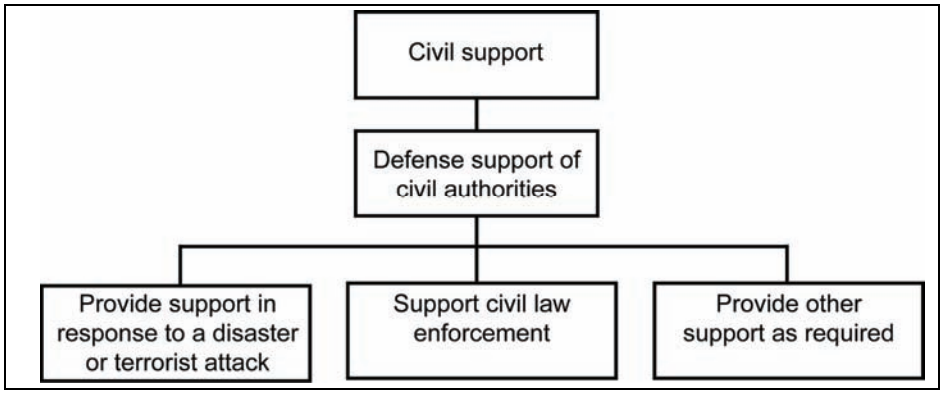


Figure 7-1. Civil support framework

7-44. The Army supports civil authorities during civil support operations in a unity of effort. Most disasters are handled at the state level and below. The Army may be under immediate response authority or ordered by their respective chains of command at the local through state level. Federal resources are committed when requested by the state in need. A civilian federal agency may be placed in charge of a disaster response if the state government is overwhelmed or the incident triggering the disaster is an incident of national significance. Chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) assets may be required for disaster response. It is important for commanders and staffs to know the proponent and its responsibilities. Initial coordination and training with these agencies facilitates the planning process; however, there is usually little time to prepare for civil support operations. To be prepared for such civil support operations, it is essential for commanders to have contingency plans developed and units identified

7-45. Army forces conduct civil support operations as part of HLS within the United States and its territories. HLS provides the nation with strategic flexibility by protecting its citizens, critical assets, and infrastructure from conventional and unconventional threats. It includes the three missions of homeland defense (HLD), civil support, and emergency preparedness planning. Unless the nation is attacked, Army forces conduct civil support operations exclusive of the offense and defense. If the United States comes under direct attack or is threatened by hostile armed forces, Army forces under joint command conduct offensive and defensive operations against the enemy, while simultaneously providing civil support to federal authorities. A defensive task routinely conducted in HLD missions is protecting critical assets and key infrastructure during crises. The ability to conduct offensive operations, though maintained primarily as a potential, is also present. That potential, simultaneously employed with defensive and civil support operations, complements the execution of domestic support tasks. Similarly, effective and efficient civil support operations reduce the need to conduct offensive or defensive operations to quell civil unrest or protect infrastructure. Discipline, endurance, and unit cohesion developed during training prepare Soldiers and units to deal effectively with the ambiguities and complexities of executing civil support operations.

BRIGADE COMBAT TEAM

7-46. Although not the norm, the BCT could be deployed into an area in support of civilian agencies to provide essential services, assets, or specialized resources to help civil authorities deal with situations beyond their capabilities. The BCT has a functional chain of command, reliable communications, and well-trained and equipped forces that can operate and sustain themselves in an austere environment with organic or attached assets. In civil support operations, the adversary is often disease, hunger, or consequences of disaster. Companies and battalions from the BCT can expect to participate in civil support operations with or without other units from time to time.

Disaster or Terrorist Attack

7-47. In response to a disaster or terrorist attack, Army forces provide essential services to an affected area. Essential services include—

- Rescue.
- Emergency medical care.
- Veterinary services.
- Epidemic disease prevention.
- Food and water.
- Emergency shelter.
- Basic sanitation (sewage and garbage disposal).
- Minimum essential access to affected areas.

7-48. Army forces work directly with state and federal officials to restore and return control of essential services to civil authorities as rapidly as possible. As a result of disaster or attack, the capacity of government may be reduced or overextended. Army forces provide C2, protection, and sustainment to government agencies at all levels until they can function normally.

Law Enforcement

7-49. When authorized and directed, Army forces provide support to local, state, and federal law enforcement officials. Support is normally provided when an emergency overwhelms the capabilities of civil authorities. Typical contingencies include support to antiterrorism, counterdrug, civil disturbances, border security, and disaster response. In extreme cases, when directed by the President, Regular Army forces maintain law and order under martial law. The BCT could be selected to provide security, logistics, and communications in support of antiterrorism efforts to reduce the vulnerability of personnel, equipment, and facilities. The BCT could also serve in a supporting role to the lead federal agency to assist with national special security events (state of the union address, democratic national convention, republican national convention, Olympics [when held in the United States]). In support of counterdrug operations, the BCT principal mission could be the detection and monitoring of the transit of illegal drugs into the United States using its organic ISR assets.

Other Support

7-50. This task primarily denotes planned, routine, and periodic support not related to a disaster (military support for parades, funeral details, community relations). Supporting and participating in events and activities that benefit the Army and the civilian community builds on a long tradition of the Army helping communities and can have a lasting effect on the attitudes of the American people. Commanders should identify opportunities to conduct initiatives that meet specific needs; have specific start points and end states; and advance the interests of the nation, the Army, and local communities. Installations may have memorandums of agreement with neighboring towns to provide emergency snow removal or some other capability not readily available. These activities provide an effective means of projecting a positive military image, providing training opportunities, and enhancing the relationship between the Army and the American public.

ENGINEERS

7-51. General engineer support for the restoration of essential services is the primary focus in civil support operations; however, all three engineer functions may be applied simultaneously to some degree. The generating force elements of the Engineer Regiment play a critical and significant role in civil support operations. TECs, under their OPCON relationship with USACE, can provide C2 support. (See in FM 3-34, appendix F, for more information on engineer applications in civil support operations.)

7-52. The BCT organic engineer company can provide manpower and limited support for maintaining or restoring essential services and activities to mitigate damage, loss, hardship, or suffering that results from natural or man-made disasters (CBRNE incidents). The organic geospatial engineering team within the

BCT can support relief operations by providing geospatial products and the analysis of potential life support areas. The likelihood is low that a BCT is committed to support CBRNE consequence management, although the possibility certainly exists. Support to domestic CBRNE consequence management is a major operation. It has, by far, the most extensive support requirements for military personnel. Other U.S. government agencies have the primary responsibility for responding to domestic terrorist incidents. Local authorities are the first to respond to a CBRNE incident. However, Army forces have a key supporting role and can quickly respond when authorized.

7-53. As with stability operations, most BCT engineer requirements in civil support operations are likely met with augmented general engineering and other specialized engineer capabilities. The BCT ENCOORD must be prepared to direct and coordinate the simultaneous application of engineer capabilities in support of the BCT mission. When the required engineer augmentation or capability is unavailable to the BCT, the ENCOORD must rely on reachback or collaborative planning with other engineer elements for the necessary technical support to enhance BCT organic engineer capabilities. If the BCT is committed in response to disaster or a terrorist attack, its organic and augmenting engineer forces may perform or support some critical relief and recovery functions, such as the—

- Search and rescue.
- Emergency flood control.
- Hazard identification.
- Food distribution.
- Water production, purification, and distribution.
- Temporary shelter.
- Transportation.
- Firefighting.
- Medical support.
- Veterinary support.
- Communications.
- Contamination control.
- Sanitation.

7-54. In support of civil law enforcement, typical engineer tasks might include—

- Constructing or repairing law enforcement target ranges; helipads; and fuel storage, billet, CP, and maintenance facilities.
- Producing geospatial products.
- Constructing and upgrading access roads for drug interdiction patrols.
- Clearing observation fields for counterdrug teams.
- Providing explosive breach capability or training to law enforcement personnel.
- Integrating engineer operations into stability and civil support operations.

7-55. Planning for civil support operations is significantly different than planning for stability operations—not in terms of the degree of effort, but because of the unique nature of the threat. The threat will likely be a natural or man-made disaster with unpredictable consequences. Additionally, planners must be aware that civil support operations are governed by different laws and regulations than operations conducted OCONUS. The U.S. Constitution, statutes, and regulations govern the use of military assistance and restrict Army interaction with OGAs and civilians. Issues related to the Posse Comitatus Act, the use of force, civil disaster assistance, and the federalizing of troops necessitates timely legal advice throughout operations.

7-56. In stability and civil support operations, there may be a need for specialized engineer requirements such as prime power, well drilling, and firefighting. Engineer planners must have a general understanding of the capability of specialized assets within the engineer force structure and the ability to determine when their employment would be appropriate.

7-57. The ENCOORD and the engineer company commander may have a requirement to integrate the activities of several engineer capabilities (assessments, engineering services, emergency repairs) within the BCT AO. During a major reconstruction effort, additional engineer battalions and possibly an engineer brigade could be task-organized to the BCT. These units are equipped and manned to fulfill design, construction management, and C2 requirements needed to accomplish these missions, which will likely include—

- Base camp construction and power generation.
- Emergency restoration of critical public services and facilities.
- Infrastructure reconnaissance, technical assistance, and damage assessment.
- Emergency demolition.
- Debris or route-clearing operations.
- Construction and repair of expedient (temporary) roads and trails.
- FACE, to include the repair of paved, asphalt, and concrete runways and airfields.
- Installation of assets that prevent FOD to rotary-wing aircraft.
- Temporary bridge construction.
- Area damage control missions that support the mobility of the civil support force.
- Access to the region through the construction and upgrade of ports; airfields; and reception, staging, onward movement, and integration (RSO&I) facilities.

INTEGRATION THROUGH THE WARFIGHTING FUNCTIONS

7-58. The following are considerations for integrating engineer operations through the warfighting functions and into stability and civil support operations.

Movement and Maneuver

7-59. In stability operations, engineers support BCT movement and maneuver as they do in offensive and defensive operations. However, there is likely to be more emphasis on minimizing the effects of breaching or clearing operations on infrastructure and collateral damage to civilian areas. In stability operations, improving mobility in the BCT AO may be part of the unit mission. If so, the BCT may be augmented with U.S. military and civilian engineers, contractors, and HN engineers. This includes the tasks performed by elements other than engineers (military police, CBRN, EOD). Depending on the magnitude of required effort, the BCT may elect to establish an integration cell (assured mobility section) to coordinate the associated activities.

7-60. Engineers must be creative in implementing nonlethal obstacles (fences, roadblocks, checkpoints) in controlling civilians or separating belligerent forces while working within the limitations of the ROE or use-of-force directives.

7-61. The movement and maneuver missions for engineers during civil support operations include combat and general engineering efforts to clear roads, repair roads, and (in some cases) repair bridges. The BCT organic combat engineering equipment is well suited for the removal of rubble and debris associated with disasters.

Intelligence

7-62. In offensive and defensive operations, engineer IR identified during IPB tend to focus on the effects of terrain and the threat engineer force mission, intent, and capabilities. In stability operations, the engineer planner must expand beyond geographical and threat force capability considerations and understand more on the ethnic and religious factions, assessments of infrastructure and key structures, and current capabilities of existing facilities providing essential services. In civil support operations, the adversary is often disease, hunger, or the consequences of a natural or man-made disaster.

7-63. Stability operations place more demand on understanding the civil considerations (political, cultural, historical, economic, ethnic, and humanitarian factors) in an AO. For instance, cultural information might be important in predicting the potential reactions of a civilian area to an operation. Determining the

disposition of the civilian population and how they may react (hostile or neutral) to construction projects may help engineer planners determine where best to apply engineer manpower and resources to be most effective. Engineer planners must seek all available sources for information (engineer reconnaissance and infrastructure assessments, USACE FFE, NGOs that were in the area before U.S. forces).

7-64. Civil considerations are assessed (ASCOPE) to determine how each might affect operations. Key civilian areas and structures (industrial centers, government centers, communication and media infrastructure, power plants, roads and bridges, airports, schools, hospitals, places of religious worship) are those that have significance to the local population. Assessing the capabilities of a HN includes understanding the government's ability to provide key functions or services (public administration, public health, and emergency services). Consider organizations (military and nonmilitary groups, political or religious organizations, intergovernmental organizations, NGOs) within the AO that influence, interact, or have significance with the local population. Consideration of the people includes all the civilians in the AO and AI whose actions, opinions, or political influence can affect the missions. Events (elections, religious holidays, historically significant dates) to consider are those that have cultural significance within the AO and the AI which could affect the mission.

Fires

7-65. FS planning for stability operations is the same as for offensive and defensive operations, though there could be limitations and restrictions on the use of certain indirect-fire assets. Engineers provide specialized geospatial products to highlight critical areas, structures, and infrastructure (including underground utilities such as oil pipelines) where there is an increased potential for collateral damage (UXO) and subsequent effects on follow-on repair and reconstruction efforts.

7-66. During the planning of nonlethal fires (IO), engineers share their knowledge of public works systems and reconstruction efforts in an attempt to effectively and efficiently focus efforts. In civil support operations, engineers support the commander's PA program by providing updates on engineering projects supporting relief and recovery operations.

Sustainment

7-67. In stability operations, the support provided by sustainment units often extends beyond sustaining military operations. Support provided to the population may become a crucial shaping or decisive operation. Engineers may be a critical enabler in the provision of essential services until the HN government or other agencies can do so. Engineering tasks primarily focus on assisting the stabilization of a region by reconstructing or establishing infrastructure to provide essential services to the population in addition to supporting the sustainment of maneuver forces in their missions. Infrastructure reconnaissance plays a key role in assessing the requirements associated with providing essential services (see FM 3-34.170). As the AO matures, the general engineering effort may transfer to theater support contracts or external support contracts (LOGCAP, Air Force Contract Augmentation Program, Navy Global Contingency Construction Contract). Engineer planners must understand the availability and procedures for employing HNS, DOD contracting, and local purchases.

7-68. Initially, there may be a need to deploy an advance party (heavy with logistics and engineering support) if the AO does not have the infrastructure to support the operation. In other circumstances, it may be necessary for the commander and a small group of specialized key personnel (CA, PA, staff judge advocate [SJA]) to lead the advance party. These personnel set the groundwork for the rest of the force by conducting face-to-face coordination with local civilian and military leaders. Show-of-force operations most likely necessitate that the commander send a large contingent of forces to act as a deterrent and to ensure initial security. In all cases, a well-developed movement order is essential.

Command and Control

7-69. Stability operations tend to be joint, multinational, or interagency. Similar to stability operations, civil support operations involve a high degree of coordination and cooperation with a number of local, state, and federal agencies and private sector and volunteer organizations to accomplish clearly established

objectives. Conducting effective interagency coordination and ensuring a unity of effort may require the establishment of working groups, boards, coordination centers, and the use of LNOs at various levels (see FM 3-07 for more information on interagency coordination). Engineer planners must consider the span of control in arraying C2 for engineer units. No single C2 option works best for all stability and civil support operations. Additionally, Army forces may often be the supporting organization rather than the lead agency.

Protection

7-70. In stability operations, engineers play a major role in protecting positions, headquarters, support facilities, base camps, and highly vulnerable assets. In addition to protecting U.S. and multinational military and civilian personnel, consideration must also be given to protecting contractors and local workers. Stability operations are often decentralized to the battalion, company, or platoon level. Engineer support requirements for protection may stretch throughout the AO as the BCT positions troops where they can best stabilize the situation. Every unit has an inherent capability to provide basic survivability, which can be supplemented with combat engineering equipment to establish lower-end hardening (with earth berms and HESCO Bastion Concertainers). The most effective protection level can only be provided by general engineers or civilian contractors. In stability operations, the BCT may face a mine or UXO threat. Engineers typically play a major role in coordinating the effort to reduce the effects on military forces, nonmilitary forces, and civilians.

7-71. In civil support operations, the immediate effort is on protecting civilians from the elements or the residual hazards from a disaster. Engineers can assist in erecting temporary shelters or prefabricated buildings. Engineer effort may include the construction of earth walls and berms to mitigate emergency flooding and preserve property. Army forces may also have a role in protecting federal property and federal government functions when the local authorities are unwilling or unable to do so.

7-72. Regardless of BCT requirements in stability and civil support operations, there most likely are not enough engineer assets (including civilian-contracted engineer support) available. This situation requires BCT units to construct their own fortifications and assist with other engineer tasks within their capabilities. In prioritizing the use of engineers or organic forces to accomplish engineer tasks, the BCT commander emphasizes the strengthening of protection measures.

CIVIL AFFAIRS OPERATIONS

7-73. As stated in FM 3-0, Army forces conduct CA operations as part of full spectrum operations. CA operations are those activities that enhance the relationship between military forces and civil authorities in areas where military forces are present. Commanders use CA operations to mitigate the impact of military presence on the population and vice versa. These activities are fundamental to executing stability tasks.

7-74. Engineers have a critical role in CA operations, since military operations typically include engineer activities of nonmilitary organizations and military forces. If the experiences of the Gulf War, Operation Restore Hope, Operation Joint Endeavor, Operation Enduring Freedom, and Operation Iraqi Freedom are repeated in future military operations, engineer operations will include many DOD civilians and the services of NGO, international organizations, OGAs, and contractors. The total engineer force of active and reserve military, civilians, contractors, HN personnel, and allies constitute primary resources for CA operations; and the BCT commander can draw upon them to accomplish the engineer mission in their AO.

7-75. While CA units retain responsibility for the overall conduct of CA operations, all Army forces have some inherent capability of supporting CA operations. The integration of engineers, military police, health services, communications, transportation, and other SOF capabilities is essential to the overall effort. Engineer capabilities are applied to provide specific construction and other technical support. The engineer support must be fully integrated with the CA operations plan. Integration occurs through operations process activities and is facilitated by coordination among the ENCOORD and S-9 staff. The BCT may also form working groups under the S-9's lead to ensure the integration of necessary capabilities.

7-76. CA elements can assess the needs of civil authorities, act as an interface between civil authorities and the military supporting agency, and act as a liaison to the civil population. They can develop population and resource control measures and coordinate with international support agencies. The S-9 and civil affairs team-bravo (CAT-B) team leader are the principal advisors to the commander on CA operations. In current operations, most BCTs are task-organized with a civil affairs team (CAT). As with the PSYOP team, these teams have proven to be an invaluable combat multiplier. The CAT operational focus is on the civil center of gravity and on establishing, maintaining, influencing, and supporting the commander's interaction with OGAs, NGAs, and international organizations. CA activities include population and resource control, foreign nation support, humanitarian assistance, civil-military actions, civil defense, civil assistance, and civil administration during stability and civil support operations.

CIVIL-MILITARY PROJECT COORDINATION

7-77. For prioritizing and resourcing civil-military construction and engineer projects, the BCT can form a working group, board, or project integration cell or use the civil-military operations center (CMOC) (if established) to plan, synchronize, and execute approved projects that achieve the commander's desired effects. Civil-military construction and engineer project nominations are submitted by subordinate unit commanders in the form of a statement of work (SOW). Projects are reviewed, prioritized, and presented to the BCT commander for approval. Once approved and resourced, the project is synchronized through an established format within the BCT and submitted through the BCT operations cell as a tasking, construction directive, or execution order. The ENCOORD, financial management staff officer (S-8), provost marshal officer (PMO), and S-9 are critical members in this process.

7-78. The ENCOORD role in civil-military construction and engineering projects includes orchestrating infrastructure reconnaissance teams as required, coordinating for contracted construction or troop construction projects in support of the approved CA operations initiatives, and tracking the progress of ongoing projects. The ENCOORD also coordinates for geospatial products that can facilitate construction activities and serves as the interface or initiates reachback to the USACE and other agencies to coordinate for planning products, technical support, and professional expertise. The ENCOORD coordinates and collaborates with adjacent or higher-unit engineer staff sections to ensure unity of effort.

SPECIAL CONSIDERATIONS

7-79. Infrastructure reconnaissance is a multidiscipline task conducted by a base team augmented, as necessary, with additional expertise. The ENCOORD is likely responsible for coordinating infrastructure reconnaissance, but should rely on other branches for help, depending on the category or required expertise. The base infrastructure reconnaissance team includes expertise from engineer, CA, preventive medicine, military police, and other disciplines. Augmentation from additional disciplines is provided when possible. (See FM 3-34.170 for more information on infrastructure reconnaissance.)

7-80. In the OE, engineers at most echelons operate or interact with other government, nongovernment, and international agencies and organizations participating in the operation. Given the multitude of organizations and capabilities involved, it is important that ENCOORDs (at the appropriate levels) coordinate with these organizations to ensure that resources are focused to meet objectives. Establishing and maintaining effective liaison with all participating agencies is critical to achieving the unity of effort. The CMOC can be a focal point for this effort at the BCT level.

This page intentionally left blank.

Chapter 8

Sustainment Support for Engineer Operations

Good logistics is combat power.

—Lieutenant General William G. Pagonis
Director of Logistics, Gulf War, 1991

Sustaining engineer capabilities in combat poses a tremendous challenge to engineer commanders and staff at all echelons. With Army transformation into a modular force, the engineer company organic to the BCT became completely dependent upon BCT sustainment organizations for support. Engineer forces augmenting the BCT may also rely substantially on those sustainment organizations. The efforts of engineer planners at all levels to plan and coordinate engineer sustainment are essential to the full integration of engineers into BCT sustainment structure. Within the IBCT and HBCT, battalion level sustainment support for the engineer company is provided through the BSTB. Support is provided through the BSB and headquarters and headquarters company (HHC) for the SBCT engineer company. Sustainment support for engineer operations includes logistics provisions, personnel services, and HSS necessary to maintain and prolong operations until mission accomplishment. Logistics tasks include transportation, maintenance, supply, EOD, distribution management, contracting, and field services. This chapter focuses on sustainment support for the organic engineer company in the BCT and highlights the sustainment norms within the BCTs that affect augmenting engineer elements. (See FM 3-90.5, FM 3-90.6, FM 3-90.61, and FM 4-90.7 for more information.)

PLANNING

8-1. Successful sustainment involves balancing effectiveness with efficiency. Sustainment operations are characterized by being able to anticipate requirements, integrate joint and multinational sustainment, improvise solutions, and be responsive and continuous.

8-2. During the operations process, engineer commanders and staff must plan, prepare, execute, and continuously assess sustainment support for engineer capabilities. During the MDMP, engineer planners concurrently develop a sustainment plan while conducting other operational planning. To ensure an effective sustainment plan, the engineer planner must understand the engineer and supported unit mission, commander's intent, and concept of the operation.

8-3. The development of the sustainment plan begins during mission analysis and is refined during war-gaming. Upon receipt of the mission, engineer planners initiate their portion of the logistics estimate process, which is described in FM 5-0 as an analysis of logistics factors affecting mission accomplishment. Engineer planners focus the logistics estimate on the requirements for the upcoming mission and the sustainment of all subordinate engineer units that are organic and task-organized to the supported unit. The engineer planner predicts support requirements by determining the—

- Type of support required (maintenance, supply, transportation, medical support).
- Quantity of support required.
- Priority of support (type and unit).

8-4. After determining the support requirements, the engineer planner assesses the—

- Sustainment resources available (supported unit, parent unit, contractor, HN).
- Status of sustainment resources (location, maintenance, personnel).

- Time that sustainment resources are available to the engineer unit.
- How resources are made available.
- Shortfalls in equipment and supplies needed to support the operation.

8-5. Close integration with the BSB or forward support company (FSC) can simplify and accelerate this process as the information to address many of these considerations should be readily available to sustainment planners to facilitate rapid planning. It should also be resident in the FBCB2, medical communications for combat casualty care (MC4), and Battle Command Sustainment Support System (BCS3).

8-6. After conducting the logistics estimate, engineer planners work with the supported-unit S-4 and compare the requirements with the reported status of subordinate units to determine the specific amount of supplies needed to support the operation. These requirements are then coordinated with the BSB or FSC to ensure that needed supplies are identified and resourced through next-higher stocks.

8-7. The ENCOORD translates the estimate into specific plans that are used to determine the supportability of maneuver unit COAs. After a COA is determined, the ENCOORD incorporates the specific sustainment input into the supported-unit base OPORD and paragraph 4 of the engineer annex. (See appendix H.)

8-8. In each BCT, the ENCOORD works with the appropriate sustainment planner and executor to track essential sustainment tasks involving supporting engineer units. Accurate and timely status reporting assists the ENCOORD in providing the overall engineer status to the supported-unit commander and allows the ENCOORD to intercede in critical sustainment problems when necessary. The ENCOORD also ensures that supplies needed by task-organized or augmenting engineer units are integrated into supported-unit sustainment plans. For the ENCOORD to execute these missions properly, accurate and timely reporting and close coordination with sustainment planners and providers and organic and augmenting engineer commanders and staff is essential.

8-9. Prior to execution, sustainment rehearsals are normally conducted at the brigade, battalion, and company level to ensure a smooth, continuous flow of materiel and services.

LOGISTICS

8-10. The Army principles of logistics are defined in FM 4-0. The application of these principles facilitates effective, efficient sustainment and enables operational success. Engineer commanders and staff understand and use these principles while planning engineer operations. The logistics principles are discussed (with an engineer focus) in the following paragraphs.

Responsiveness

8-11. Responsiveness is the key logistics principle. It means providing the right support in the right place at the right time. Responsiveness includes the ability to anticipate operational requirements and is the keystone logistics principle. Engineers identify all sustainment requirements in advance, taking command or support relationships of task-organized engineer units into consideration. This information must be passed through the proper sustainment channels and tracked through delivery. It involves identifying, accumulating, and maintaining the minimum assets, capabilities, and information necessary to meet support requirements. Engineers plan to meet the changing requirements of the operation on short notice. The engineer sustainment system should be versatile enough to keep pace with rapid decision cycles and mission execution to react quickly to crises or opportunities. It must continually respond to a changing situation and the shifting of engineer units on the battlefield. Engineer planners are sensitive to engineer task organization changes. Interim contingency sustainment support must be planned until task organization is modified or changed. The plan should include aerial resupply when possible.

8-12. Personnel losses and unit capabilities must also be anticipated to plan for continuous operations and future missions. Forward engineer units depend on the sustainment system of their parent unit or the supported unit and may require significant support to accomplish engineer tasks. The ENCOORD at every echelon must anticipate likely task organization changes that affect the flow of sustainment to engineer

organizations. Additional missions or tasks (clearing an LZ for aerial resupply) are created by the sustainment support plan. These missions or tasks must be anticipated (ensuring the passage of sustainment units through obstacles to continue their support of the maneuver units) and planned for during mission analysis.

8-13. The planner who anticipates is proactive—not reactive—before, during, and after operations. The ability of the force to seize and maintain the initiative, synchronize activities along the entire depth of the AO, and exploit success depends on the abilities of commanders, logisticians, and engineers to anticipate requirements. Engineers consider joint, multinational, contract civilian, and interagency assets when planning support for engineer operations. Engineers—

- Use all available resources to the fullest (especially HN assets).
- Prioritize critical engineer activities based on the concept of operations.
- Anticipate engineer requirements based on war-gaming and rock drills, incorporating experience and historical knowledge.
- Organize and resource for simultaneous and noncontiguous operations, but do **not** think contiguously or sequentially.
- Participate in and evaluate the engineer significance of each phase of the operation throughout the entire MDMP.

8-14. The ENCOORD at every echelon and the engineer unit commander forecast future requirements and accumulate the assets needed to accommodate likely contingencies. Engineer operations frequently require—

- High fuel consumption rates (higher than most equipment found in a light brigade).
- Engineer-specific Class IX repair parts that often require extraordinary coordination to obtain.
- Large amounts of Class IV and V construction and barrier materials.
- Demolitions for offensive and defensive operations.
- A large commitment of maintenance and transportation support.
- Financial services to support the local purchase and contracting of HN assets and materials.

Simplicity

8-15. Simplicity involves avoiding complexity and often fosters efficiency in planning and executing logistics operations. Mission type orders and standardized procedures contribute to simplicity. Engineer commanders and staffs establish priorities and allocate supply classes and services to simplify sustainment operations. Engineers use preconfigured loads of specialized classes of supply to simplify transport.

Flexibility

8-16. The key to flexibility lies in the expertise for adapting sustainment structures and procedures to changing situations and missions. Sustainment plans and operations must be flexible enough to achieve responsiveness and economy. Flexibility may include the kind of improvisation that makes, invents, or arranges what is needed from what is on hand.

8-17. Extraordinary methods may be necessary to ensure success during operations. Sustainment planners attempt to push support forward to engineer units to ensure smooth combat operations. Sometimes this is not feasible. In such cases, engineers improvise by making, inventing, devising, or fabricating what is needed. Engineers rely on the results of engineer resource assessments to evaluate the availability of materiel, resources, and terrain features that have engineer application (creating a demolition cratering charge using common fertilizer and diesel fuel). (See FM 3-34.170 for more information on engineer resource assessments.)

8-18. Sustainment organizations must improvise to meet current needs and respond to unforeseen emergencies. They should plan for and use HN supply assets, facilities, and equipment when possible. Specific damage assessment and repair procedures may also be implemented based on the need to improvise during operations. Improvisation is not a substitute for good planning; requirements must be anticipated. However, improvisation can be a great strength; engineer personnel must recognize it as an advantage in meeting emergencies.

Attainability

8-19. Attainability involves generating the minimum-essential supplies and services necessary to begin operations. Commanders determine the minimum levels of support acceptable to initiate operations. Engineers, in conjunction with logisticians, complete the logistics estimate and initiate resource identification based on the supported commander's requirements and priorities. An operation should not begin until minimum-essential levels of support are on hand.

8-20. For engineers, attainability is at the very core of decisions. Trade-offs may be necessary to attain a given goal or quality of product. While attainable, the cost may make other things unattainable. Since engineer materiel must meet specific technical requirements, engineers work closely with the logistics staff to help them understand these requirements and obtain acceptable and suitable alternatives when trade-off decisions are required.

Sustainability

8-21. The engineer commander needs continuous logistics capability to gain and maintain initiative. Pauses for rebuilding power impede momentum and rob the command of initiative. Engineer planners synchronize all sustainment assets to ensure that the support operation does not impede the engineer commander. Continuous operations are critical to success.

8-22. Sustainability ensures the longevity of logistics support to engineers throughout the AO for the duration of the operation. Sustainability focuses on the engineer commander's attention for long-term objectives and the engineer force capabilities. Long-term support is a challenge for the engineer staff, which must not only attain the minimum-essential materiel levels to initiate operations, but must also sustain those operations through the end state. The ENCOORD must ensure that logistics requirements are known and flowing based on available transportation assets.

8-23. Engineers are committed to the current operation or preparing for the next one. The tempo of the operation requires a constant vigilance by the logistician and engineer commander to ensure a constant flow of support. Supplies are pushed (unit distribution method) forward when logistically feasible. Maneuver units rely on lulls in the tempo of an operation to conduct sustainment operations, while engineers may not. Engineers do not usually have this opportunity since many of their missions occur during a lull in operations, and this may deny them the opportunity to use the supply point method. This increases the need for engineers to plan for continuous, routine, and emergency logistics support.

8-24. General engineering involves constructing, repairing, operating, and maintaining infrastructure and facilities to enhance sustainment provisions and services (see FM 3-34.400). Contracting support obtains and provides supplies, services, and construction labor and materiel, often providing a responsive option or enhancement to support the force (see FM 3-100.21, FM 100-10-2, and FMI 4-93.41). General engineers and, potentially, USACE personnel may be required to provide subject matter expertise for the supervision of contracted materiel and services.

Survivability

8-25. Survivability is based on being able to protect support functions from destruction or degradation. Engineers contribute to ensuring that sustainment means are survivable by constructing sustainment bases and clearing LOCs.

> ***Note.*** The logistics principle of survivability is related to, but not exactly the same as, the discussion of survivability operations in FM 5-103.

Economy

8-26. Economy is providing the most efficient support to accomplish the mission. Economy reflects the reality of resource shortfalls, while recognizing the inevitable friction and uncertainty of military operations. This requires commanders to set clear priorities in the resource allocation. The priority of effort is established while balancing the mitigation of risk to the operation. Engineer commanders may have to improvise to meet the higher intent and mitigate the risks.

Integration

8-27. Sustainment must be integrated into the tactical plan. Too often, a COA is selected that cannot be supported logistically. The ENCOORD must ensure that the engineer plan meets the maneuver commander's intent and is able to be supported logistically. The ENCOORD should make accurate and timely recommendations of required logistics support.

8-28. Integration consists of synchronizing sustainment operations with all aspects of Army, joint, interagency, and multinational operations. The concept of operations achieves integration through a thorough understanding of the commander's intent and synchronization of the sustainment plan. Integration includes coordination with and mutual support among Army, joint, interagency, and multinational sustainment organizations.

8-29. Engineers support joint, interagency, and multinational operations. The theater commander integrates operations in his area of responsibility (AOR), which often includes engineers from other Services or countries and possibly civilian engineering contractors. FFE is one example of the integration of military and civilian engineers (see FM 3-34).

8-30. Operational and tactical plans integrate all sustainment support to create a synergy with the concept of operation. Engineer planners participate in and evaluate the sustainment significance of each phase of the operation during the MDMP. They create a clear and concise concept of support that integrates the commander's intent and concept of operation.

OFFENSIVE OPERATIONS

8-31. In support of offensive operations, sustainment operations maintain the momentum of the attack. If these operations are unsuccessful, the enemy might recover from the initial assault, gain initiative, and mount a successful counterattack. Units must operate solely with their basic load and be prepared to quickly transition to defensive operations. Shortages of sufficient haul assets and potential operations in support of dismounted infantry challenge the ability of engineers to organically haul or stockpile supplies. Due to the speed of the battle, the push package concept is the desired resupply method.

8-32. When preparing for offensive operations, engineer planners must consider several situations. For example, when a maneuver battalion changes from search-and-attack to an approach march or a hasty attack, great shifts in engineer sustainment plans are not normally required. However, other adjustments in operations, such as transitioning to the defense, may cause a significant change in sustainment focus or emphasis. Because of this, engineer planners must ensure that the supported unit S-4 sustainment plan is organized to help the sustainment executor be proactive regarding a change of mission without interrupting engineer-related sustainment. In planning offensive operations, it is important to—

- Position vital, engineer-related sustainment supplies (explosives, Class III) well forward within supported unit combat trains.
- Use air resupply when possible.
- Use previously planned and configured engineer LOGPACs of supplies when possible.
- Plan for the resupply of Class V MICLIC and Volcano reloads.
- Plan for the resupply of lane-marking material.
- Plan for increased engineer equipment maintenance needs.
- Use HN or captured-enemy engineer supplies (especially haul assets for bulky Class IV and V supplies) when possible.
- Increase LOC (air and ground) through mobility operations to support AO expansion, logistics traffic increase, and casualty evacuation. Operations include engineer reconnaissance, route clearance, FACE, and others.
- Plan and prepare for replacement operations based on known and projected engineer losses.

DEFENSIVE OPERATIONS

8-33. In contrast to offensive operations, defensive operations break the momentum of the enemy attack. The engineer company does not have the requisite haul assets to transport necessary Class IV and V supplies to the obstacle site. Mission-critical materials must be planned for and throughput coordinated to bring those items to the obstacle site. Only the barrier material required to conduct specific engineer mission support is requested to be brought forward. Stockpiling unit sustainment supplies (rations, water, fuel) may also be required. Push and pull methods of resupply may be used, and the method used is generally dictated by the time available before enemy contact is expected. In planning defensive operations, it is important to—

- Maintain a brigade level or, if possible, a division or JTF level focus on Class IV and V obstacle material-handling in the brigade AO. Maneuver battalions have limited capability to move or transport these materials, so it and this must be well coordinated.
- Maintain a low signature of Class IV and V supply points. Enemy intelligence collection assets key on these sites during reconnaissance operations.
- Resupply during limited visibility conditions when possible. This reduces the fingerprint of the obstacle material moving on the battlefield and the potential for enemy interference.
- Plan for lost, damaged, and destroyed obstacle material and engineer equipment. Maintain an emergency stockpile of Class IV and V supplies when possible.
- Develop and use preconfigured obstacle packages to push logistics to the obstacle site. These packages facilitate obstacle planning, delivery, and execution for the brigade.
- Plan additional protection for engineer units, equipment, and sustainment during defensive operations. These assets may be an HVT for the enemy.
- Plan additional maintenance of engineer equipment and its rapid evacuation as required. Fuel consumption and the expenditure of engineer-specific Class IX supplies are also high for engineer equipment.

BRIGADE COMBAT TEAM UNITS AND FUNCTIONS

8-34. The BCT has units that provide sustainment support. These units are the—

- BSB.
- FSC.
- BSTB.

BRIGADE SUPPORT BATTALION

8-35. The BSB is the organic sustainment unit of the BCT. The BSB commander is the BCT commander's single sustainment operator. The BSB support operations officer (SPO) manages sustainment and Army health system (AHS) support operations for the BSB commander. The SPO provides technical supervision for the external sustainment mission of the BSB and is the key interface between the supported units and the BSB. The SPO plans and monitors support operations and makes necessary adjustments to ensure that support requirements are met. The SPO requests and coordinates augmentation with the higher echelon when requirements exceed capabilities. The BSB also has a automation management office that assists with maintenance of logistics-related, Standard Army Management Information Systems (STAMISs) throughout the BCT. The BSB has four FSCs (in the IBCT and HBCT only) and three other companies in addition to its HHC (see figure 8-1). Companies within the BSB consist of the—

- **Distribution company.** The distribution company provides all transportation and classes of supply (excluding medical) for BCT units.
- **Field maintenance company (FMC).** The FMC provides common maintenance support for the BCT, excluding medical and automation support. It generally supports the BSTB (and HHC in the SBCT) and BSB, since support for maneuver battalions comes from FSCs in the HBCT and IBCT.

- **BSMC.** The BSMC operates a Role 2 MTF and provides Role 2 AHS support to all units on an area basis. The BSMC is responsible for providing MEDEVAC from supported units to its Role 2 MTF. It also provides Role 1 care to units without organic medical personnel and augments and reinforces maneuver battalion medical platoons and sections.
- **FSC.** The FSC (IBCT and HBCT only) has a distribution platoon that provides transportation, food, and water, fuel, and ammunition and a maintenance platoon that provides repair parts, maintenance, and recovery. There can be four FCSs (see figure 8-1).

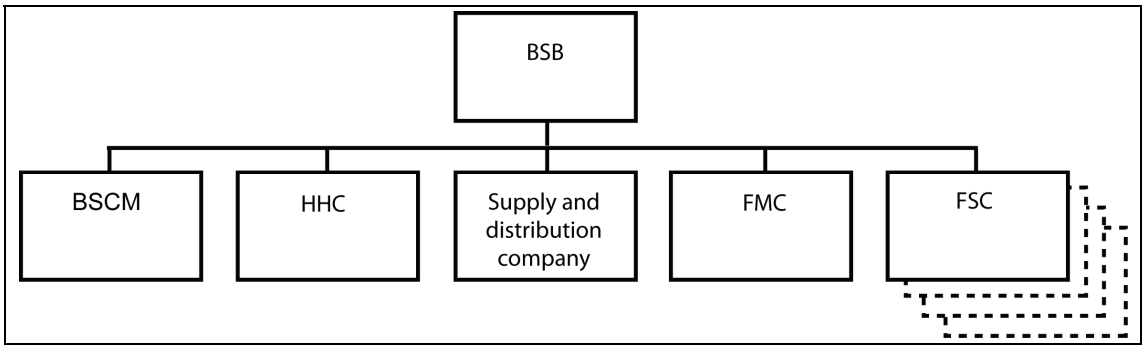


Figure 8-1. BSB and subordinate unit organizations

FORWARD SUPPORT COMPANY

8-36. The HBCT and IBCT BSBs have FSCs to provide sustainment support to maneuver, reconnaissance, and fires battalions. The SBCT BSB does not have an FSC authorized and creates improvised logistics teams to support SBCT units. FSCs are assigned to the BSB, but are generally task organized to their supported battalions. The FSC commander is responsible for executing the sustainment plan according to the supported battalion commander's guidance. The BSB provides technical oversight to each FSC. The BCT commander must ensure that the staff and subordinate units understand the command and support relationships of FSCs. If an engineer battalion augments the BCT, it should be accompanied by its appropriate sustainment element that is task-organized to the battalion and augments the sustainment capabilities of the BSB.

BRIGADE SPECIAL TROOPS BATTALION

8-37. The HBCT and IBCT each have a BSTB that provides unit level sustainment support to its organic engineer company and provides attachments from engineer augmentation. Support includes medical, maintenance, Class III supply (petroleum, oils, and lubricants [POL]), food service, and religious assistance. The BSTB also coordinates the necessary support for attached units that are beyond the capability of the support platoon. The BSTB commander has a significant challenge to ensure that units receive sustainment support across the AO. Therefore, he must use BSTB-limited sustainment assets efficiently. If resources prove insufficient, the BSTB commander must request additional resources from the BCT to ensure that sustainment is fully available to support two BCT CPs and engineer, MI, military police, and dispersed signal sections. (See FM 3-90.61 for additional information on the BSTB.)

ENGINEER LEADER RESPONSIBILITIES

8-38. Engineer leaders and planners are crucial to the accomplishment of sustainment for organic and augmenting engineer organizations within the BCT. The basic sustainment responsibilities are to monitor, report, and request requirements through the correct channels and to ensure that sustainment requirements are met when sustainment is brought forward to the engineer unit. The engineer company XO and 1SG are normally in charge of these functions within the engineer company, and they receive guidance and oversight from the commander. They are also responsible for supporting any augmentation they may receive. Accurate and timely submission of personnel and logistics reports and other necessary information and requests is essential.

COORDINATOR

8-39. The ENCOORD at all echelons is ultimately responsible for engineer logistics estimates and plans and the monitoring of engineer-related sustainment execution within the supported unit. When engineer elements are task-organized within the supported unit, the ENCOORD recommends the most effective command or support relationship. The ENCOORD—

- Writes the engineer annex and associated appendixes to the OPLAN or OPORD to support the commander's intent. Included is a recommended distribution for engineer-related, command-regulated supply classes and special equipment.
- Assists in planning the locations of engineer forward supply points (EFSPs) for the delivery of engineer-configured loads of Class IV and V barrier material. These sites are coordinated with the unit responsible for the terrain and the appropriate S-4.
- Assists in planning the location of engineer equipment parks for pre-positioning critical equipment sets (tactical bridging). These sites are coordinated with the unit responsible for the terrain and the appropriate S-4.
- Coordinates for appropriate material-handling equipment to unload supplies and equipment at EFSPs and engineer equipment parks.
- Works closely with the sustainment staff (including HN) to identify available haul assets and recommends priorities to the sustainment planners.
- Identifies extraordinary MEDEVAC requirements or coverage issues for engineer units and coordinates with sustainment planners to ensure that the supporting unit can accomplish these special workloads.
- Identifies critical engineer equipment and engineer mission logistics shortages.
- Provides the appropriate S-4 with an initial estimate of required Class IV and V supplies for countermobility and survivability efforts.
- Provides the appropriate S-4 with an initial estimate of required Class IV supplies in support of construction. Monitors advice (as required) implications of statutory, regulatory, and command policies for procurement of construction materials. A critical issue for the ENCOORD is ensuring the timely delivery of materials that meet the required specifications, regardless of their source.
- Tracks the flow of mission-critical Class IV and V supplies into support areas and forward to the supporting engineer units. Provides engineer assistance, as required, to accept delivery of construction materials.
- Coordinates MSR-clearing operations and tracks their status at the main CP.
- Coordinates for EOD support and integration as necessary.
- Develops engineer SOPs and integrates engineer considerations into maneuver unit SOPs to facilitate the planning and execution of sustainment operations.
- Provides terrain visualization and analysis in support of sustainment planning.

COMPANY COMMANDER

8-40. The company commander ensures that sustainment operations maintain the fighting potential of the company and supporting unit and their ability to enhance the combat power of the BCT. The company commander may provide critical insight during BCT planning, while also providing mission guidance to sustainment operators within the BCT. The commander—

- Coordinates sustainment support requirements external to the engineer unit.
- Anticipates problems, works to avoid delays in planning and transition, and conducts sustainment battle tracking.
- Communicates with subordinate leaders to identify the need for push packages, ensures their arrival, and tracks their expenditure.
- Positions and monitors unit resupply point the operations.
- Executes sustainment operations according to the supported-unit SOP and OPORD.
- Monitors engineer equipment locations and maintenance status.

- Adjusts engineer-specific Class IV and V supply requirements, based on the reconnaissance of mission sites.
- Monitors engineer equipment use, maintenance deadlines, and fuel consumption.
- Establishes systems for receiving, consolidating, and forwarding logistics, administrative, personnel, and casualty reports to the parent or supported unit.
- Provides proper medical support within the unit and properly coordinates additional support requirements.
- Establishes systems for the evacuation of casualties, detainees, and damaged equipment.
- Properly assigns personnel replacements.
- Conducts sustainment rehearsals at the company level.
- Performs proper unit field sanitation activities.
- Integrates EOD support as necessary.

COMPANY EXECUTIVE OFFICER

8-41. The company XO is the coordinator and supervisor of the company sustainment effort. During planning, he receives status reports from platoon leaders, platoon sergeants (PSGs), and the 1SG. He reviews the tactical plan with the commander to determine company sustainment requirements and coordinates the requirements with the parent or supported unit S-4. During mission execution, the XO is at the second most important place on the battlefield for the company. He retains oversight of engineer sustainment requirements to ensure that they are met. The XO—

- Serves as the link between the engineer company and the parent or supported-unit headquarters to ensure that engineer Class IX requirements are met.
- Supervises sustainment coordination external to the engineer company.
- Anticipates problems, works to avoid delays in planning and battle transition, and conducts company sustainment battle tracking.
- Communicates with platoon leaders to identify the need for push packages, ensures their arrival, and tracks their expenditure.
- Determines the location of company resupply points and monitors their operation.
- Compiles periodic maintenance updates from platoon leaders, PSGs, and the 1SG, providing updates to the commander as required.
- Ensures (along with the 1SG) that the company is executing sustainment operations according to the supported-unit SOP and OPORD.
- Monitors equipment locations and maintenance status.
- Assumes command of the company in the absence of the commander.

COMPANY FIRST SERGEANT

8-42. The 1SG is the primary sustainment operator for the engineer company—executing the sustainment plan and supervising company trains. The 1SG also ensures that the XO receives current status reports from subordinate elements and assists in preparing reports and requests for the parent or supported unit. The 1SG also helps the XO or company commander prepare paragraph 4 of the company OPORD (see appendix F). The 1SG—

- Executes and coordinates the company sustainment plan.
- Directs and supervises procedures for receiving, consolidating, and forwarding logistics, administrative, personnel, and casualty reports to the parent or supported unit.
- Directs and supervises medical support within the company, coordinating for additional support as required.
- Supervises and monitors the evacuation of casualties, detainees, and damaged equipment.
- Monitors company maintenance activities, orients new personnel replacements, and assigns personnel to squads and platoons according to the commander's guidance.

- Tracks platoon logistics requirements and relays and coordinates LOGPAC requirements with PSGs.
- Conducts sustainment rehearsals at the company level and integrates sustainment into company maneuver rehearsals.

COMPANY SUPPLY SERGEANT

8-43. The supply sergeant is the company representative in the field trains. He assembles the LOGPAC and moves it forward to the logistics release point (LRP). The supply sergeant—

- Coordinates with the parent or supported-unit sustainment executor for Class I, III, and V supplies.
- Maintains individual supply and clothing records and requisitions Class II supplies as needed.
- Requisitions Class IV and VII equipment and supplies.
- Picks up replacement personnel and delivers them to the 1SG as necessary.
- Receives and evacuates fatalities to the BSA mortuary affairs point.
- Transports, guards, and transfers detainees as required.
- Guides the LOGPAC and damaged vehicles (if applicable) back to the field trains.
- Coordinates with the parent or supported-unit S-1 to turn in and pick up mail and personnel action documents.
- Collects bagged, contaminated soil and transports it to collection points as part of LOGPAC procedures.
- Maintains and provides supplies for company field sanitation activities.

PLATOON SERGEANTS

8-44. PSGs—

- Ensure that crews perform proper maintenance on assigned equipment and collect and verify all DA Forms 5988-E (Equipment Inspection Maintenance Worksheet).
- Compile personnel and logistics reports for the platoon and submit them according to the SOP or as directed.
- Obtain mail and classes of supplies and equipment from the supply sergeant or 1SG and ensure proper distribution within the platoon.

COMBAT MEDICS

8-45. A combat medic is the first individual in the medical chain who makes medically substantiated decisions based on military occupational specialty (MOS) 68W-specific training. The headquarters platoon combat medic is designated the senior company combat medic and supervises the platoon combat medics. All combat medics provide emergency medical treatment (EMT) for sick, injured, or wounded company personnel. EMT (immediate, far-forward care) consists of lifesaving steps that do not require the knowledge and skills of a physician. EMT procedures performed by combat medics may include opening airways, starting intravenous fluids, controlling hemorrhages, preventing or treating shock, splinting suspected or confirmed fractures, and relieving pain. Emergency procedures performed by combat medics are supervised by a surgeon or physician's assistant assigned to the BSTB or the BSMC. The combat medics—

- Supervise triage for injured, wounded, and sick personnel (friendly and enemy).
- Provide EMT for and stabilize injured, wounded, and sick personnel.
- Evacuate seriously wounded personnel under the direction of the 1SG.
- Implement force health protection measures to counter health threats and prevent disease and nonbattle injury (see FM 4-02.17).
- Provides predeployment, deployment, and post-deployment health assessments coordinated through the 1SG to the supporting MTF for all engineer company personnel.

- Request preventive-medicine support through the 1SG, as required.
- Request combat and operational stress control support through the 1SG as required.
- Ensure that company personnel are practicing good oral hygiene.
- Conduct sanitation inspections of troop living areas, food service areas, waste disposal areas, and potable water distribution points and equipment.
- Supervise training of the company field sanitation team and oversee their performance.
- Conduct sick call as required.
- Assist in training company personnel on basic first aid procedures and the combat lifesaver program.
- Advise the company chain of command on personnel health status and HSS concerns.
- Requisition Class VIII supplies (including combat lifesaver bags and first aid kits) for the medical team and other company elements. Maintain medical sets, kits, and outfits (SKO).
- Recommend locations for casualty collection points.
- Mentor the company combat lifesaver.

SUPPORT FUNCTIONS

8-46. Sustainment support functions are an important part of engineer operations. They are discussed in the following paragraphs.

MAINTENANCE SUPPORT

8-47. The Army has transitioned to two levels of maintenance—field and sustainment. To provide a quick turnaround of maintenance problems, each engineer unit should coordinate for a field maintenance team (FMT) from their supporting FSC, the BSTB maintenance section, or the BCT FMC). FMTs have contact maintenance trucks and mechanics who are trained to repair company equipment. (See FM 3-90.6 and FM 4-90.7 for more information on field maintenance in the BCT.) (See figure 8-2, page 8-12.)

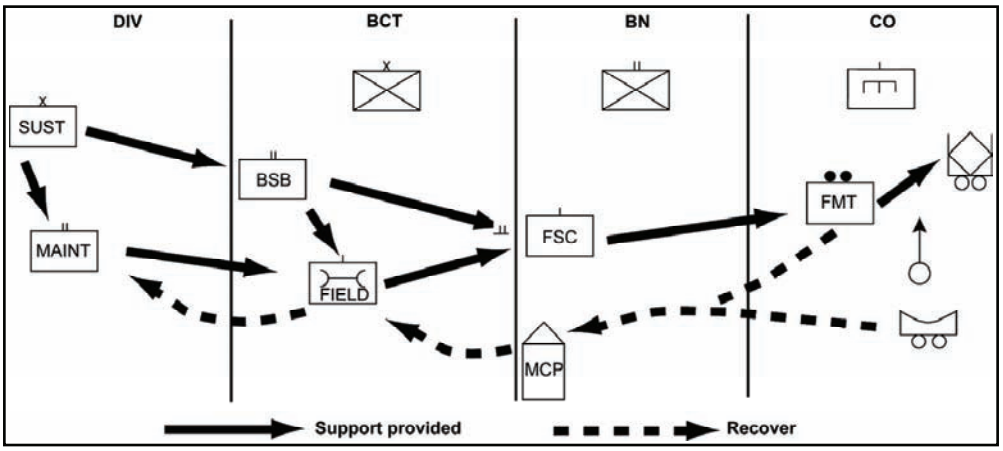


Figure 8-2. BCT maintenance operations

8-48. In the SBCT, a tailored maintenance team from the FMC performs the same functions as previously discussed. When individual engineer platoons are task-organized to Stryker infantry battalions, a mechanic from this FMT normally accompanies the platoon. Additional field maintenance and evacuation support for damaged equipment is received at the supported units supported unit maintenance collection point (UMCP).

Field Maintenance

8-49. Field maintenance returns repaired equipment to Soldiers, provides on-system maintenance, and mainly involves preventive maintenance and the replacement of defective parts. It covers tasks previously assigned to operator, crew, organization, unit, and DS maintenance levels. It includes some off-system maintenance that is critical to mission readiness. Within the BCT, field level maintainers are generally concentrated in the BSB (FSCs or FMC). Sustainment maintenance consists of repairing components of the user's system. It is generally a merging of the previous GS and depot maintenance levels.

Sustainment Maintenance

8-50. Sustainment maintenance is typically performed by an element of the sustainment brigade or higher echelon (see figure 8-2). The ENCOORD ensures that sustainment maintenance is identified for each supporting engineer unit. Company commanders ensure that vehicle crews and equipment operators perform preventive-maintenance checks and services (PMCS).

SUPPLY

8-51. The various classes of supply are discussed in the following paragraphs.

Class I

8-52. Class I supplies consist of subsistence and gratuitous health and welfare items. They are automatically requested based on daily strength reports. BCT units deploy with three days of operational rations (meals, ready to eat [MREs]). MREs are distributed in case lots at the BSB distribution point and picked up by the appropriate supply section (FSC or BSTB). Unitized group rations (UGRs) and A-rations are broken down into lots at the BSB distribution point and picked up by the appropriate field-feeding section (FSC or BSTB) for incorporation into the LOGPAC. Water is provided to Soldiers in two forms—bulk and bottled. Water support is provided through organic water purification and distribution capability when feasible. Bulk potable water is used as needed for individual Soldiers. Bottled water may be provided on a limited basis, usually during the deployment phase of operations. Bottled water containers are issued based on the same unit daily strength reports used for rations and field feeding. The BSB receives, stores, and distributes water. The BSB may not have adequate equipment to satisfy BCT requirements for water purification, therefore requiring augmentation. Each company has water trailers and five-gallon containers for distribution of potable water. Company supply sergeants maintain water trailers in their company area and refill them from the BSA. The refilling of five-gallon containers typically occurs during LOGPAC operations.

Class II

8-53. Class II supplies consist of such items as clothing, individual equipment, tenting supplies, hand tools, administrative and housekeeping supplies, and CBRN defense and decontamination items. Usually, the BCT deploys with 30 days of common consumable supplies. These supplies are provided by the BSB and are maintained as part of the BCT authorized stock list. Replenishment and other necessary supplies are ordered by company supply sergeants using the Property Book Unit Supply-Enhanced (PBUSE) Program from the BSB. Supplies are provided at the BCT distribution point to the supporting supply unit (FSC or BSTB) for the appropriate company. They are carried forward with the next LOGPAC or immediately if needed. Religious supplies and maps are also considered Class II items. Unit ministry teams (UMTs) order consumable chaplain supplies as necessary. Maps are ordered using the PBUSE Program. Usually, paper map sheets are delivered with appropriate supplies to the requester.

Class III

8-54. Class III supplies consist of bulk and packaged POL (petroleum fuels, lubricants, hydraulic and insulating oils, preservatives, liquids and gases, bulk chemical products, coolants, deicer and antifreeze compounds, components and additives of petroleum and chemical products, coal). The BCT usually

deploys with half-full vehicle fuel tanks, purged fuelers, and empty fuel cans. Fuel is issued upon BCT arrival in the theater. Units forecast requirements based on the current or upcoming mission. The forecast is SOP-dependent, but is usually for the 72-hour period beyond the next day or up to 96 hours. The BSB fuel and water support platoon transports fuel to FSCs for maneuver battalions or the BSTB support platoon.

Class IV

8-55. Class IV supplies consist of construction materials, including fortification and barrier materials. These are items for which allowances are not prescribed. The management of Class IV supplies for survivability is most efficient when there is a shared interest between maneuvers and engineer logisticians. BCT units deploy with a limited amount of Class IV barrier material, primarily for the protection of unit perimeters and key positions. This material is considered the unit basic load (UBL), and is usually carried on tactical vehicles. Replenishment is ordered by company supply sergeants using the PBUSE Program from the BSB. Supplies are provided from the BCT distribution point and carried forward by sustainment elements with the next LOGPAC or immediately if necessary. Barrier material may also be requested as configured loads. The ENCOORD typically coordinates closely with the logistics staff to assist in managing barrier and construction materials. (See FM 3-90.6 for additional information.)

Class V

8-56. Class V supplies consist of all types of ammunition (chemical, radiological, and special weapons; bombs; explosives; mines; fuses; detonators; pyrotechnics; missiles; rockets; propellants). Class V supplies are based on a required supply rate (RSR) or controlled supply rate (CSR). RSR is the amount of ammunition, usually expressed in rounds-per-weapon per day, estimated to be required to sustain operations, without restriction, for a specific period. The BCT S-3 develops the RSR. CSR is the rate of ammunition consumption that can be supported (considering availability, facilities, and transportation) for a given period. The CSR may be less than the RSR. If the RSR exceeds the CSR, the commander determines who receives the ammunition. A combat load is the unit commander's designated quantity of munitions and items authorized to be carried by unit personnel and combat vehicles (turret load). Troop-carried munitions to accompany troops (TAT) are those issued before departure from the aerial port of embarkation (APOE). Turret load or combat load munitions are those authorized for transportation in thick-skinned vehicles for deployment purposes. Generally, BCTs try to keep three combat loads of critical munitions on hand. Most units do not deploy with their authorized basic load (ABL) of ammunition. Instead, they are issued their combat load upon arrival in the theater. However, there are times when selected units deploy with a full combat load of ammunition.

Class VI

8-57. Class VI supplies consist of all personal-demand items (candy, cigarettes, soap, cameras [nonmilitary sale items]). BCT Soldiers are usually directed to deploy with 30 days of personal comfort items. Health and comfort packages (HCPs) are also Class VI items. Class VI support is obtained through supply channels when a post exchange (PX) is not available. Resupply flow is the same as for Class I supplies. The delivery of HCPs is based on the head count provided for field feeding.

Class VII

8-58. Class VII supplies consist of major end items (launchers, tanks, mobile machine shops, vehicles, organizational tool sets). Units deploy with all required equipment based on the appropriate MTOE. Additional equipment may be issued to the unit in theater based on mission requirements. Class VII replacement is based on losses reported through command channels. Reporting the loss of major end items permits the commander to remain apprised of the operational status of subordinate commands and to direct the distribution of items to those units having the most critical need. Replacement Class VII equipment is delivered to the BSA BCT.

Class VIII

8-59. Class VIII supplies consist of medical material (repair parts peculiar to medical equipment). Usually, the medical company and medical platoons in support of the BCT deploy with a three- to five-day supply of consumable medical supplies, and all companies deploy with complete combat lifesaver bags. Initial sustainment supplies are pushed to the BSMC based on theater casualty estimates. Individual Soldiers deploy with a 180-day supply of personal prescription medications. Soldier must advise their supporting medical unit of their specific needs. Resupply of medical supplies is done through medical channels. The BSMC and maneuver platoon medical personnel are responsible for maintaining medical SKOs. Combat lifesavers and combat medics normally receive replenishment for their aid bags from their unit medical platoon or section or from the medical company, platoon, section, or team providing Role 1 or Role 2 medical support.

Class IX

8-60. Class IX supplies consist of repair parts and components (kits, assemblies, subassemblies [repairable and unrepairable that are required for maintenance support of equipment]). Each company in the BCT stocks and deploys with combat spares for repair parts. Combat spares are a combination of prescribed load list (PLL), shop stock, and bench stock. Stocks are based on demand history and usually issued in 30-day supply quantities. Maintenance personnel replenish their combat spares and order other parts as needed through the BSB. Class IX repair part requisitions are prioritized based on the commander's priority of maintenance and need and are ordered through the Standard Army Maintenance System–Enhanced (SAMS-E).

Class X

8-61. Class X supplies consist of materials to support nonmilitary programs (agriculture and economic development). Class X items are requested based on requirements from CA or operations channels. Material for nonmilitary support is usually provided by the HN, NGOs (Red Cross), or DOS. Humanitarian assistance is governed by Title 10, USC, Section 401, which specifies that humanitarian assistance must—

- Be carried out according to HN military or civilian personnel.
- Complement and not duplicate any other form of social or economic assistance that may be provided to the HN by any other department or agency of the U.S. government.
- Not be provided directly or indirectly to any individual, group, or organization engaged in military or paramilitary activities.
- Not be provided unless DOS specifically approves such assistance.

Note. Prior to providing civil-military support or humanitarian assistance, commanders should seek legal review from their servicing SJA.

ARMY HEALTH SYSTEM

8-62. The AHS involves the delineation of support responsibilities by capabilities (roles of care) and geographical area (area support). The AHS executes it HSS and force health protection missions as a single, seamless, and integrated system. It is a continuum from the point of injury or wounding through successive roles of care to the continental United States (CONUS) support base. The AHS encompasses the promotion of wellness and preventive, curative, and rehabilitative medical services. It is designed to maintain a healthy and fit force and to conserve the fighting strength of deployed forces.

Role 1 Medical Support

8-63. The first medical care a Soldier receives is provided at Role 1. This care includes immediate lifesaving measures, EMT, advanced trauma management (ATM), disease prevention, stress prevention, casualty collection, and evacuation from the supported unit to the supporting MTF. These elements include

the combat medic, assisted by first aid (self-aid or buddy aid), advanced first aid (combat lifesaver), and the supporting Role 1 MTF (battalion aid station or treatment team). When Role 1 MTF capability is not present in a unit, it is provided on an area support basis by the supporting Role 1 or Role 2 medical unit or element. The engineer company receives Role 1 medical support from the BSTB or BSMC. The engineer company receives Role 2 medical support from a BSMC or an area support medical company, depending on its unit of attachment.

Combat Lifesavers

8-64. Combat lifesaver and buddy aid are crucial to sustaining HSS. The combat lifesaver is almost always the first person on the scene to begin the process of providing enhanced first aid to wounded and injured personnel. The combat lifesaver is a nonmedical Soldier trained to provide enhanced first aid and lifesaving procedures beyond the self-aid or buddy aid level. The combat lifesaver is not intended to take the place of medical personnel, but to slow the deterioration of a wounded Soldier's condition until medical personnel arrive. Each squad-, crew-, or equivalent-size deployable unit has at least one Soldier who is trained and certified as a combat lifesaver.

Medical Evacuation

8-65. The vehicle commander is responsible for ensuring that injured crewmen receive immediate first aid and for reporting casualties. Vehicle commanders coordinate with the 1SG and senior medic for ground evacuation. The evacuation of injured Soldiers is categorized into two types—

- MEDEVAC is the use of ground or air ambulances to evacuate from the point of injury to an MTF while providing en route care.
- CASEVAC is the use of nonmedical vehicles or other means for patient movement without providing en route care.

8-66. Medical evacuation elements use the most expedient means available for the MEDEVAC of sick, injured, or wounded Soldiers. The use of air ambulance is METT-TC-dependent and may not always be available. Based on mission requirements, the combat aviation brigade, general support aviation battalion (GSAB) determines where to position the forward support medical evacuation teams (FSMTs) and the number of HH-60 Black Hawk aircraft in support of a BCT. The brigade aviation element (BAE) and BCT surgeon coordinate the use and positioning of the FSMT. They integrate air ambulance support (coordinating AC2 requirements, establishing clear lines of authority to launch a MEDEVAC, and identifying pickup zones (PZs) and LZs. (See FM 4-02.2 for more information on MEDEVAC.)

8-67. Planners must anticipate the potential of high casualty rates and long evacuation distances while retaining the flexibility to shift nonstandard evacuation assets to support mass casualty or CASEVAC as required.

Role 2 Medical Support

8-68. Capabilities at the BSMC duplicate those found at Role 1 MTFs and expand available medical services by adding operational dental, laboratory, X-ray, patient-holding, behavioral health, and preventive-medicine capabilities. EMT and ATM are continued. If necessary, additional emergency measures are instituted; however, these measures do not exceed those dictated by immediate needs. The forward surgical team (FST) from echelons above division may collocate with the BSMC and provide emergency resuscitative surgical support. The BSMC examines and evaluates casualty wounds and the general physical condition to determine treatment and evacuation priorities. The BSMC provides sick-call services, area medical support, and ground ambulance MEDEVAC support for the engineer company.

PERSONNEL SERVICES

8-69. Personnel services are those sustainment functions related to Soldier welfare, readiness, and quality of life. The BCT S-1, augmented from higher headquarters, plans and coordinates human resources, financial management, legal, and religious support. (See FM 1-0, FM 3-90.6, and FMI 1-0.01 for more information on personnel services in the BCT.)

Human Resources Support

8-70. The unit S-1 section provides Soldiers with an organic capability for essential personnel services. The S-1 focuses on the two critical wartime functions—personnel accounting and strength reporting (PASR) and casualty reporting. These functions must begin at the company level and are essential to receiving timely replacements. They are conducted using the electronic military personnel office (eMILPO). Company 1SGs and unit S-1s must reconcile personnel accounting on a periodic basis (generally outlined in the unit SOP). The S-1 must ensure that Soldiers in the medical treatment process are reconciled.

Casualty Operations

8-71. The single most important S-1 function in casualty operations is ensuring that all casualties are reported (timely and accurately) in the required format. This ensures accurate and expeditious notification of the next of kin (NOK). All changes in Soldier status must also be reported.

8-72. Casualty reporting starts at the point of injury with the preparation of DA Form 1156 (Casualty Feeder Card). As casualties occur, the nearest observer informs the company 1SG by the most expedient method available (messenger; voice; or electronic text data through Force XXI battle command–brigade and below [FBCB2], Blue Force Tracker [BFT], or Enhanced Position Location Reporting System [EPLRS]) per the unit SOP. The 1SG submits a duty status change on casualties using FBCB2 and the personnel situation report (PERSITREP). FBCB2 sends the reports directly to the battalion CP. Casualties are taken to casualty collection points for treatment and sorting into categories of evacuation precedence (urgent, urgent-surgical, priority, routine, and convenience) for ground or air ambulance evacuation. Casualties are evacuated to the nearest MTF that can provide the required treatments to enhance survivability and save sight/limbs.

8-73. When a Soldier becomes a casualty, the combat medic or health care specialist from the medical treatment element records the medical treatment on Department of Defense (DD) Form 1380 (U.S. Field Medical Card). The unit S-1 should electronically receive a notification message to update the Soldier's patient tracking status. With this message, an S-1 can identify a casualty's location and properly account for him.

8-74. Engineer leaders must work with the appropriate S-1 to ensure that attachments and augmentations are accurately reported. Each Soldier is only reported once and personnel must ensure that accurate reporting occurs. Personnel from other branches of Service, DA civilians, and contractors may require special procedures. The engineer company 1SG or his designated representative—

- Forwards reports to higher headquarters within one hour after casualties occur.
- Verifies and reconciles PASR data with the supported-unit S-1.
- Coordinates requirements with the supported-unit S-4 for mortuary affairs items.
- Coordinates with the supported-unit S-1 to ensure that proper NOK notification procedures are followed.
- Reconciles casualty reports.
- Coordinates with the supported-unit S-1 for company personnel to return to duty.
- Submits combat-critical personnel information to the supported-unit S-1 for database update.

Postal Services

8-75. Postal support comes from a postal unit provided by higher headquarters. The postal unit separates the mail by battalion level organizations. The mail is picked up by the designated battalion mail clerk or sent forward to him in combat trains. Outgoing mail is exchanged at the same time. The battalion mail clerk receives and distributes the mail to the company mail clerk (usually the supply sergeant) who delivers it to the 1SG, platoon sergeant, or Soldier.

Other Personnel Services

8-76. Special teams from higher headquarters sometimes augment the BCT to provide administrative services (awards, promotions, evaluations, reassignments); military pay support; morale, welfare, and recreation (MWR) support; and Red Cross coordination.

FIELD SERVICES

8-77. Field services support includes food preparation, water purification, bakery facility operation, clothing and light textile repair, laundry and shower facility operation, parachute packing, air item maintenance, rigging supplies and equipment for airdrops, mortuary affairs, and force provider operations. Usually, laundry, clothing, and light textile repair are not available outside theater staging bases.

Field Feeding

8-78. The FSC and BSTB field-feeding sections and BSB SBCT field-feeding teams, have trailer-mounted containerized kitchens (CKs) to prepare meals for Soldiers. There is also a food sanitation center to support field kitchen operations.

Showers

8-79. Small unit showers are authorized according to Common Table of Allowances (CTA) 50-909. One shower unit consists of one heater, one shelter, and two water bags. Showers may be provided to the BCT by sustainment brigade units during mission staging operations.

Mortuary Affairs

8-80. The recovery and identification of deceased personnel is the responsibility of each company. Company 1SGs supervise the preparation of DD Form 565 (Statement of Recognition of Deceased). These documents accompany the remains during transport to a remains collection point. Usually, remains collection points are in the vicinity of combat trains, but not near the MTF. Once necessary reports are complete, the remains are evacuated to the BCT unit remains collection point (usually in the BSA). From there, remains are evacuated to a mortuary collection point established by the theater support command. If remains have been contaminated by CBRN agents or toxic industrial materials (TIMs), the BCT S-4 (in coordination with the BCT CBRN officer) should provide guidance to units before they handle or evacuate the remains.

Host Nation Support

8-81. HNS is a common method of providing services to deployed U.S. Army forces. This support can include assistance in almost every aspect required to sustain military operations within a theater. Planners must consider that HNS meets local standards and not necessarily U.S. standards. HNS can be a significant resource, provided it is available and the appropriate agreements are in place.

DETAINEES

8-82. Detainee is a term used to refer to any person captured or otherwise detained by an armed force. More specifically, detainees encompass the broad category of EPWs, other detainees, civilian internees, and retained persons. All persons captured, detained, or otherwise held in U.S. custody must receive humane care and treatment (see FM 3-19.40). The unit S-3 leads the staff in planning the retrograde of detainees. Soldiers who capture EPWs and detain civilians maintain control of them and any captured documents and materiel until they are turned over to the proper authority. EPWs are evacuated to the detainee collection point (DCP) as rapidly as possible. The BCT may be required to operate a detention facility, but this site is more likely to be run by another unit.

QUALITY OF LIFE SUPPORT

8-83. A direct relationship exists between adequate and well-thought out Soldier and family quality-of-life programs, Soldier morale, and combat effectiveness. These operations include—

- **Postal services.** Postal services include the movement, delivery, and collection of mail in the company.
- **PA. PA** is the provision for an expedited flow of complete, accurate, and timely information, which communicates the Army perspective, keeps Soldiers and the American people informed, and helps establish the conditions that lead to confidence in the U.S. Army.
- **Family readiness group programs.** Family readiness group programs enhance Soldier effectiveness by ensuring that their families are appropriately cared for in their absence.

Appendix A

Metric Conversion Chart

A-1. This appendix complies with AR 25-30 which states that weights, distances, quantities, and measures contained in Army publications will be expressed in both U.S. standard and metric units. Table A-1 is a metric conversion chart.

Table A-1. Metric conversion chart

U.S. Units	*Multiplied By*	*Equals Metric Units*
Acres	0.49470	Hectares
Cubic yards	0.76460	Cubic meters
Degrees Fahrenheit (-32)	0.55560	Degrees Celsius
Feet	0.30480	Meters
Inches	2.54000	Centimeters
Inches	0.02540	Meters
Inches	25.40010	Millimeters
Long tons	1.01600	Metric tons
Miles (nautical)	1.85320	Kilometers
Miles (statute)	1.60930	Kilometers
Short tons	0.90700	Metric tons
Metric Units	***Multiplied By***	***Equals U.S. Units***
Centimeters	0.39370	Inches
Cubic meters	1.30790	Cubic yards
Degrees Celsius (+17.8)	1.80000	Degrees Fahrenheit
Hectares	2.47100	Acres
Kilometers	0.53960	Miles (nautical)
Kilometers	0.62137	Miles (statute)
Meters	3.28080	Feet
Meters	39.37000	Inches
Metric tons	1.10200	Short tons
Metric tons	0.98400	Long tons
Millimeters	0.03937	Inches

This page intentionally left blank.

Appendix B

Selected Engineer Organizations and Capabilities

This appendix describes organic engineer staffing and organizations within the BCT and ACR. It also highlights some of the modular engineer units that are likely to augment the BCT and ACR or provide support within their AO. (See FM 3-34 for a more complete listing of engineer organizations.)

ORGANIC ENGINEERS IN THE BRIGADE COMBAT TEAM

B-1. Each BCT and ACR has an organic engineer company. In the HBCT and IBCT, the organic engineer (Sapper) company is located within the BSTB. In the SBCT, it is positioned as a separate unit under the brigade (see figure B-1, page B-5). The ACR combat engineer company is also positioned as a separate unit under the regiment, similar to that of the SBCT. The engineer company organic to the BCT and ACR is focused on tactical-level maneuver. Its mission is to provide assured mobility to the BCT and ACR by conducting combat engineering (M/CM/S) and limited general engineering to enhance maneuver in the AO. As a combat multiplier, engineers concentrate their efforts on maintaining the freedom of movement for the supported force and reducing the enemy's ability to mass and maneuver on the battlefield.

B-2. There is an organic engineer staff element within each BCT and ACR (see figure B-2, page B-6). Though each type of BCT is slightly different, there is generally an ENCOORD, engineer planner, senior engineer NCO, and geospatial engineering team in the HBCT and IBCT. In addition there are also organic engineer personnel within the BSTB, and within the HHC, CAB, and infantry battalion. Engineer personnel within the BSTB facilitate additional engineer forces being attached to augment the HBCT or IBCT. Engineer units from company size and below are intended to be attached to the BSTB for C2 and logistics support.

B-3. The organic geospatial engineering team within the BCT operates in the BCT main CP and provides geospatial engineering support. The topographic section—

- Generates and analyzes terrain data.
- Prepares decision graphics.
- Produces image maps.
- Provides 3-D terrain perspective views.
- Manages the theater geospatial database.
- Updates maps.
- Produces tactical decision aids.
- Produces IPB overlays.
- Operates on a 24-hour basis.

B-4. Equipment assigned to the topographic section includes—

- One Digital Topographic Support System (DTSS–B)–Base: AN/TYQ-67 (light).
- One DTSS–B: AN/TYQ-71 (deployable).
- One light medium tactical vehicle (LMTV) with towed generator.
- One high-mobility, multipurpose, wheeled vehicle (HMMWV).

B-5. Figures B-3 through B-6, page B-7 through B-10, show the organic engineer company in the ACR, HBCT, IBCT, and SBCT.

AUGMENTING ENGINEER UNITS

B-6. As discussed in chapter 1, the organic engineer capability within the BCT and ACR is designed to provide a baseline of combat capabilities to which augmentation can and typically will be added. METT-TC analysis and the engineer requirements identified early in the planning phase determine the type and amount of augmentation needed to support mission requirements. The primary means of augmenting the BCT and ACR is baseline engineering units (combat and general engineering). The following paragraphs summarize some of the baseline engineering units and their capabilities that can augment the BCT and ACR. Depending on their number, augmenting units, likely come task-organized under an engineer battalion headquarters to ensure effective C2.

ENGINEER BATTALION

B-7. The engineer battalion shown in figure B-7, page B-11, is capable of planning, integrating, and directing the execution of combat and general engineering missions conducted by one to five assigned engineer companies. Engineer battalions are typically found within the engineer brigade, within the MEB, or in support of a BCT. The battalion receives design and/or survey teams or EHTs to facilitate construction or EH clearance missions. When supporting a BCT, the battalion may be focused on a single mission (route clearance, security construction, cache interrogation and reduction). The battalion may also be organized to perform as a breach force command during BCT combined arms breaching operations. During a gap-crossing operation, the battalion provides the option to be designated as the crossing-site command.

SAPPER COMPANY

B-8. The Sapper company executes M/CM/S tasks in support of BCTs and support brigades to enable force application, focused logistics, and protection. It often reinforces the organic engineers in the BCTs. The Sapper company varies in design, though all are organized with three Sapper platoons (see figure B-8, page B-12). Airborne- and air assault-capable Sapper companies have the unique ability to employ air-droppable, rapid runway repair kits in support of forcible-entry operations.

MOBILITY AUGMENTATION COMPANY

B-9. The mobility augmentation company (MAC) conducts assault gap crossings, conducts mounted and dismounted breaches, and emplaces obstacles in support of BCTs and support brigades to enable force application, focused logistics, and protection. The MAC is equipped with a variety of assault-breaching and countermobility equipment. It is organized with two assault breach platoons and one obstacle platoon (see figure B-9, page B-13). It can provide four assault gap crossings for a BCT, four mounted breaches for an IBCT or SBCT, two mounted breaches for an HBCT, and four additional dismounted breaches for a BCT. It can emplace 4,432 linear meters of fix or disrupt tactical obstacle frontage without reloading.

CLEARANCE COMPANY

B-10. The clearance company conducts detection and limited IED neutralization (as outlined in FM 3-90) along routes and within areas of support to enable force application, focused logistics, and protection. The company provides battle command for three to five route, area, or Sapper platoons. In an area clearance role it is capable of clearing 255 kilometers of two-way routes, 2 acres, 8,000 square meters per day. The clearance company is equipped with a variety of EH-clearing equipment and is organized with three route clearance platoons and one area clearance platoon (see figure B-10, page B-14).

ENGINEER SUPPORT COMPANY

B-11. The engineer support company provides rapid runway repair (RRR), constructs tactical UAS airfields and LZs, performs initial base camp construction, and repairs and maintains ground LOCs. An engineer support company is equipped with a variety of earth moving equipment and is organized with two rapidly deployable, equipment–light (RDE-L) platoons and one rapidly deployable, equipment–medium (RDE-M) platoon (see figure B-11, page B-15).

MULTIROLE BRIDGE COMPANY

B-12. The multirole bridge company (MRBC) is required for hasty crossings of gaps greater than 18 meters. One or more MRBCs are required to support deliberate gap crossings (wet or dry). (See appendix E for more information on gap-crossing operations.) The MRBC is organized with a company headquarters, two bridge platoons, and a support platoon (see figure B-12, page B-16). The company has maintenance, equipment, park, and mess sections, which allow it to function as a single entity when performing gap-crossing operations. The company can be task-organized into several sections and spread across the BCT AO.

HORIZONTAL AND VERTICAL COMPANIES

B-13. The horizontal company (see figure B-13, page B-17) and vertical company (see figure B-14, page B-18) 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 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 to provide bituminous mixing and paving, quarrying and crushing, and major horizontal construction projects (highways, storage facilities, airfields). Additional augmentation could also include pipeline construction or dive support, depending on the type and scope of the construction mission.

EXPLOSIVE HAZARDS COORDINATION CELL AND EXPLOSIVE HAZARDS TEAM

B-14. The EHCC mission (see figure B-15, page B-19) is to gather and track EH incidents, maintain the mine strike database, provide pattern analysis of EH incidents, and provide technical advice on EH to enable the land component commander to predict, track, distribute information on, and mitigate EHs within the theater. The 15-person cell provides technical advice on the mitigation of EHs (TTP development) and provides training updates to field units. (EHTs are coordinated as shown in figure B-16, page B-20.) EHCC capabilities include—

- Establishing, maintaining, and sharing the explosive hazards database (EHDB) within the joint operations area (JOA).
- Ensuring accuracy of EH information distribution via the battle command system.
- Coordinating site evaluations, strike incident investigations (four sites simultaneously), or unit training (four sites simultaneously).
- Assisting ISR planners with EH pattern analysis and intelligence collection management.
- Coordinating technical and tactical training for the BCTs.
- Providing updated TTP and guidance for route and area clearance.

EXPLOSIVE ORDNANCE CLEARANCE AGENT

B-15. The EOCA is not an engineer unit, but rather a special engineer capability. EOCA personnel are combat engineers who are trained to perform limited identification and battlefield destruction of UXO as outlined in the EOCA identification guide and supplemental list of EOCA ordnance (part of the ordnance order of battle) provided by the theater EOD commander. If the UXO is out of the scope of operations for the EOCA, EOD personnel must be called. EOCA personnel can assist EOD personnel in disposing of other EH as requested. Properly trained and certified EOCA personnel capabilities include—

- **UXO reconnaissance.** EOCA personnel are trained to perform detailed reconnaissance of suspected UXO.
- **UXO identification.** EOCAs can perform limited identification of the items listed in the EOCA identification guide and the supplemental EOCA ordnance list. Items that the EOCA cannot positively identify must be reported to EOD personnel.
- **UXO area marking.** EOCAs mark the UXO area according to the standard UXO marking system.

- **Protective works.** EOCAs can provide protective works to isolate a blast and fragmentation danger area of identified UXO. EOCA may provide an estimated blast and fragmentation danger area for items similar to, but not included in, the EOCA identification guide and supplemental EOCA ordnance list. EOCAs advise the on-scene commander with the recommended personnel and equipment protective measures. When the commander determines that certain personnel or equipment cannot be removed from the hazard area, protective works must be established to protect those personnel and assets from the effects of the UXO. EOCAs recommend and supervise the appropriate protective works to be completed.
- **UXO disposal.** EOCAs are authorized to destroy (by detonation) individual UXO identified in the EOCA identification guide and supplemental EOCA ordnance list.
- **IED disposal.** EOCAs are authorized to "blow in place" single, munitions-based IEDs that are positively identifiable in the EOCA identification guide and supplemental EOCA ordnance list.

B-16. The following are EOCA limitations (see FM 3-90.119 for the most detailed and current information). EOCAs—

- Are **not** trained to move, combine, or destroy multiple UXOs (a cache or IED to incorporate more than one munition).
- Are **not** trained to perform reconnaissance or handling of IED or vehicle-borne IED incidents.
- Can only perform explosive remnants of war operations under the direct supervision of EOD personnel (including EHTs).
- Are **not** to be used for EH response calls. If EOD is not readily available as determined by the maneuver commander, EOCA personnel can be used to conduct an initial reconnaissance of the UXO. If the UXO falls within their capability, EOCA personnel may dispose of the UXO.

Note. The joint force commander is advised by the senior EOD commander who creates and manages modifications to the JOA UXO supplemental list. Requests to modify the supplemental list are coordinated through the local EOD unit or EHT for approval by the CBRNE cell, EOD group or battalion staff. Any modification to the JOA UXO supplemental list is provided based on positively identifiable munitions in the theater ordnance order of battle.

ENGINEER DETACHMENT HEADQUARTERS (CANINE)

B-17. The engineer detachment headquarters (canine) (see figure B-17, page B-21) plans, coordinates, supports, and controls canine clearance and specialized search operations. The detachment provides support to route clearance, area clearance and reduction, and area identification and quality assurance and proofing after mechanical clearance. The detachment headquarters is normally attached to an engineer battalion or clearance company in support of a BCT or directly assigned to an engineer brigade or MEB in support of echelons above BCT units.

B-18. The detachment headquarters can provide C2 for five engineer squads (canine) (see figure B-18, page B-22). Each squad consists of six mine detection dogs and handlers. A dog handler and dog can typically work four hours per day, depending on the weather, terrain, and soil conditions. Consistent refresher and other training is required for each dog and handler.

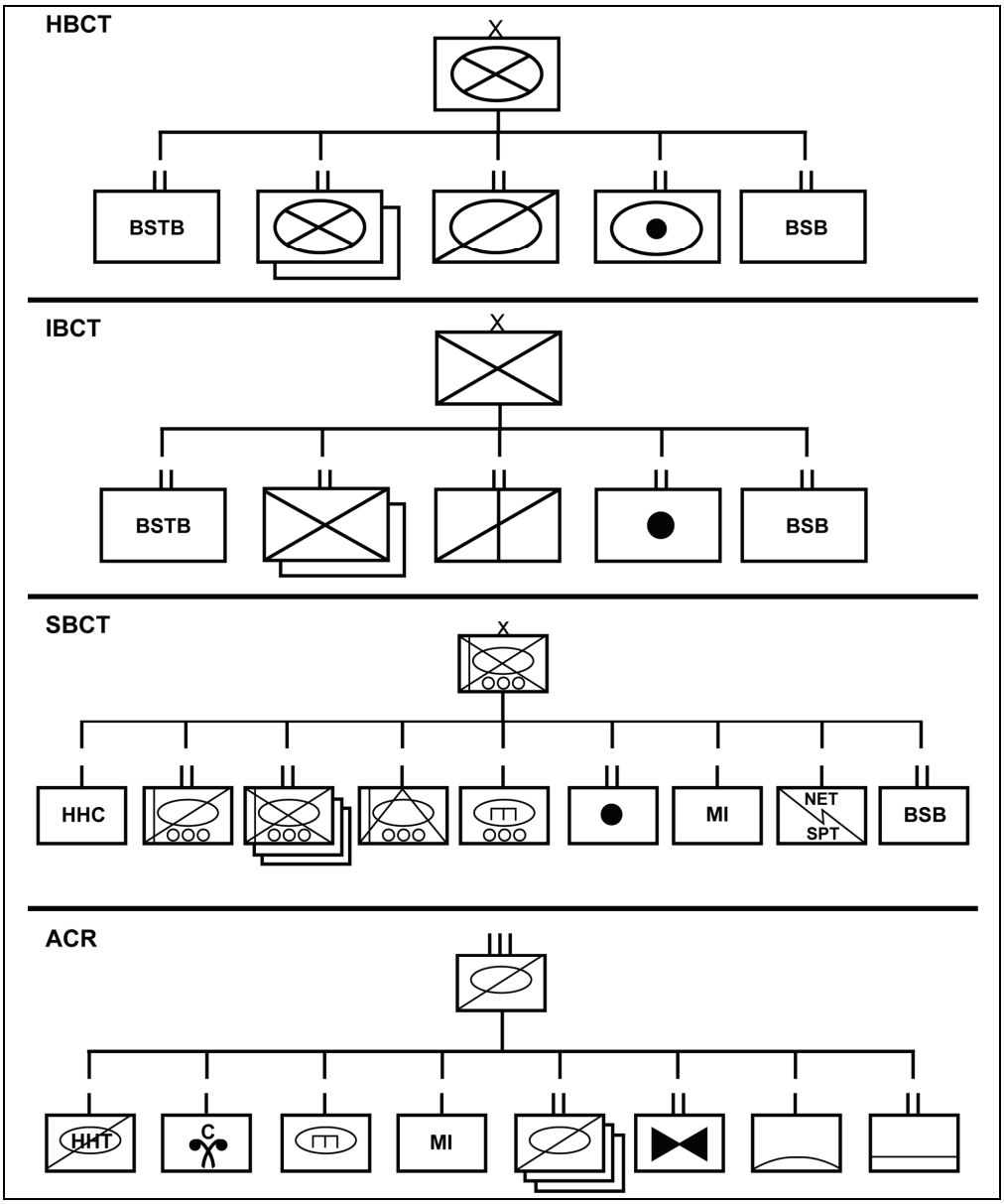


Figure B-1. BCTs and ACR structure

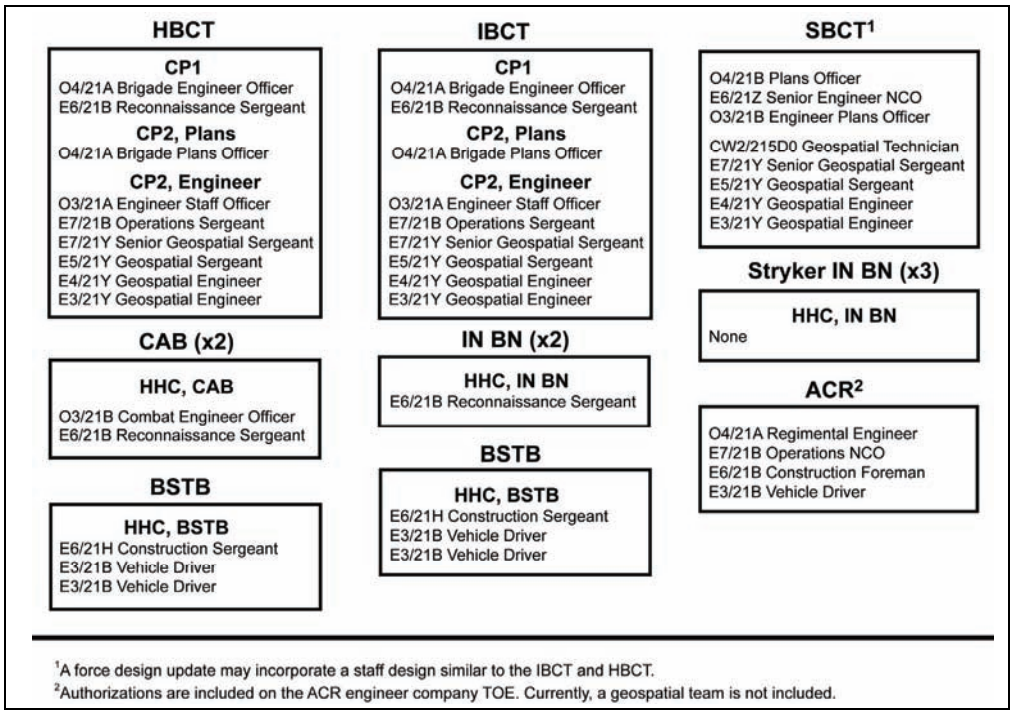
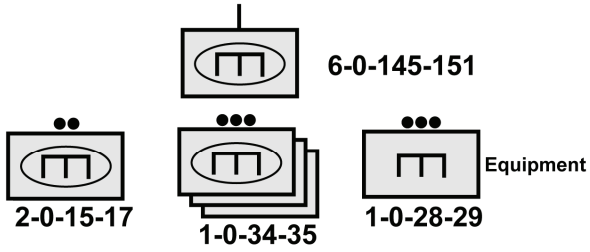


Figure B-2. Organic engineer staffs in BCTs and ACR

ENGINEER COMPANY, HBCT
05303G200



MISSION

To increase the combat effectiveness of the BCT by accomplishing M/CM/S, and limited general engineering tasks or performing combat tasks when required.

CAPABILITIES

- Provides advice to maneuver element commanders and staffs on engineer capabilities and engineering impacts on plans and operations.
- Prepares and maintains essential combat trails in the forward area.
- Conducts expedient repair of essential bridges, fords, and roads.
- Conducts engineer reconnaissance and provides obstacle intelligence for the BCT.
- Provides engineer support for conducting mobility and countermobility operations.
- Provides field engineering advice, assistance, and equipment to maneuver elements in the construction of fighting positions for individuals and weapon systems.
- Prepares and conducts demolition targets (bridge destruction, road and runway craters, abatis, road blocks, tunnel and road destruction).
- Emplaces and provides technical assistance in mine emplacement and networked munitions.
- Performs limited sustainment engineering tasks (construction, repair, and maintenance of CPs and combat trails and site drainage [chemical decontamination sites and logistics field sites]).
- Fights as infantry when required.

DEPENDENCIES

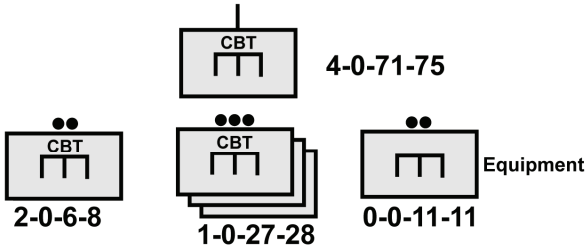
- Appropriate elements of the BSTB or BCT for unit level maintenance; direct-support maintenance; and religious, legal, health, finance, and personnel and administrative service support.
- HHC, BSTB, for religious, legal, HSS, field-feeding, finance, and personnel and administrative services.
- FSC for unit and direct-support maintenance, except electronic communications and COMSEC equipment.
- Engineer battalion (TOE 05436G000) for sufficient C2 assets to support the entire brigade.
- Engineer company, multirole bridge (TOE 05473L000) for additional personnel and equipment in support of assault gap-crossing missions.
- Engineer support company (TOE 05419G000) for additional equipment in support of obstacle emplacement, defensive-position construction, and sustainment engineering missions.

RULE OF ALLOCATION

One per HBCT.

Figure B-3. Engineer company, HBCT

ENGINEER COMPANY, IBCT
05453G000



MISSION

To increase the combat effectiveness of the BCT by accomplishing M/CM/S, and limited general engineering tasks or performing combat tasks when required.

CAPABILITIES

- Provides advice to maneuver element commanders and staffs on engineer capabilities and engineering impacts on plans and operations.
- Prepares and maintains essential combat trails in the forward area.
- Conducts expedient repair of essential bridges, fords, and roads.
- Conducts engineer reconnaissance and provides obstacle intelligence for the BCT.
- Provides engineer support for conducting mobility and countermobility operations.
- Provides field engineering advice, assistance, and equipment to maneuver elements in the construction of fighting positions for individuals and weapon systems.
- Prepares and conducts demolition targets (bridge destruction, road and runway craters, abatis, road blocks, tunnel and road destruction).
- Emplaces and provides technical assistance in mine emplacement and networked munitions.
- Performs limited sustainment engineering tasks (construction, repair, and maintenance of CPs and combat trails and site drainage [chemical decontamination sites and logistics field sites]).
- Fights as infantry when required.

DEPENDENCIES

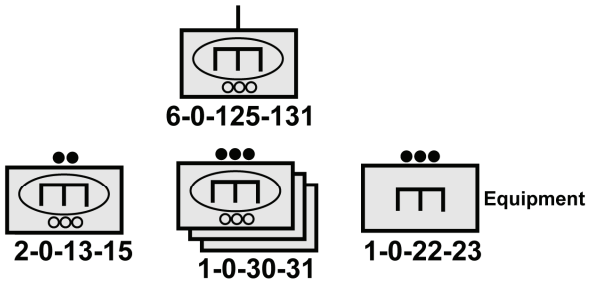
- Appropriate elements of the BSTB or BCT for unit level maintenance; direct-support maintenance; and religious, legal, health, finance, and personnel and administrative service support.
- HHC, BSTB, for religious, legal, HSS, field-feeding, finance, and personnel and administrative services.
- FSC for unit and direct-support maintenance, except electronic communications and COMSEC equipment.
- Engineer battalion (TOE 05436G000) for sufficient C2 assets to support the entire brigade.
- Engineer company, multirole bridge (TOE 05473L000) for additional personnel and equipment in support of assault gap-crossing missions.
- Engineer support company (TOE 05419G000) for additional equipment in support of obstacle emplacement, defensive-position construction, and sustainment engineering missions.

RULE OF ALLOCATION

One per IBCT.

Figure B-4. Engineer company, IBCT

ENGINEER COMPANY, SBCT
05063F300



MISSION

To increase the combat effectiveness of the BCT by accomplishing M/CM/S, and limited general engineering tasks or performing combat tasks when required.

CAPABILITIES

- Provides advice to maneuver element commanders and staffs on engineer capabilities and engineering impacts on plans and operations.
- Prepares and maintains essential combat trails in theforward area.
- Conducts expedient repair of essential bridges, fords, and roads.
- Conducts engineer reconnaissance and provides obstacle intelligence for the BCT.
- Provides engineer support for conducting mobility and countermobility operations.
- Provides field engineering advice, assistance, and equipment to maneuver elements in the construction of fighting positions for individuals and weapon systems.
- Prepares and conducts demolition targets (bridge destruction, road and runway craters, abatis, road blocks, tunnel and road destruction).
- Emplaces and provides technical assistance in mine emplacement and networked munitions.
- Performs limited sustainment engineering tasks (construction, repair, and maintenance of CPs and combat trails and site drainage [chemical decontamination sites and logistics field sites]).
- Fights as infantry when required.

DEPENDENCIES

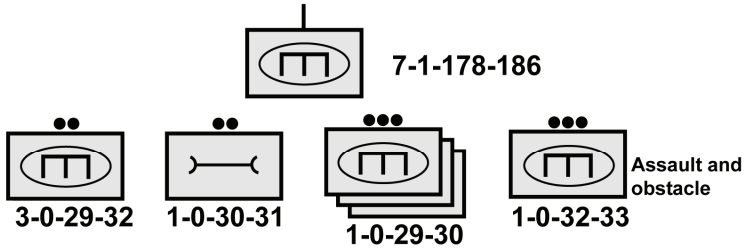
- Appropriate elements of the BSTB or BCT for unit level maintenance; direct-support maintenance; and religious, legal, health, finance, and personnel and administrative service support.
- HHC, BSTB, for religious, legal, HSS, field-feeding, finance, and personnel and administrative services.
- FSC for unit and direct-support maintenance, except electronic communications and COMSEC equipment.
- Engineer battalion (TOE 05436G000) for sufficient C2 assets to support the entire brigade.
- Engineer company, multirole bridge (TOE 05473L000) for additional personnel and equipment in support of assault gap-crossing missions.
- Engineer support company (TOE 05419G000) for additional equipment in support of obstacle emplacement, defensive-position construction, and sustainment engineering missions.

RULE OF ALLOCATION

One per SBCT.

Figure B-5. Engineer company, SBCT

ENGINEER COMPANY, ACR
05113L000



MISSION

To increase the combat effectiveness of the BCT by accomplishing M/CM/S, and limited general engineering tasks or performing combat tasks when required.

CAPABILITIES

- Provides advice to maneuver element commanders and staffs on engineer capabilities and engineering impacts on plans and operations.
- Prepares and maintains essential combat trails in the forward area.
- Conducts expedient repair of essential bridges, fords, and roads.
- Provides, emplaces, and maintains assault bridges to span six 60-foot gaps simultaneously.
- Conducts engineer reconnaissance and provides obstacle intelligence for the regiment.
- Provides engineer support for conducting mobility and countermobility operations.
- Provides field engineering advice, assistance, and equipment to maneuver elements in the construction of fighting positions for individuals and weapon systems.
- Prepares and conducts demolition targets (bridge destruction, road and runway craters, abatis, road blocks, tunnel and road destruction).
- Emplaces and provides technical assistance in mine emplacement and networked munitions.
- Performs limited sustainment engineering tasks (construction, repair, and maintenance of CPs and combat trails and site drainage [chemical decontamination sites and logistics field sites]).
- Provides nine assault boats to transport up to 108 personnel in a single crossing.

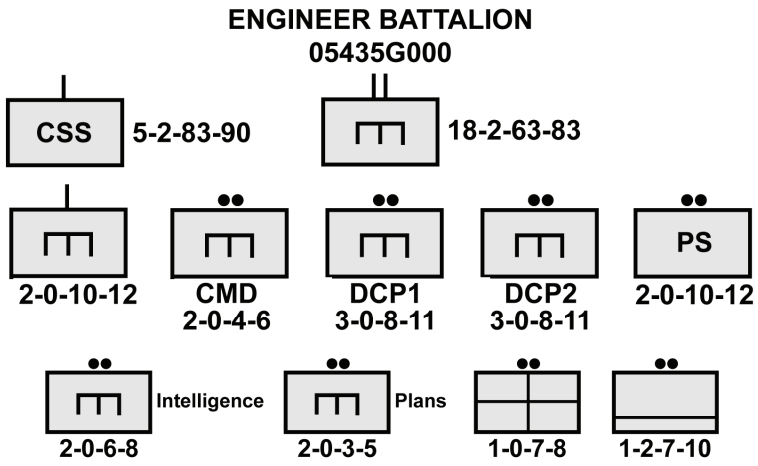
DEPENDENCIES

- HHC, ACR (TOE 17442L000) for religious, legal, health, and personnel and administrative services.
- ORD maintenance troop, support squadron, ACR (TOE 43187L000) for unit level maintenance of COMSEC equipment and DS maintenance on all equipment.
- Engineer company, multirole bridge (TOE 05473L000) for river-crossing missions.
- Engineer support company (TOE 05419G000) for additional equipment in support of obstacle emplacement, defensive-position construction, and sustainment engineering missions.

RULE OF ALLOCATION

One per ACR.

Figure B-6. Engineer company, ACR



MISSION

To provide an engineer headquarters for C2 of engineer operations in the AO.

CAPABILITIES

- Conducts engineer missions with two to five task-organized engineer companies and other force pool units.
- Provides C2 for units task-organized to the battalion.
- Conducts engineer operations (combat and general engineering missions) with task-organized engineer units.
- Conducts combat missions, when required, with task-organized combined arms units.
- Conducts area damage control, when required, with task-organized units.
- Provides unit administration, religious, and logistics support to task-organized units.
- Provides two scalable, deployable CPs as required.

DEPENDENCIES

- Appropriate elements of corps or division for religious, legal, health, finance, personnel and administrative, and logistics services.
- FSC engineer battalion (TOE 63357G000) for field feeding, fuel and supplemental transportation for Class IV and V supplies, and limited field maintenance.

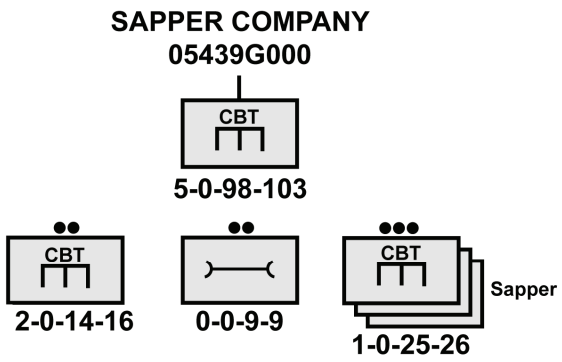
SUPPORTS

The battalion headquarters provides C2 for engineer operations supporting brigade, division, or corps operations.

RULE OF ALLOCATION

One headquarters per two to five engineer companies.

Figure B-7. Engineer battalion



MISSION

To conduct M/CM/S tasks and provide support for general engineering missions as part of a tailored force package or be task-organized to the BCT.

CAPABILITIES

- Commands and controls two to five sapper, assault, obstacle, clearance, or tactical bridge platoons operating as an engineer team in the execution of M/CM/S missions.
- Conducts 120 km of hasty route clearance per day.
- Conducts six dismounted and three mounted or urban breach lanes.
- Receives and analyzes ground/airborne standoff minefield detection data from other units.
- Provides 660 man-hours per day for general construction labor tasks to vertical, horizontal, or BCT companies during general engineering missions.
- Improves lanes and marking in the BCT AO.
- Provides engineer reconnaissance.
- Fights as infantry when required.

DEPENDENCIES

Appropriate support elements for religious, legal, health, finance, personnel and administrative, and logistics services.

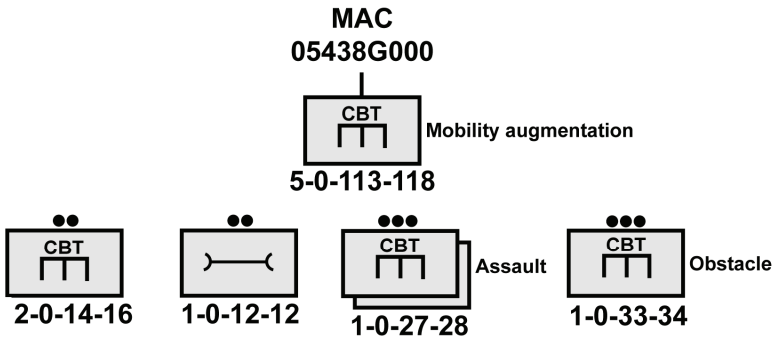
SUPPORTS

- A force with an engineer battalion conducting engineer operations in support of brigade, division, or corps operations.
- May be task-organized to a BSTB, CAB, or other battalion conducting combined arms operations.

RULE OF ALLOCATION

- One per clearance company conducting clearance operations.
- One per BCT conducting combat operations.
- One and a half per general construction workload.

Figure B-8. Sapper company



MISSION

To conduct assault gap crossings, mounted and dismounted breaches, and obstacle emplacement as part of a tailored force package or be task-organized to the BCT.

CAPABILITIES

- Commands and controls two to five assault, obstacle, or sapper platoons operating as an engineer team in the execution of mobility and countermobility missions.
- Provides up to four assault gap crossings to a BCT.
- Conducts up to four mounted breaches to an infantry or SBCT.
- Conducts up to two mounted breaches to a heavy BCT.
- Conducts up to four additional dismounted breaches to a BCT.
- Emplaces 4,432 linear meters of fix or disrupt tactical obstacle frontage without reload.
- Provides engineer reconnaissance.
- Provides advice on the employment of SCATMINEs and networked munitions.
- Fights as infantry when required.

DEPENDENCIES

Appropriate support elements for religious, legal, health, finance, personnel and administrative, and logistics services.

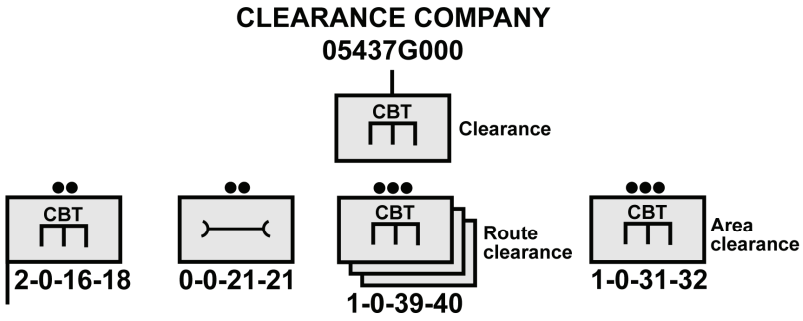
SUPPORTS

- A force with an engineer battalion conducting engineer operations in support of brigade, division, or corps operations.
- May be task-organized to a BSTB, CAB, or other battalion conducting combined arms operations.

RULE OF ALLOCATION

- One per infantry or SBCT conducting combat operations.
- Two per heavy BCT or ACR conducting combat operations.

Figure B-9. MAC



MISSION

To detect and neutralize explosive hazards along routes and within designated areas as part of a tailored force package or be task-organized to the BCT.

CAPABILITIES

- Provides C2 for three to five route, area, or sapper platoons operating as an engineer or combined arms clearance team.
- Clears of 255 km of two-way routes per day (without improvement).
- Clears 8,000 square meters per day.
- Clears 2 acres per day.

DEPENDENCIES

- Appropriate support elements for religious, legal, health, finance, and supplemental personnel and administrative services and power generation equipment maintenance.
- EHT for EH data and analysis and technical training and advice on EH threats.
- Engineer squad (canine) for specific detection capabilities.
- Sapper platoon and combined arms assets as required by METT-TC for combined arms clearance missions.
- Lift capability to load and unload mine rollers.
- Reachback capability to technical expertise.

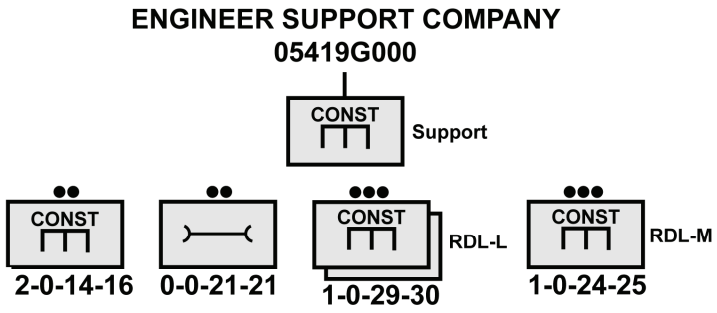
SUPPORTS

- A force tailored with an engineer battalion conducting engineer oprations in support of brigade, division, or corps operations.
- May be task-organized to a BSTB, CAB, or other battalion conducting combined arms operations.

RULE OF ALLOCATION

One per four BCTs or per requirement for 255 km of two-way route clearance per day.

Figure B-10. Clearance company



MISSION

To provide construction support for base camp development, road maintenance and repair, runway repair and airfields, and nonexplosive obstacle clearance.

CAPABILITIES

- Provides C2 for three to five construction platoons.
- Provides two RDE-L and one RDE-M platoons as required.
- Constructs 18 two-man fighting positions or 12 crew-served fighting positions per hour.
- Constructs 200 m of protective berm per hour.
- Repairs/maintains 8 to 12 km of MSR per day.
- Provides horizontal construction for runway repair and to establish airfields, FARPs, HLZs, and UAS LZs.
- Prepares ingress and egress for float bridge operations.
- Self-mobiles to 130 km.

DEPENDENCIES

- Appropriate elements for religious, legal, health, finance, personnel and administrative, and logistics services.
- Combines with horizontal company assets for additional construction capabilities.

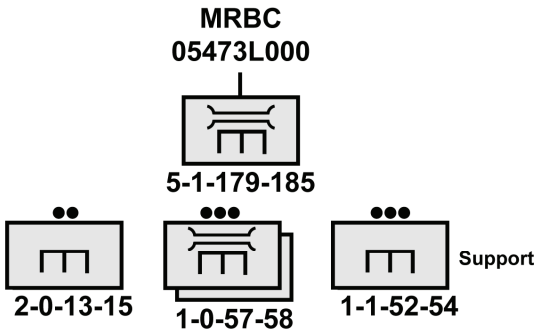
SUPPORTS

- A force tailored with an engineer battalion conducting engineer operations in support of brigade, division, or corps operations.
- May be task-organized to an engineer brigade conducting vertical construction operations.

RULE OF ALLOCATION

One per horizontal construction workload of 1,000 man-hours per day.

Figure B-11. Engineer support company



MISSION

To provide personnel and equipment to transport, assemble, disassemble, retrieve, and maintain all standard U.S. Army bridging systems and to provide transportation of Palletized Loading System-configured cargo.

CAPABILITIES

- Provides four heavy, dry-support sets with sufficient components for the assembly of various spans and load classes of single and double story bridges when performing fixed bridging. Under normal conditions, the sets provide four 40- to 48-meter Class 80 bridges.
- Provides a ribbon bridge, approximately 213 meters of Class 75 (track) and Class 96 (wheel) float bridging, or six Class 75 and Class 96 rafts based on 0- to 3-feet-per-second stream velocity when performing float bridging.
- Provides technical advice and assistance to other organizations in the construction of standard U.S. Army bridging systems.

DEPENDENCIES

Appropriate support elements for religious, legal, health, finance, and supplemental personnel and administrative services and power generation equipment maintenance.

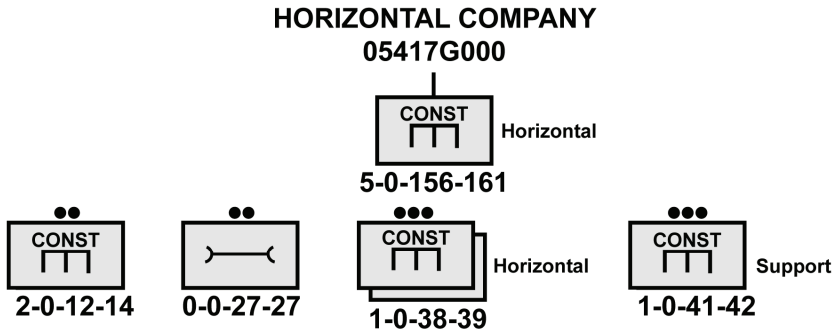
SUPPORTS

- A force with an engineer battalion conducting engineer operations in support of brigade, division, or corps operations.
- May be task-organized to an engineer brigade conducting gap-crossing operations.

RULE OF ALLOCATION

One per two BCTs.

Figure B-12. MRBC



MISSION

To repair, maintain, or construct roads and airfields; emplace culverts; haul construction materials; conduct clearing and grubbing; and provide other horizontal construction.

CAPABILITIES

- Provides C2 for two to five construction platoons.
- Provides personnel and equipment to perform tasks (clearing and grubbing operations; haul, grade, shape, compact, cut, and fill material; emplace culverts; remove snow and ice; construct drainage structures; conduct burrow pit operations; provide dust control operations; construct base camps, air landing platforms, FARPS, supply routes, roads, control points, fire bases, tank ditches, ASPs, and field hospital platforms; prepare river-crossing sites; support port repair).
- Provides personnel and equipment for lift and load support to remove stockpiles, haul material, remove rubble, or raze and remove structures.
- Conducts convoy operations and burrow pit operations (light).

DEPENDENCIES

Appropriate elements for religious, legal, health, finance, personnel and administrative, and logistics services.

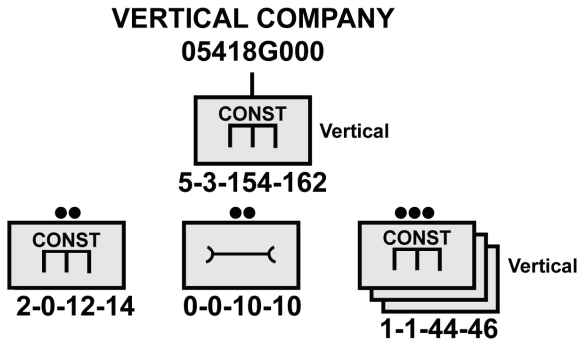
SUPPORTS

- A force with an engineer battalion conducting engineer operations in support of brigade, division, or corps operations.
- May be task-organized to an engineer brigade conducting horizontal construction operations.

RULE OF ALLOCATION

- One per division.
- One per BCT during defensive operations.

Figure B-13. Horizontal company



MISSION

To provide the vertical construction required in the development of base camps and construct, repair, and maintain other facilities and infrastructure as required.

CAPABILITIES

- Provides C2 for three to five construction platoons.
- Constructs, repairs, and maintains wood, steel, concrete, and preengineered structures.
- Constructs, repairs, and maintains interior plumbing, water distribution, and sewage distribution systems.
- Constructs culverts, abatements, and retaining walls.
- Scrapes 0.62 cy of material per lift with a skid steer loader.
- Emplaces interior electrical or sewer systems.
- Scoops 0.23 to 0.62 cy of material per lift with a backhoe.

DEPENDENCIES

- Appropriate elements for religious, legal, health, finance, personnel and administrative, and logistics services.
- Dive team for port repair operations.

SUPPORTS

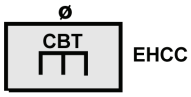
- A force with an engineer battalion conducting engineer operations in support of brigade, division, or corps operations.
- May be task-organized to an engineer brigade conducting vertical construction operations.

RULE OF ALLOCATION

One per vertical construction workload of 1,000 man-hours per day.

Figure B-14. Vertical company

EHCC
05601GH00



5-0-10-15

MISSION

To provide a staff element for the collection, analysis, and dissemination of EH information.

CAPABILITIES

- Gathers and tracks EH incidents.
- Maintains the mine strike database.
- Provides pattern analysis of EH incidents.
- Provides technical advice on EHs.
- Provides EH SA within the theater or JOA.
- Provides prediction of mobility impediments.

DEPENDENCIES

- Appropriate elements for unit maintenance, field-feeding, health, religious, and supplemental logistics services.
- Topographic analysis unit.
- Reachback capability to technical expertise at CBRNE defense cells.
- Criminal investigator for forensics investigation provided by military police or CID organization responsible for area coverage.

SUPPORTS

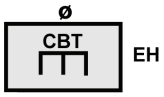
A force tailored to the corps, division, or brigade headquarters.

RULE OF ALLOCATION

One per theater or JOA.

Figure B-15. EHCC

ENGINEER HAZARDS TEAM
05601GI00



1-0-5-6

MISSION
To provide a staff element for the collection, analysis, and dissemination of EH information.

CAPABILITIES
- Gathers and tracks EH incidents.
- Maintains the mine strike database.
- Provides pattern analysis of EH incidents.
- Provides technical advice on EH.
- Provides EH SA within the theater or JOA.
- Provides prediction of mobility impediments.

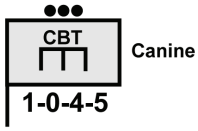
DEPENDENCIES
- Appropriate elements for unit maintenance, field-feeding, health, religious, and supplemental logistics services.
- Topographic analysis unit.
- Reachback capability to technical expertise at CBRNE defense cells.
- Criminal investigator for forensics investigation provided by military police or CID organization responsible for area coverage.

SUPPORTS
A force tailored to the corps, division, or brigade headquarters.

RULE OF ALLOCATION
One per theater or JOA.

Figure B-16. Engineer hazards team

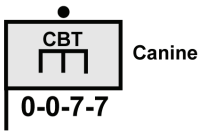
MINE DOG DETACHMENT HEADQUARTERS
05550LA00



MISSION
To provide C2 of engineer canine clearance and specialized search operations.
CAPABILITIES
• Provides C2 of five engineer squads (canine) (TOE 05550LB00). • Provides management of specialized care, treatment, and sanitary conditions of mine-detecting and specialized search dogs in the engineer squads (canine). • Provides mass movement of dog kennels and dogs as required.
DEPENDENCIES
• Appropriate elements for unit maintenance, field-feeding, health, religious, and logistics services. • Medical detachment, veterinary services (TOE 08413L000) for veterinarian support.
SUPPORTS
• A force with the engineer battalion or clearance company. • May be task-organized to a BCT, support brigade, or other headquarters conducting clearing operations.
RULE OF ALLOCATION
One per HHC, engineer command.

Figure B-17. Mine dog detachment headquarters

MINE DOG SQUAD
05550LB00



MISSION

To support units by detecting casualty-producing devices for route clearance, area clearance, and specified searches.

CAPABILITIES

Provides six mine detection dogs and handlers for detecting mines in routes, areas, and zones.

DEPENDENCIES

- Engineer detachment headquarters (canine) (TOE 05550LA00) for C2 of squad operations, finance, legal, logistics, and personnel and administrative services and first-level care of dogs.
- Appropriate elements for unit maintenance, field-feeding, health, religious, and supplemental logistics services.
- Medical detachment, veterinary services (TOE 08413L000) for veterinarian support.

SUPPORTS

A force with the engineer detachment headquarters (canine).

RULE OF ALLOCATION

- One per division.
- One per six route and area clearance operations in LR 1, 2, and 3.
- One per 0.222 acres of route or area requiring detection and proofing per day in LR 1, 2, and 3.

Figure B-18. Mine dog squad

Appendix C

Combined Arms Breaching Operations

Breaching operations are conducted to allow maneuver in the presence of obstacles. Obstacle breaching is the employment of a combination of tactics and techniques to advance an attacking force to the obstacle farside that is covered by fire. It is one of the most difficult combat tasks a force can encounter. Breaching is a synchronized combined arms operation under the control of a maneuver commander. This appendix serves as a quick reference for leaders planning breaching operations. (See FM 3-34.2.)

OPERATIONS

C-1. Attacks take place along a continuum based on the knowledge of enemy capability and disposition and the intentions and details of friendly force planning and preparation. The following terms refer to the opposite ends of that continuum and describe characteristics of the attack:

- **Deliberate attack.** During a deliberate attack, friendly forces have more knowledge of the enemy situation and have more time to plan and prepare for the enemy. With this knowledge, friendly forces conducting a deliberate attack can develop detailed plans, task-organize to accomplish the mission, and execute rehearsals down to the lowest levels (see FM 3-90).
- **Hasty attack.** During a hasty attack, the enemy situation is vague or changes rapidly. Friendly forces have little or no time to plan or prepare for this type of operation. Because the primary purpose of the hasty attack is to maintain momentum or take advantage of the enemy situation, it is normally conducted only with resources that are immediately available (see FM 3-90).

C-2. Breaching operations may be required to support an attack anywhere along this continuum. Breaching operations must be adapted to best exploit the situation. The breaching tenets apply across the continuum regardless of where the attack falls. The level and type of planning distinguishes which of the following general types of breaching operations are used to meet mission variables (METT-TC):

- **Deliberate breach.** A deliberate breach is used against a strong defense or complex obstacle system. It is similar to a deliberate attack, requiring detailed knowledge of the defense and obstacle systems. It is characterized by the most prior planning, preparation, and build up of combat power on the obstacle nearside. Subordinate units are task-organized to accomplish the breach. The breach often requires securing the obstacle farside with an assault force before or during reduction. Amphibious breaching is an adaptation of the deliberate breach intended to overcome antilanding defenses to allow a successful amphibious landing.
- **Hasty breach.** A hasty breach is an adaptation to the deliberate breach and is conducted when less time is available. It may be conducted during a deliberate or hasty attack due to a lack of clarity on enemy obstacles or changing enemy situations (SCATMINE emplacement).
- **In-stride breach.** An in-stride breach is a variation of a hasty breach that consists of a rapid breaching adaptation conducted by forces organic to (or task-organized with) the attacking force. It consists of preplanned, well-trained, and well-rehearsed breaching battle drills and the use of the unit SOP. The in-stride breach takes advantage of surprise and momentum to penetrate obstacles. The force uses an in-stride breach against weak defenders or very simple obstacles and executes the battle drill on the move. Attacking forces should be configured to execute an in-stride breach, except when a deliberate breach is planned.
- **Covert breach.** A covert breach is used to pass through obstacles without being detected by the enemy. It uses elements of deliberate and hasty breaches as required. Covert breaching is

characterized by using stealth to reduce obstacles, with support and assault forces executing their mission only if reduction is detected. Covert breaches are usually conducted during periods of limited visibility.

C-3. The *breach area* is the area where a breaching operation occurs. It is established and fully defined by the higher headquarters of the unit conducting breaching operations. (FM 3-34.2) The area must be large enough to allow the attacking unit to deploy its support force and extend far enough on the obstacle farside to allow follow-on forces to deploy before leaving the breach area. One technique is to establish the breach area using phase lines (PLs) or unit boundaries. The PL defining the breach area farside may be established as a battle handover line (BHL).

C-4. The reduction area is a number of adjacent points of breach that are under the control of the breaching commander (see FM 3-34.2). The commander conducting the attack determines the size and location of the reduction area that supports the seizure of a POP. (See figure C-1.)

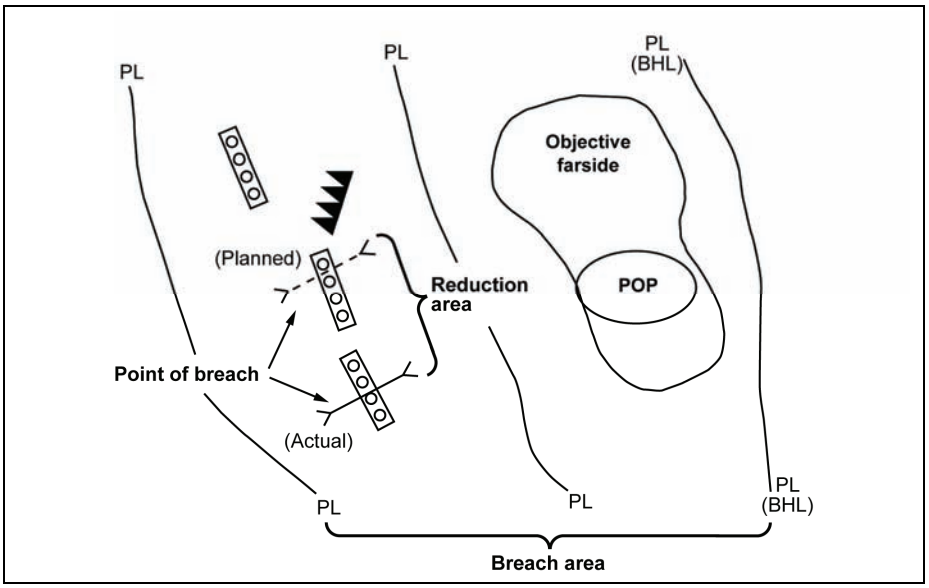


Figure C-1. Reduction area, breach area, and point of breach

C-5. A breaching operation includes the reduction of minefields and other EHs and obstacles. Reduction is the creation of lanes through or over the obstacle to allow the attacking force to pass. The number and width of lanes varies with the enemy situation, size and composition of the assault force, and scheme of maneuver. The lanes must allow the assault force to rapidly pass through the obstacle. Breaching is a mobility operation planned for within the overall framework of assured mobility. Heavily reliant on reconnaissance, it generally requires significant engineering support to accomplish.

C-6. Most combined arms breaching operations are conducted by a BCT or its subordinate battalion TF elements as a tactical operation, but higher headquarters may also conduct operational-level combined arms breaching. As previously mentioned in chapter 6, significant engineer augmentation from EAB is required to enable a BCT breach or a battalion TF hasty or deliberate breach. Depending on the size of the assaulting force, number of lanes required, and addition of the appropriate redundancy in reduction assets the necessary engineer augmentation may include additional Sapper companies, a MAC, or a combat engineer battalion.

PLANNING

C-7. Successful breaching operations are characterized by applying breaching tenets (see table C-1). These tenets should be applied when an obstacle is encountered in the AO during an attack or route clearance operation (see table C-1). The tenets are—

- Intelligence.
- Breaching fundamentals (SOSRA).
- Breaching organizations.
- Mass.
- Synchronization.

Table C-1. Breaching tenets

Breaching Tenets	*Actions*
Intelligence	• Show a template of enemy obstacles on the SITEMP for each enemy COA during IPB. • Determine the enemy engineer capabilities (manpower, equipment, materials, and time available). • Predict obstacle locations based on the terrain and within the maximum effective range of weapons from the template of enemy defensive positions. • Develop IRs on enemy engineer units, equipment, activities, and obstacles (location, composition, types of mines). • Integrate IRs and engineer reconnaissance into the ISR plan to develop OBSTINTEL.
Breaching fundamentals (SOSRA)	• Implement fire control measures to allow the support force to provide effective direct and indirect suppressive fires **(suppress)**. • Determine the placement (wind condition), density, and timing of obscuration smoke on enemy positions and screening smoke between the enemy and the reduction area **(obscure)**. • Resource the breach force based on combat power of enemy forces over watching the obstacle **(secure)**. • Determine the number and width of lanes based on the scheme of maneuver (one lane per company and two lanes per battalion), determine reduction methods (explosive, mechanical, electronic, or manual), and establish a lane-marking system **(reduce)**. • Complete the breach when the enemy on the obstacle farside is destroyed **(assault)**.

Breaching organizations	• The support force—
	  ▪ Suppresses the enemy direct-fire systems covering the reduction area.
	  ▪ Controls obscuration smoke.
	  ▪ Prevents the enemy from repositioning or counterattacking to place direct fires on the breach force.
	• The breach force—
	  ▪ Creates and marks lanes (breach element).
	  ▪ Secures the obstacle nearside and farside (security element).
	  ▪ Reports lane status and location.
	• The assault force—
	  ▪ Assaults through the obstacle and destroys the enemy farside.
	  ▪ Seizes terrain on the obstacle farside to prevent enemy direct fires on the created lanes.
	  ▪ Is prepared to breach follow-on or protective obstacles after passing through the breach area.

Table C-1. Breaching tenets (continued)

Breaching Tenets	*Actions*
Mass	● Plan the point of breach where the enemy defense is the weakest. ● Mass combat power to create enemy weakness at the point of breach.
Synchronization	● Conduct detailed reverse planning. ● Communicate clear subunit instructions. ● Provide effective C2. ● Perform combined arms rehearsals.

INTELLIGENCE

C-8. During IPB, the situation template (SITEMP) is developed to graphically depict enemy expected disposition based on threat doctrine and the effects of the AO for a particular COA. The ENCOORD creates a template of enemy obstacles on the SITEMP based on enemy countermobility capabilities (manpower, equipment, materials, and time available), terrain, and the range of enemy weapon systems. Any unknowns about the enemy obstacle effort become IRs and are integrated into the ISR plan to generate OBSTINTEL. OBSTINTEL validates the template of obstacles and leads to refined maneuver and breach planning. Utilizing engineers in the reconnaissance effort can improve the specificity of the obstacle information being collected. Examples of obstacle-related IR include the—

- Capability and location of enemy SCATMINE systems.
- Location of existing and reinforcing obstacles.
- Orientation and depth of obstacles.
- Soil conditions (in the case of a minefield) to determine the ability to use tank plows.
- Wire presence, location, and type.
- Lane and bypass information.
- Minefield composition (buried or surface-laid antitank [AT] or antipersonnel [AP] mines, antihandling devices [AHDs], and depth of mines).
- Types of mines and fuses.
- Composition of complex obstacles.
- Areas between successive obstacle belts.

FUNDAMENTALS

C-9. The five breaching fundamentals (SOSRA) must be applied to ensure success when breaching against a defending enemy. These fundamentals always apply, but may vary based on mission variables in the AO.

ORGANIZATION

C-10. A commander organizes friendly forces to accomplish the breaching fundamentals quickly and effectively. Table C-2 shows the relationship between the breaching organization and breaching fundamentals. The commander organizes the following three forces to conduct breaching operations:

- Support force.
- Breach force.
- Assault force.

C-11. Planners use reverse planning to determine the forces and assets needed to conduct breaching operations and to ensure that actions on the objective are effectively resourced with the necessary breaching assets. Reverse planning starts with actions on the objective and works backward to the LD. The following apply to reverse planning:

- The actions on the objective drive the size and composition of the assaulting force.
- The size of the assaulting force determines the required number and location of lanes.

- The lane requirements and type of obstacle drive the amount and type of mobility assets task organized to the breach force.
- The SITEMP depicting enemy direct-and-indirect fire coverage of predicted enemy obstacles determines the size and composition of the breach force security element and the support force.

Table C-2. Relationship between breaching organization and breaching fundamentals

Breaching Organization	*Breaching Fundamentals*	*Responsibilities*
Support force	Suppress Obscure	• Suppress enemy direct-fire systems covering the reduction area. • Control obscuring smoke. • Prevent enemy forces from repositioning or counterattacking to place direct fires on the breach force.
Breach force	Suppress (provides additional suppression) Obscure (provides additional obscuration in the reduction area) Secure (provides local security) Reduce	• Create and mark the necessary lanes in an obstacle. • Secure the obstacle nearside and farside. • Defeat forces that can place immediate direct fires on the reduction area. • Report the lane status and location.
Assault force	Assault Suppress (if necessary)	• Destroy the enemy on the obstacle farside that is capable of placing direct fires on the reduction area. • Assist the support force with suppression if the enemy is not effectively suppressed. • Be prepared to breach follow-on and/or protective obstacles after passing through the reduction area.

Support Force

C-12. The primary responsibility of the support force is to eliminate the enemy's ability to interfere with a breaching operation. The commander must allocate enough direct- and indirect-fire systems to the support force to allow it to accomplish its missions. The support force must—

- Isolate the reduction area with fires.
- Mass and control direct and indirect fires to suppress the enemy and neutralize any weapons that are able to bring fires on the breach force.
- Control obscuring smoke to prevent enemy-observed direct and indirect fires.

C-13. The support force must seize a support by fire (SBF) position, seeking maximum protection from the terrain. To increase the survivability of the support force, the commander may establish CFZs for the support force once it has occupied its SBF positions. If possible, the support force should follow a covered or concealed route to the SBF position, take up its assigned sectors of fire and observation, and begin to engage the enemy. It may have to make some adjustments to its direct-fire plan if the situation dictates. Observation is particularly critical. Artillery observers with the support force may initially bring indirect fires on enemy positions to fix and suppress the enemy. The support force adjusts the artillery-delivered obscuring smoke, if necessary, to protect the breach and assault forces as they approach the reduction area.

Breach Force

C-14. The primary mission of the breach force is to reduce the obstacle. The breach force assists in the passage of the assault force by creating, proofing, and marking lanes. It is a combined arms force and includes engineers, reduction assets, and enough maneuver forces to provide additional suppression and local security. The breach force must be allocated enough maneuver forces to provide additional suppression against various threats, including—

- Enemy direct-fire systems that cannot be effectively observed and suppressed by the support force due to the terrain or masking of support force fires by the breach force as it moves forward to reduce the obstacle.
- Counterattacking or repositioning forces that cannot be engaged by the support force.

C-15. The breach force employs vehicle-mounted smoke systems and smoke pots, if necessary, for self-defense and to cover lanes while the assault force is passing. Smoke may also be provided by indirect-fire systems. The breach force secures itself from dismounted threat forces that are providing close-in protection of the obstacle. The breach force also secures the lanes through the tactical obstacles (once they are created) to allow safe passage of the assault force. The breach force assaults through the point of breach to the obstacle farside and seizes the reduction area. The breach force is comprised of the following subordinate elements—

- **Security element.** The security element is comprised primarily of maneuver forces. It is normally responsible for providing additional suppression, obscuration, and local security.
- **Reduction element.** The reduction element is comprised primarily of reduction assets (mine-clearing blades [MCBs]; MICLICs; armored, vehicle-launched bridges [AVLBs]; ACEs; dismounted engineers). Assets are allocated based on the number of lanes required (one lane for each assaulting company or two lanes for a battalion-size TF), terrain, and type of obstacle.

C-16. The breach force must be able to deploy and begin reducing the obstacle as soon as enemy fires have been suppressed and effective obscuration is achieved. It can expect enemy artillery fires within a matter of minutes. CFZs should be activated at the point of breach before the commitment of the breach force. Engineers within the breach force are allocated with the reduction assets necessary to clear mines, EHs, nonexplosive obstacles, and small gaps. Scouts, engineers, or other reconnaissance assets are also capable of finding local bypasses or existing lanes in the obstacle system. The commander should plan for a 50 percent loss of mobility assets in close combat. As a planning factor, one engineer platoon with the necessary reduction assets should be allocated to create and mark one lane. After the breach force has reduced the obstacle and passed the assault force through, the breach force may be required to hand over the lane to follow-on units. At a minimum, the lanes must be marked and their locations and conditions reported to higher headquarters and follow-on units as prescribed in the unit SOP.

Assault Force

C-17. The primary mission of the assault force is to destroy the enemy and seize terrain on the obstacle farside to prevent the enemy from placing direct fires on created lanes. The assault force may be tasked to assist the support force with suppression while the breach force reduces the obstacle. The assault force must be sufficient in size to seize the POP. Combat power is allocated to the assault force to achieve a minimum 3:1 ratio on the POP. In a breaching operation, particularly TF and above, the assault force normally maneuvers as a separate force when attacking through a reduced obstacle. However, breach and assault assets may maneuver as a single force when conducting lower-level breaching operations (independent company team conducting an attack). If the obstacle is defended by a small enemy force, assault and breach force missions may be combined. This simplifies C2 and provides more immediate combat power for security and suppression. Fire control measures are essential, since support and breach forces may be firing on the enemy when the assault force is committed. The suppression of over watching enemy positions must continue and other enemy forces must remain fixed by fires until the enemy has been destroyed. The assault force must assume control for direct fires on the assault objective as support and breach force fires are lifted or shifted.

MASSED COMBAT POWER

C-18. Breaching is conducted by rapidly applying concentrated efforts at a point to reduce the obstacle and penetrate the defense. Massed combat power is directed against the enemy weakness. The location selected for breaching depends largely on enemy weakness, where its covering fires are minimized. If friendly forces cannot find a natural weakness, they create one by fixing most of the enemy force and isolating a small portion of it for attack. Denying the enemy's ability to mass combat power against the breach is

achieved by isolating, fixing, or disrupting the defending forces; synchronizing the application of friendly combat power; and simultaneously breaching at separate locations to prevent the enemy from concentrating fires and defeating a breaching force in detail.

SYNCHRONIZATION

C-19. Breaching operations require the precise synchronization of breaching fundamentals by support, breach, and assault forces. Failure to synchronize effective suppression and obscuration with obstacle reduction and assault can result in rapid, devastating losses of friendly troops in the obstacle or the enemy EA. A combined arms breach is a complex operation by nature. Support, breach, and assault forces must apply breaching fundamentals (SOSRA) within a short time and distance. The support force masses its direct fires and controls indirect fires in concert with breach and assault force maneuvers. The commander must employ smoke at the right time and place to maximize its effectiveness or risk hampering target acquisition and C2. The breach force must have the right reduction asset for the type of obstacle encountered. Engineers must ensure that they do not prematurely exhaust the reduction assets needed to reduce subsequent obstacles. The commander ensures synchronization through proper planning and force preparation. Fundamentals to achieve synchronization are—

- Detailed reverse planning.
- Clear subunit instructions.
- Effective C2.
- Well-rehearsed forces.

C-20. Subordinate units must clearly understand the mission, how the mission relates to the phases of the operation, and what role adjacent units play in the overall plan. The commander may use an execution matrix to synchronize forces. An execution matrix is a superb synchronization tool and lists subunit instructions sequentially in relation to key events or the sequence of the attack. It also provides subordinate commanders with an understanding of how the mission and those of adjacent units fit into the overall plan. More importantly, it allows subordinates to better track the battle and coordinate their own maneuver with that of adjacent units. This is critical to achieving the unity of effort between support, breach, and assault forces. (See figure C-2, page C-8, for a sample execution matrix.)

Units	Support Force	Breach Force		Assault Force	Force Allocation
		Security Element	Reduction Element		
	B	A	(+)	D	
	C (-)				
LD to PL Austin	Move along Axis Horse.	Trail Team Sapper.	Lead move along Axis Main.	Be prepared to follow Team A.	Maneuver formation.
PL Austin to PL Houston	Occupy SBF 15 and 25. BP to occupy SBF 20.	Occupy SBF 20.	Identify POP.	Cross LD, on order.	
Obstacle reduction	SBF 25 orient TRP 09, on order TRP 27. SBF 15 orient TRP 09.	SBF 20 orient TRP 09.	Create and mark two lanes (vicinity AB123456).	Occupy CP 16; identify lanes.	
Attack on OBJ Bird	SBF 15 shift fires to TRP 33.	Move through lanes to seize OBJ Bird, on order. Occupy SBF 35 and orient TRP 27.	Assist passage of Team A. Secure lanes.	Occupy SBF 20; orient TRP 27.	Reduce
Attack on OBJ Cat	SBF 15 orient TRP 33. SBF 25 shift fires to TRP 33, on order.	Lift fires; continue to orient CP 27, on order.	Secure and improve lanes.	Pass through lanes and OBJ Bird to seize OBJ Cat, on order. Be prepared to occupy SBF 45.	
Attack on OBJ Dog	Lift fires. SBF 25 orient north, on order. SBF 15 orient south.	Be prepared to assume Company D mission to seize OBJ Dog.	Move to OBJ Bird vicinity. TRP 09 orient southeast.	Seize OBJ Dog, on order.	Actions on OBJ Dog
Consolidate	SBF 25 orient north. SBF 15 orient south.	SBF 35 orient southeast.	Support hasty defense operations.	OBJ Dog orient northeast.	

Note: The breach force commander may come from a battalion level C2 mode.

Figure C-2. Sample execution matrix

C-21. C2 is integrated into the plan through the use of maneuver and fire control measures and the positioning of key leaders to see the battlefield. Maneuver control measures enable the commander to graphically convey the intent, scheme of maneuver, and subunit instructions. The commander must be in a position to best control the battle. Since effective suppression is the most critical event during breaching operations, the commander may move with the support force (this enables the commander to personally influence fire control and facilitate the necessary cross talk between breach and assault forces). The S-3 may initially move with the breach force to track the progress of obstacle reduction and anticipate the commitment of the assault force. A commander who feels that a personal influence is required with the breach or assault force must make a conscious effort to track the entire battle and not focus completely on the reduction of the obstacle or the assault itself.

PREPARATION

C-22. Intelligence collection continues throughout the preparations for a breaching operation. As intelligence reports are received, the SITEMP and ISR plan are updated and revised. Intelligence reports are also used to refine the task organization of support, breach, and assault forces and the scheme of maneuver (proposed points of breach and target grids for smoke and suppressive fires). Updated intelligence information is also used during combined arms rehearsals.

C-23. A unit meticulously plans, manages, and controls breaching rehearsals. Time is allocated to each unit to perform combined arms rehearsals. A rehearsal site should reflect the actual obstacle system in as much detail as possible. Friendly forces choose terrain similar to the operational area and construct a practice obstacle system based on OBSTINTEL. At a minimum, rehearsals should include a leader and key personnel walk-through and individual rehearsals by support, breach, and assault forces. As time permits, conduct as many full-scale rehearsals as possible. When possible, friendly forces rehearse the operation under the same conditions (operational environment, obscuration and darkness) expected during the actual mission. Rehearsals should also include contingencies such as enemy counterattacks and attacks by enemy indirect-fire systems (artillery, rockets, attack helicopters, other air assets, and enemy use of CBRNE). If updates become available after the last possible rehearsal, the information should be immediately passed on to affected elements.

EXECUTION

C-24. Each element of the breaching organization must accomplish its assigned tasks for a breaching operation to be successful. Additionally, the entire force must be flexible when responding to changes in the plan. Some changes might be—

- Allocating additional assets to the support force due to attrition.
- Changing the location of the POP.
- Modifying the scheme of reduction and changing the order of the units passing through the created lane.

C-25. All units must continually update the commander during mission execution. A critical phase of a breaching operation is the movement of the support force from the LD to its SBF positions. The support force must be prepared to maneuver to its SBF positions. Additionally, the support force must plan for the enemy use of SCATMINEs along its axis of advance, which may require it to conduct a breaching operation. After the support force has occupied its SBF positions and the commitment criteria of the breach force have been met (achieved necessary suppression and obscuration), the breaching commander should order the breach force to begin reduction. As the breach force commander maneuvers the force to the point of breach, he must always remain cognizant of his relationship to the support force to ensure that he does not unnecessarily mask their fires. Actions by the assault force at an assault position may include—

- Verifying current friendly and enemy situations using tactical reports from company teams or support forces.
- Issuing FRAGOs and disseminating information to the lowest level.
- Confirming target reference points (TRPs) and direct-fire responsibilities.
- Positioning artillery observers.
- Conducting final prepare-to-fire checks.
- Reorganizing to compensate for combat losses.

C-26. The breach force commander should lead with the security element to allow it to establish nearside security before the reduction element arrives at the obstacle. As the security element occupies its position, the reduction element commander should conduct a reconnaissance to acquire obstacle information and quickly confirm or refine the scheme of reduction. As the reduction element commander brings the element forward, the exact location where the obstacle will be reduced and the estimated time to reduce, proof, and mark the obstacle is reported. At the same time, the breach force commander must assess the effectiveness of the suppression and determine if and how to augment support force fires.

C-27. As the reduction continues, the support and breach force commanders must update their commander with the current status. Specifically, the support force commander must update the ammunition status and strength of the unit. The breach force commander must update the progress of the reduction effort and the effectiveness of obscuration and suppression. The breach force commander should verify who the assault force will be and where it will come from to assist in their passage.

C-28. As the reduction effort nears completion, the breach force commander should report the grid coordinates of the far recognition marker so that the assault force can begin movement to that location. When reduction is complete, the breach force commander must—

- Report lane completion.
- Provide grid coordinates of the final approach marker.
- Confirm and report the lane-marking pattern and material.

C-29. The breach force commander establishes farside local security and assists in the assault force passage. Once the lanes have been reported or signaled as being open for traffic, the assault force passes through the lanes to destroy forces that can bring direct fires on created lanes. To accomplish this mission, the assault force may have to reduce enemy protective obstacles.

C-30. The obstacle system continues to be a choke point and danger area even after the assault force has passed through created lanes. Additional lanes are constructed to speed follow-on force passage, and lanes are monitored to ensure that they remain clear. Reduction assets need to be maintained near the points of breach in case a scatterable minefield is emplaced by the obstacle. The lane-marking pattern is upgraded to intermediate. There are many ways this can be accomplished, the higher headquarters—

- Takes command of the point of breach and has some or all of the reduction element revert to its control and continue creating or expanding lanes in the obstacle for follow-on forces.
- Takes command of the point of breach and has additional reduction assets follow closely behind the assault force and create additional lanes to allow the reduction element to remain under unit control.
- Tasks the breaching unit to maintain lanes in tactical obstacles.
- Widens lanes to allow two-lane traffic through obstacles. They are marked with the full lane-marking pattern. Deliberate marking and fencing systems are installed, and military police establish necessary traffic control. Eventually, follow-on engineer forces clear obstacles and eliminate the choke point.

Appendix D

Clearing Operations

Based on an analysis of the mission variables, the maneuver commander may order clearing operations to facilitate mobility within the AO. He may order a critical route or area cleared of mines, EHs, or other obstacles. The operation could be conducted as a single mission to open or reopen a route or area or may be conducted on a recurring basis in support of efforts to defeat a sustained threat to a critical route. This appendix serves as a quick reference for leaders planning clearing operations. (See FM 3-34.2 for more detailed information.)

OPERATIONS

D-1. In land operations, clearing operations are designed to clear or neutralize all mines, other EHs, or obstacles from a route or area (see FM 3-34.2). Clearing operations are normally mobility operations (however they can also support ISR operations) and, as with most mobility operations, is often performed by a combined arms force built around an engineer-based clearing force. Clearing operations are a combined arms tactical-enabling mission conducted when the commander orders all EHs (enemy and friendly) and enemy obstacles to be cleared within an assigned area or along a specified route. This may include a combined arms breach, but is not limited to reducing a lane or lanes through identified obstacles. In both route and area clearance, engineers eliminate or neutralize all mines, EHs, and other obstacles that are a threat to mobility along the route or within the specified area.

D-2. *Clearing* is a tactical mission task that requires the commander to remove all enemy forces and eliminate organized resistance in an assigned area. (FM 3-90) The force does this by destroying, capturing, or forcing the withdrawal of enemy forces so that they cannot interfere with the friendly unit mission.

D-3. Within the IED defeat framework described in FM 3-90.119, commanders employ mobility operations (specifically route clearance) as one tool to enable the overall IED defeat mission. The focus of clearing operations is on EHs or IEDs themselves. However, the device is merely the end product of a complex set of enemy activities. An IED attack is the result of a planned tactical operation with several key elements that work in a coordinated and synchronized manner to attain a desired result.

UNITS

D-4. The organic structure of the BCT does not include necessary combat engineer and other mobility support elements necessary to conduct clearing operations and in addition to these added clearance capabilities may also require additional breaching, clearing, or gap-crossing capabilities based on mission requirements. The BCT commander and staff must correctly identify capability shortfalls and request the appropriate augmentation early in the planning process. Combat engineers supporting clearing operations (see table D-1, page D-2) are task-organized to conduct route or area clearance. If a combined arms breach is required as part of the clearing operation, selected combat engineers and other forces are task-organized specifically for the breaching operation. Bypassing or otherwise avoiding the obstacle is preferred over a combined arms breach; however, in clearing operations the objective is to eliminate the enemy force or organized resistance (EHs, other obstacles) within an assigned area or along an assigned route.

D-5. Combat engineers within the task-organized clearance force detect and mark EHs and they then neutralize the hazard or allow an EOD unit to respond appropriately based on mission variables and the commander's guidance. In selected cases, specially trained combat engineers (known as EOCAs) can be employed to supplement the capabilities of EOD. EOCA Soldiers are trained to perform limited battlefield disposal of UXO.

Note. EOD personnel have specialized capabilities. Proper coordination and planning by the EOD staff cell is imperative to employ these capabilities at the right time and place. (See FM 4-30.16 and FM 4-30.51 for more information on EOD capabilities.)

Table D-1. Selected units involved in clearing operations

Unit	*Mission*	*Capabilities/Planning Factors*
Clearance company	• Conducts detection and neutralization of EHs along routes and within areas in support of BCT operations	• Provides training readiness and oversight of assigned route and area clearance platoons • Provides C2 for three to five route, area, or Sapper platoons, operating as an engineer team in the execution of route or area clearance missions • Clears 255 kilometers of two-way routes per day (three routes of 85 kilometers each) • Clears 2 acres per day (two 1-acre areas)
Engineer squad (canine)	• Performs EH search and detection in support of route and area clearance	• Detects metallic and nonmetallic mines (both buried and surface-laid) and other EHs • Conducts minefield extraction, combat patrols, building searches (disruptive and nondisruptive), vehicle searches, and cave clearances • Searches open areas, fields, woods, hedgerows, and embankments • Proofs along roads, tracks, and railways
EHCC	• Establishes and maintains an EH database • Conducts pattern analysis • Investigates mine and IED strikes and UXO hazard areas • Provides technical advice and TTPs on the mitigation of EHs	• Provides EH battle tracking in theater • Establishes, maintains, and shares the EH-tracking database within the JOA • Consolidates and conducts an analysis of requests for modifications to the JOA UXO supplemental list • Provides training updates to field units • Coordinates the employment of EHTs • Coordinates site evaluations and strike incident investigations (four sites simultaneously) or conducts unit training (four sites simultaneously) • Assists ISR planners with EH pattern analysis and intelligence collection management • Provides updated TTP and guidance for clearing operations.
Geospatial engineering team	• Provides terrain analysis and geospatial support to the field	• Performs geospatial pattern analysis for tracking and locating IEDs • Provides geospatial input for the IPB process

Table D-1 Selected units involved in clearing operations (continued)

Unit	*Mission*	*Capabilities/Planning Factors*
Sapper company	● Executes M/CM/S tasks and provides support to general engineering missions in support of BCT operations	● Provides training readiness and oversight of assigned route and area clearance platoons ● Provides C2 for three to five Sapper, assault, obstacle, clearance, or tactical-bridge platoons operating as an engineer team in the execution of M/CM/S missions ● Executes 120 kilometers of hasty route clearance per day ● Executes six dismounted or urban breach lanes ● Executes three mounted breach lanes ● Improves lanes and marking in the BCT AO ● Employs engineer units to emplace LOC bridges ● Receives and analyzes ground or airborne standoff mine detection system data from other units ● Provides 660 man-hours per day for general construction labor tasks
EHT	● Provides evaluation of EH incident sites in support of BCTs ● Conducts TTP training on EH mitigation	● Conducts site evaluation of EH incident sites (CEA, multiple UXO, and postblast analysis) ● Conducts annual recertification, quarterly reinforcement, and predeployment training of EOCA Soldiers ● Provides information for the EH database ● Disposes of limited EHs (EHTs are not equipped to conduct render-safe procedures on EHs)
MAC	● Conducts assault gap crossings and mounted and dismounted breaches ● Emplaces obstacles in support of BCT operations	● Provides training readiness and oversight of assigned route and area clearance platoons ● Provides C2 for three to five assault, obstacle, or Sapper platoons operating as an engineer team in the execution of mobility and countermobility missions ● Enables a BCT to conduct four assault gap crossings ● Enables an IBCT or SBCT to conduct four mounted breaches ● Enables an HBCT to conduct two mounted breaches ● Enables a BCT to conduct four additional dismounted breaches ● Emplaces 4,432 linear meters of fix or disrupt tactical-obstacle frontage without reloading ● Employs two breach platoons to execute route clearance operations
EOCA	● Performs limited battlefield disposal of UXO as outlined in the EOCA identification guide and the JOA UXO supplemental list ● Assists EOD personnel in disposing of other EHs as requested	● Performs detailed reconnaissance of a suspected UXO ● Performs limited identification of the items listed in the EOCA identification guide and the JOA UXO supplemental list ● Marks the UXO area according to the standard UXO marking system ● Provides the blast and fragmentation danger area of identified UXO; may provide the estimated blast and fragmentation danger area for items similar to but not included in the guide or list ● Recommends the on-scene commander of personnel and equipment protective measures ● Recommends and supervises the appropriate protective works to be completed ● Destroys individual UXO by detonation when authorized
Note. The EOCA is not a unit; it is a specialty trained combat engineer Soldier.		

ROUTE CLEARANCE

D-6. In land operations, route clearance is the detection, identification, marking, neutralization, destruction, and removal of EHs and other obstacles along a defined route to allow a military operation to continue with reduced risk (see FM 3-34.210). It is a combined arms operation that is usually preceded by, but can include, a reconnaissance of the route to be cleared. It can be conducted to open a route for the necessary traffic or on a recurring basis to minimize the risk along selected routes. Unlike a combined arms breach, the clearing operation aims to completely eliminate or neutralize mines (or in an ISR role), EHs, or other obstacles along the route. Also unlike a breach, route clearance is typically not conducted under fire. However, a task-organized route clearance team is prepared to employ the fundamentals of SOSRA at any point along the targeted route. While these actions may not be executed during route clearance they are planned. Planning for route clearance operations is performed in the same way as it is for breaching operations. The clearance team must be prepared to execute SOSRA fundamentals as necessary.

PHASES

D-7. The commander determines which routes or route sections must be cleared and establishes priorities for the routes within his AO. The staff analyzes the threat of obstacles, EHs, and ambushes on or along those routes, developing a SITEMP to establish what "normal" looks like along the route. The SITEMP can be used to identify changes or abnormal points on the route. Threat information is based on information gathered from the IPB, engineer running estimate, COP, and reconnaissance effort. Human intelligence (HUMINT) is especially useful for identifying threats along the route. Military police, transportation, and other units that have recently moved along the route of interest may be able to provide valuable intelligence.

D-8. Given the commander's requirement and priorities for routes in the AO and the threat information, the engineer and EOD team chief advises the commander on the recommended composition of the clearance team, method of route clearance, and support requirements. The clearance effort is organized based on the following two phases:

- **Sanitation phase.** Sanitation is the initial clearance of a route where the obstacle threat is undetermined or a confirmed obstacle threat is present. Prior reconnaissance of the route is preferred, but clearance can include reconnaissance if required. The clearance team sweeps and clears the entire route, identifying and neutralizing EHs and obstacles. An improvement element is included as part of the route clearance team to remove rubble, debris, berms, holes, trenches, vegetation, and trash from the medians and shoulders of routes to eliminate the concealment of EHs and to aid in the visual and sensory detection of EHs. The team also analyzes previous route reconnaissance records to identify and record the location of man-made objects (buried pipe, cable) and investigate suspicious areas.
- **Maintenance and sweep phase.** The route clearance team (minus the improvement element) conducts systematic, random detection sweeps of the cleared areas and progresses to deterrence and detection sweeps along the cleared route. It focuses a visual detection sweep on changed conditions and investigates suspected devices remotely with a mine-protected clearance vehicle or other system as required.

D-9. The route is cleared after the sanitation phase is conducted. When there is a sustained IED or other EH threat, the route requires persistent surveillance to ensure that it is appropriate to move to maintenance and sweep operations. Unless the route is secured and under continuous surveillance, each clearance mission must be conducted as if it is the initial clearance. With persistent surveillance and a reasonable level of security maintained along the route, the commander may weigh the risks and order maintenance and sweep clearance.

TEAM COMPOSITION

D-10. Based on the mission, sufficient maneuver and engineer assets must be allocated to the clearance team. Mission variables, route characteristics, and the type of clearance to be conducted determine the team size. Depending on the type of route-clearing operation, the commander can expect a 50 percent loss of sweep assets. Normally, as in breaching, a 50 percent redundancy of engineer assets should be allocated to the team.

D-11. Route clearance teams are generally comprised of—

- **Combat engineers.** Combat engineers (route clearance platoon, Sapper platoon, EHTs, and engineer squad [canine]) provide detection of EHs and neutralization of mines and booby traps. EOCA Soldiers in these units can remotely identify and dispose of (by detonation) those designated UXO for which they are specifically trained and authorized.
- **General engineers.** General engineers typically provide assets for the improvement element during the sanitation phase of route-clearing operations.
- **Ground maneuver element.** These assets provide reconnaissance and intelligence information on routes in the AO and provide security elements to the route clearance team as required.
- **Aviation support.** These assets also provide reconnaissance and intelligence information on routes in the AO and provide security to the route clearance team as required.
- **Medical team.** This team is on hand for rapid response to casualties.
- **EOD teams.** EOD teams provide the technical expertise to render safe and dispose of IEDs and UXO.
- **Special operations.** PSYOP and CA teams provide counterintelligence support.

ELEMENTS

D-12. The route clearance team consists of the following elements (see table D-2, page D-6):

- C2.
- Security.
- Detection and clearing.
- Improvement.

D-13. Figure D-1 shows a sample organization for a route-clearing operation.

Note. The Vehicles depicted in figure D-1 are generic in nature. For specific vehicle information, see FM 3-90.119, appendix E. See FM 3-34.210, chapter 6, for a description of the tools and functions associated with each of the four elements of the organization. The placement of additional combined arms assets are not reflected in figure D-1 and must be integrated according to mission variables.

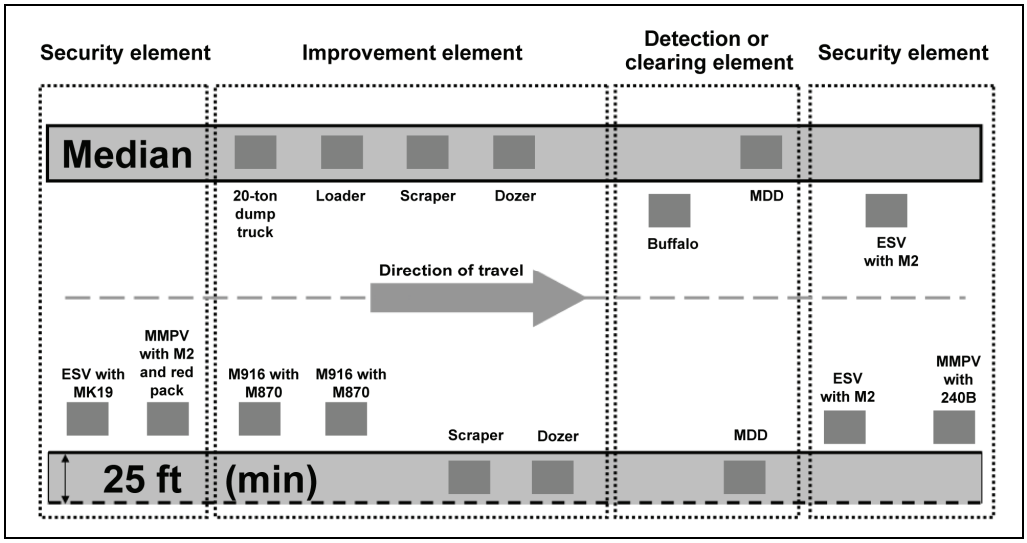


Figure D-1. Sample organization for a route-clearing operation

Table D-2. Elements of a route-clearing team

Element	*Duties*
C2 Element	• Integrates the activities of the security, detection and clearing, and improvement elements • Maintains communication with higher headquarters and the unit responsible for the AO • Travels with the security element
Security • Forward security section • Flank security section • Rear security section	• Provides traffic control, crew-served weapons support, and protection • Observes oncoming traffic for threats, identifies hazards or obstructions in the route, and contains suspect vehicles identified by other elements (forward security section) • Protects the main body from threats on the shoulders or from oncoming traffic, observes vehicles passing through, and provides traffic control within the work area (flank security section) • Observes approaching traffic for threats, provides visual warning to approaching traffic, contains suspect vehicles, and provides limited traffic control (rear security section)
Detection and Clearing	• Scans the medians and shoulders of a route and sweeps them for EHs • Pinpoints the location and remotely investigates a suspected EH • Marks and reports UXO • Secures and reports IEDs • Neutralizes or removes EHs on order (must have EOD support to conduct render-safe operations)
Improvement	• Removes all concealment for EHs from the entire width of the median and from the shoulders of the route to a minimum distance of 25 feet (when terrain allows) • Secures and reports IEDs • Includes two dozers, two scrapers, a bucket loader, and a 20-ton dump truck if possible

RATE OF MARCH

D-14. Based on the equipment available in the improvement element, leaders can expect the rates of march during sanitation operations as shown in table D-3. A typical rate of march during maintenance and sweep operations is 255 kilometers per day for two-way routes. Other factors influence the rate of march, including enemy activity; weather and terrain; type and quantity of EHs encountered; traffic; and length and width, surface composition, and median or shoulder condition of the route.

Table D-3. Typical rate of march during sanitation operations

Vegetation	*Two dozers*	*Two dozers, two scrapers, bucket loader, and 20-ton dump truck*
Light	3 kilometers per day	10 kilometers per day
Moderate	2 kilometers per day	8 kilometers per day
Heavy	1 kilometers per day	4 kilometers per day

METHODS

D-15. The three methods of route clearance are contiguous, combat, and combined. Each poses a certain degree of risk and requires a thorough analysis of mission variables before selecting which method to use.

Contiguous

D-16. In contiguous clearance (figure D-2), the clearance begins at Checkpoint 1 and is completed at Checkpoint 2. This method provides the best assurance of route clearance. Although effective, it is not the most secure method in a high-threat environment. It is also time-intensive and constrains the maneuver commander's flexibility due to the movement of sustainment assets and patrols during route-clearing operations.

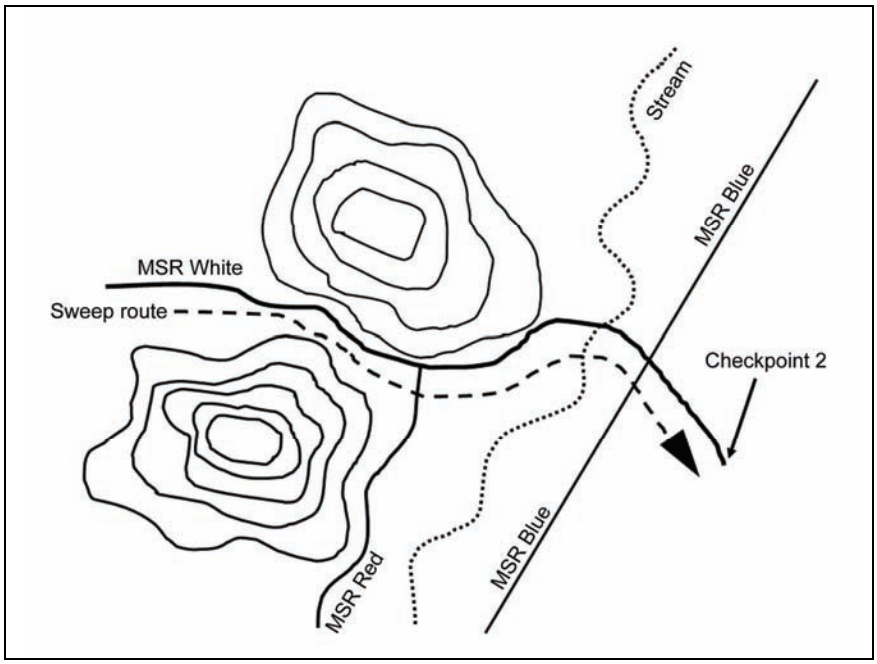


Figure D-2. Sample contiguous clearance method

Combat

D-17. Whereas contiguous clearance focuses on a specific route, combat clearance (figure D-3, page D-8), focuses on specific points along a route. As mentioned previously, the IPB or engineer running estimate can identify likely areas for obstacle and ambush locations. These areas become NAIs or objectives for combat clearance missions. The combat clearance method divides a route into sections according to the number of suspected high-threat areas. Once the clearance team clears these sections, the route is considered clear. Combat forces can patrol the route from these objectives to ensure that the route is secure, and if necessary, a route clearance team can clear an identified section where an EH is suspected. Following the seizure of these objectives, the commander must assume a moderate risk that the S-2 and the ENCOORD have identified all high-threat areas and the route is clear of EHs.

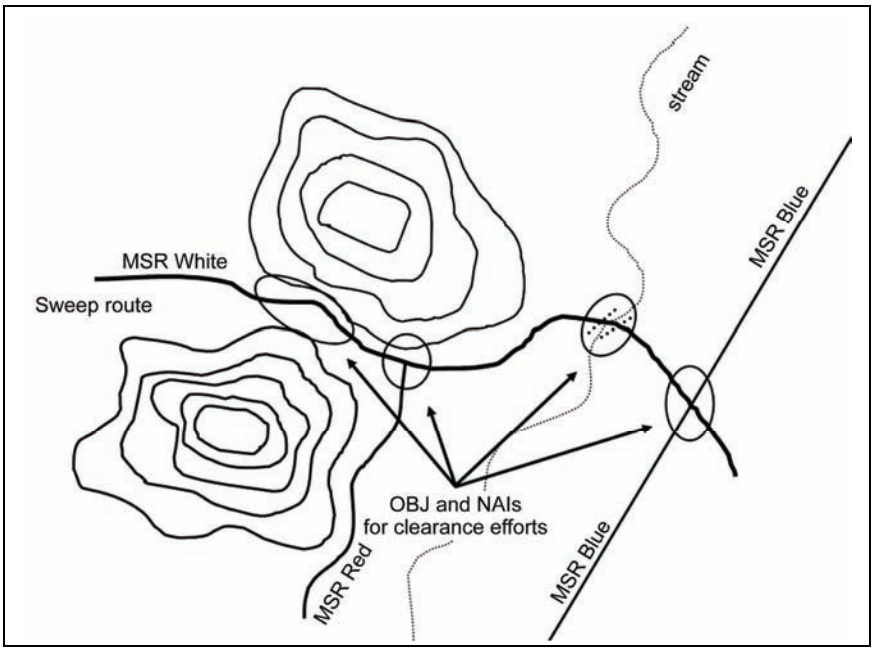


Figure D-3. Sample combat clearance method

Combined

D-18. The combined method combines the capabilities of the contiguous method with the security and surprise elements of the combat method. It is a two-phase, force-intensive operation and may require a larger element, depending on the route length. First, identified high-threat areas are targeted, secured, and cleared of EHs and enemy forces before a route clearance team moves. The team then travels the entire route and clears EHs missed or not identified during the IPB or running estimate. The advantage of this method is that the commander immediately secures the route and ultimately assumes less risk that EHs might be missed.

PLANNING

D-19. Like breaching, route-clearing operations require extensive planning and coordination. Planning considerations for route-clearing operations are shown in table D-4.

Table D-4. Selected planning considerations for route clearance

Consideration	*Descriptions*
Intelligence	● Identifies choke points, bridges, tunnels, critical road junctions, and built-up areas as likely locations for obstacle emplacement
	● Maintains a situation map that reflects the most current intelligence information
	● Maintains an incident map with a graphics overlay to facilitate pattern analysis
	● Determines how the enemy has disrupted LOCs in the past
	● Develops an ISR plan, including— ■ A focus on ISR assets on likely enemy ambush sites ■ Usage of USAF, UAS, and Army aviation assets to provide aerial reconnaissance and surveillance of the route ■ Integration of PSYOP and CA civilian interviews
	● Coordinates with HN organizations, NGOs, and SOFs for additional information on the AO
	● Provides detailed OBSTINTEL, including— ■ Description of EHs most likely encountered ■ Composition and pattern of obstacles ■ Enemy TTPs used during obstacle emplacement
	● Provides current intelligence updates to team leaders prior to departure
Movement and maneuver	● Coordinates for the establishment of TCPs
	● Secures flanks (at least 100 meters) and suspected and known obstacle farside locations
	● Closes the route to traffic during route-clearing operations to minimize the target presented to enemy forces and develops a traffic control plan if unable to close the route
	● Identifies and clears potential sniper positions before beginning obstacle clearance
	● Provides security for the cleared route
	● Plans the building of static security points along the cleared route to reduce recurring threats
	● Reports, clears, and marks obstacles and EHs to facilitate unimpeded movement
	● Ensures that lane marking meets the standards directed by the supported commander and that materials and patterns are standard throughout the route
	● Blocks uncleared roads and trails that branch from the route being cleared to protect units from inadvertently traveling an uncleared route
	● Conducts debriefings to collect information and the location, composition, and orientation of all obstacles cleared and encountered to facilitate pattern analysis
	● Provides detailed OBSTINTEL, including— ■ Description of EHs most likely to be encountered ■ Composition and pattern of obstacles ■ Enemy actions or techniques used during obstacle emplacement
Fires	● Positions mortars to ensure continuous coverage of the operation (one technique is moving under the control of the security force)
	● Plans FS based on the ROE
	● Designates obstacle clearance sites as CFZs and no-fire areas
	● Plans suppression fires on enemy elements capable of placing direct or indirect fires on the points of breach

Table D-4. Selected planning considerations for route clearance (continued)

Consideration	*Descriptions*
Sustainment	● Plans for air and ground evacuation of casualties (the preferred evacuation method is by air, and the routine method is by ground)
	● Conducts an air mission brief with air ambulance assets, including pick up zones and markers
	● Rehearses procedures for evacuation requests
	● Locates the medical team with the security force
	● Ensures that the medical team consists of one or two ambulances
	● Identifies the ambulance exchange point along the route to be cleared
	● Ensures that all vehicles have tow cables in the front and rear and plans recovery assets for extraction purposes
	● Ensures that all vehicles carrying troops have hardening (sandbags on floors and sides)
	● Provides military police working dogs and explosive detection dogs to help in route-clearing operations and provide security for convoys during and after clearing operations
C2	● Designates a controlling, coordinating, and supporting headquarters for route movement
	● Designates, recognizes, and includes EH indicators as part of clearance team rehearsals
	● Designates a reserve force that is mechanized or air assault-capable
	● Ensures that proper rehearsals are planned and conducted. (At a minimum, the team should rehearse actions at the obstacle, actions on enemy contact, casualty evacuation, and controlling civilians)
	● Ensures that the team has a clear understanding of the mission, intent, and end state
	● Ensures that the team— ■ Controls the movement of all personnel and equipment along the route ■ Clears personnel within the minimum safe distance when clearing EHs ■ Prepares a risk assessment as part of mission planning ■ Tracks the status of routes based on the amount of time since the route was cleared and the intelligence and enemy situations ■ Tracks and reports the progress of the clearing operation ■ Determines the route length, using clearly definable start and end points ■ Coordinates with adjacent units and other nonmilitary organizations within the AO
Protection	● Keeps all radios, electronic equipment, and aviation assets at a safe distance during route-clearing operations
	● Considers capabilities and limitations of available equipment (see FM 3-34.2)
	● Controls the distance between vehicles based on METT-TC

DISMOUNTED

D-20. Casualty extractions are situations that demand dismounted route clearance, because time or access is limited or the area has restrictive terrain that must be cleared prior to improvement. Task organization for dismounted route clearance is similar to mounted route clearance, except the improvement element is not included. The time required for the clearance may be greater. The security element must be prepared to assist the detection element in disengaging from enemy contact.

D-21. The detection element consists of Soldiers with mine detectors or other available detection equipment (handheld sniffers, mobile jammers, dogs). The number of mine detector operators required

varies with the width of the route to be cleared and the sweep width of the detector. For example, the sweep width for the AN/PSS-14 mine detector is 1.5 meters. Divide the width of the road to be cleared by 1.5, and round up to determine the number of AN/PSS-14 mine detector operators needed.

Note. The commander may reduce the sweep width to 1 meter to ensure the proper sweep technique and provide the greatest possibility of detecting low metallic hazards.

D-22. The sweep team must ensure redundancy of effort by mine detector operators so that no gaps exist in multiple clearance lanes. The leader should consider mission variables and the individual Soldier's fatigue level and state of mind to determine the maximum amount of time an individual can operate a mine detector. As a rule, 20 to 30 minutes is the maximum amount of time a Soldier can use an AN/PSS-14 or similar mine detector effectively.

D-23. The sophistication of the detector used determines the amount of investigation that needs to be performed to confirm an EH. A dedicated prober using appropriate techniques must investigate each suspect object identified by the mine detector operator. Local policy and procedures determine the type of marking device used. Provide at least 25 meters between Soldiers, spacing can vary depending on mission variables.

AREA CLEARANCE

D-24. In land operations, *area clearance* is the detection, identification, marking, neutralization, destruction, and removal of mines or other explosive ordnance, IEDs, and booby traps in a defined area to allow a military operation to continue with reduced risk. (FM 3-34.210) Clearing of land mine hazards is primarily the responsibility of combat engineer units, and clearing other EHs is primarily the responsibility of EOD units within the Army or EOD elements in other supporting Services.

D-25. Area clearance is not normally conducted under fire or in adverse weather and is only conducted during hours of daylight. Leaders and planners must strive to limit the areas requiring clearance to only those areas necessary to support military operations. When possible, areas not required for military operations and not an immediate threat to friendly forces are permanently marked and avoided.

D-26. Some situations where area clearance could be required include—

- Airfield clearance.
- Equipment retrieval operations.
- Runway construction.
- Logistics or maintenance facility construction.
- Air and seaport recovery.
- FARP operations.
- Personnel extraction.

D-27. Depending on the size of the area being cleared and the duration of the clearance effort, multiple or rotational units may be involved and enter the operation at different phases. To ensure continuity of effort, a controlling headquarters for the area clearance effort is designated and responsible for—

- Specifying the area to be cleared and the depth of clearance in tasking orders.
- Specifying the standards and guidelines for the clearance mission.
- Accrediting a unit ability to conduct clearance operations.
- Maintaining an EH database of cleared and uncleared areas and showing the clearance status for each EH area.
- Establishing and maintaining a system to monitor current clearance activities and posting clearance inspections of cleared areas.

D-28. Area clearance missions consist of the following three phases (see FM 3-34.2 for more information):

- Technical survey, including—
  - Information gathering (detailed technical and topographical information of known or suspected hazardous areas).
  - Reconnaissance (visual or aerial, including the use of imagery).
  - EH survey (defines the area in terms of size, described through measurements and azimuths).
- Clearing, including—
  - Planning (establish safe lanes, access lanes, and clearance boxes or lanes).
  - Site layout (see figure D-4).
  - Recognition (physical detection, verification, and technical-survey update).
  - Clearance (see figure D-5, page D-14 and figure D-6, page D-14).
  - Proofing.
  - Final marking.
- Handover (conducting a walk-through of the area with the occupying unit leaders).

D-29. In the clearance phase, all EHs from a specified area to a specified depth are removed or destroyed. The commander must be confident that cleared areas are safe for use. This requires management systems and clearance procedures that are appropriate, effective, efficient, and safe. These procedures need to have an internal audit mechanism to ensure that the end product is safe. The quality of clearance must be acceptable to the using units and must be measurable and verifiable.

PLANNING

D-30. Before undertaking a new clearance task, plan where to establish safe and access lanes and the location of clearance boxes (if using mine detection dogs) or clearance lanes. Safe lanes are prepared to provide access for personnel and equipment to a box or area. They also provide safe start lines for the clearing operation and may be used for CASEVAC. Safe lanes are 2 meters wide to allow safe passage for personnel and equipment and to allow CASEVAC.

SITE LAYOUT

D-31. A safe clearing operation includes the proper design and layout of a clearance worksite by fencing and marking hazardous areas, controlling the movement of Soldiers and visitors, enforcing safety distances, and providing effective medical support. This requires the clearance unit to develop and maintain appropriate local policies and procedures. (See figure D-4 for a sample layout of a clearance site.)

D-32. A clearance worksite is designed to—

- Provide a clearly visible separation of hazardous areas (blast and fragmentation zones, cleared areas, useable areas, unknown areas in and around the worksite).
- Control the movement of Soldiers and visitors.
- Limit the number of Soldiers and visitors allowed in the blast and fragmentation zones.
- Take all reasonable precautions to exclude Soldiers and visitors from blast and fragmentation zones during the controlled destruction of EHs or provide suitable protection inside buildings, bunkers, or mobile structures.
- Include measures to prevent collateral damage to structures and the environment.

D-33. The effective control of a worksite is achieved by establishing and clearly marking a number of areas for safety and administration. Such areas should be outside the relevant safety distances from all contaminated areas, clearance activity, and explosive storage. The terrain determines the layout of an area clearing operation.

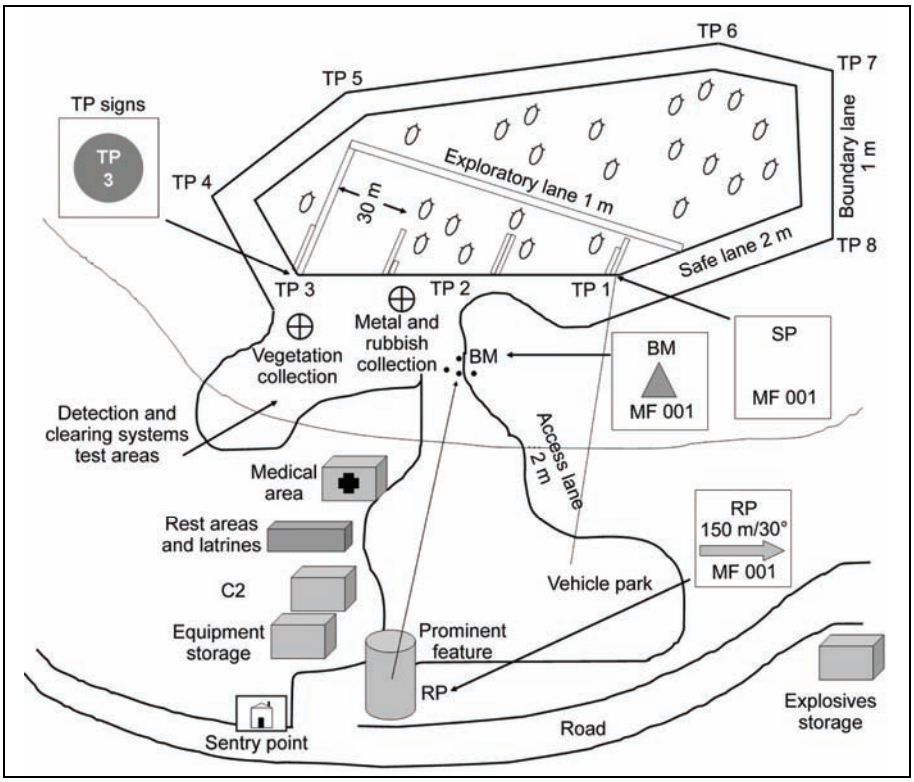


Figure D-4. Sample clearance site layout

METHODS

D-34. The clearance phase is the direct application of an asset to remove a specific threat. Mines are cleared by mechanical mine-clearing systems, demolitions, or incendiary devices. UXO is neutralized by EOD or EOCA using appropriate techniques. Based on the recognition of threat locations, leaders match the best clearing method and equipment to the threat.

Note. The safe execution, highest possible effectiveness, and impacts on proofing methods in future operations need to be considered.

D-35. Clearance procedures vary depending on the type of clearance equipment used. (See figure D-5, page D-14 for a sample clearance technique using a mechanical system. See figure D-6, page D-14, for a sample clearance technique using mine dog handler teams.) Progressive marking is also done during the clearance phase.

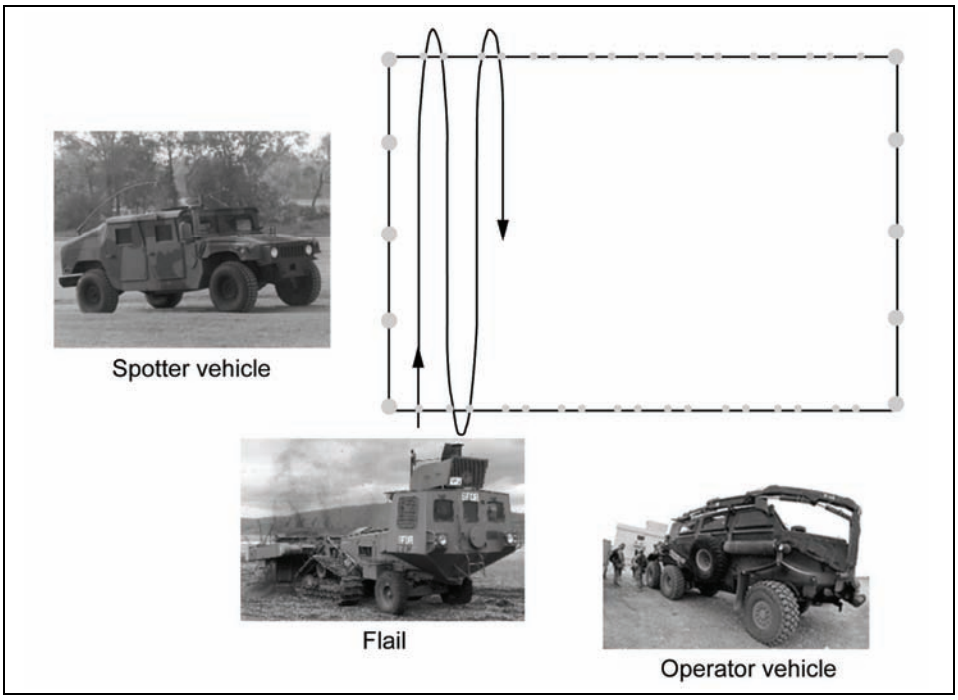


Figure D-5. Sample mechanical clearance method

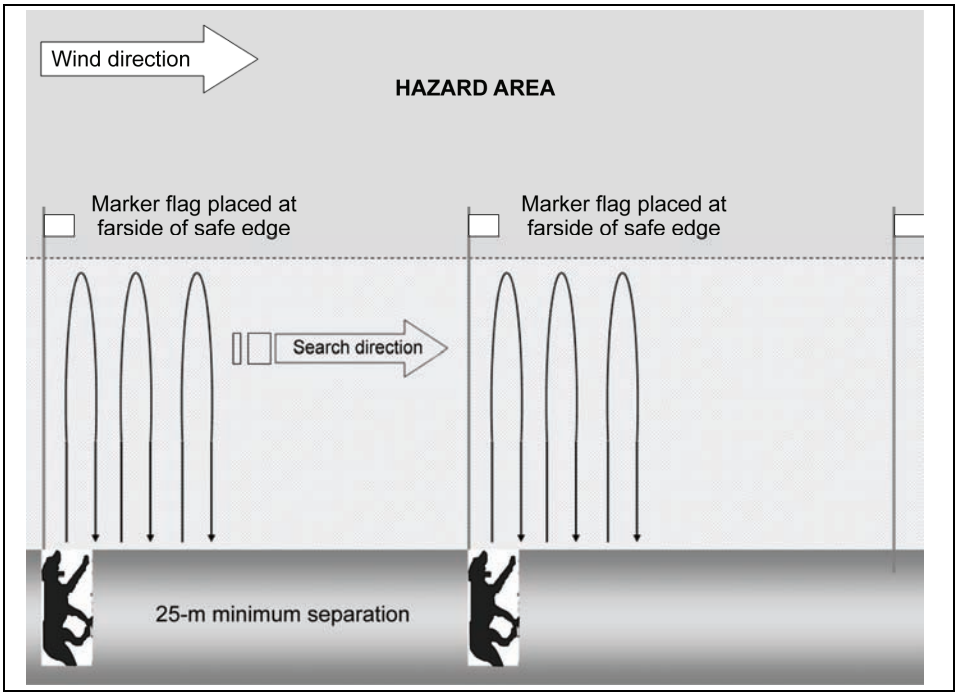


Figure D-6. Sample mine dog handler team clearance method

D-36. The results of a clearing action may have adverse effects to nearby cleared areas. Certain pieces of equipment, like flails, may kick EHs into previously cleared areas, as far as 100 meters from the flail. Proofing must clear this area (usually by Soldier inspection, but at times mine dog detection teams are required) in addition to the specified area. The end state of a clearing phase means that the area is ready for proofing.

PROOFING

D-37. Proofing involves checking the entire cleared area. Using a different type of asset than what was used in the clearing phase should yield a reasonable assurance that the area is clear of all EHs and safe for use. The end state of the proofing phase means that the area is ready for use.

FINAL MARKING

D-38. Permanent marking systems should be used to indicate the outer edge of EH areas that are not cleared immediately and should employ a combination of markers, signs, and physical barriers.

This page intentionally left blank.

Appendix E

Combined Arms Gap-Crossing Operations

The purpose of a gap-crossing operation is to project combat power across a linear obstacle (wet or dry) to accomplish a mission. A gap crossing normally requires special equipment or materials that are limited or nonexistent as organic assets in the BCT. It is incumbent on engineer planners to highlight the need for augmentation of additional assets early in the planning process. Those assets are then task-organized in a manner that best supports the commander's concept of the operation. This appendix serves as a quick reference for leaders planning gap-crossing operations. (See FM 3-90.12 for more detailed information.)

TYPES

E-1. The three types of gap crossings are deliberate, hasty, and covert. Regardless of the type of crossing, the planning requirements and engineer technical support are similar. The following text provides a brief description of each type of crossing. (See table E-1 for a list of gap-crossing fundamentals.)

Table E-1. Gap-crossing fundamentals

Fundamental	***Description***
Surprise	● Mitigates the vulnerability of an exposed force conducting a crossing by— ■ Implementing a deception plan. ■ Enforcing OPSEC measures (camouflage, noise, electromagnetic, and light discipline).
Extensive preparation	● Develops an accurate and complete intelligence picture of the enemy and terrain. ● Plans and initiates deceptive operations early to mask the actual preparation. ● Improves routes and establishes traffic control to handle traffic volume of the crossing operation. ● Conducts full-scale rehearsals.
Flexible planning	● Plans for multiple approach routes from the AA to crossing sites. ● Establishes lateral routes to access alternate crossing sites. ● Retains crossing equipment in reserve to replace losses or create alternative sites. ● Uses multiple crossing means and/or methods.
Traffic control	● Prevents target formation. ● Contributes to flexibility by enabling changes in the sequence, timing, or crossing sites.
Organization	● Enables C2 through terrain management. ● Integrates additional functions within existing C2 nodes. ● Organizes the force into an— ■ Assault force (seize the objective farside). ■ Assured mobility force (provide the crossing means, traffic control, and obscuration). ■ Bridgehead force. ■ Breakout force.

Table E-1. Gap-crossing fundamentals (continued)

Fundamental	*Description*
Speed	● Masses combat power on the farside faster than the enemy. ● Prevents interference with the flow of vehicles once the crossing has started.
Gap size	● Determines unit and asset requirements. ● Defines gap sizes early.
Location and purpose	● Locates gaps and determines the purpose of crossings. ● Determines potential crossing sites and types of crossings.
AAs	● Designs routes from AAs to crossing sites that can support a large volume of traffic. ● Develops routes to allow lateral movement and easy access in and out of staging or waiting areas. ● Considers cover and concealment along routes. ● Considers the impact of sharp curves, narrow roads, and overhead obstructions.
Size/type of crossing units	● Drives the number of crossing sites and the type and amount of required assets. ● Determines the number and type of vehicles (tracked or wheeled) that impact the type of crossing equipment and its emplacement duration.
Deliberate or hasty versus covert	● Determines the type of crossing based on the mission, enemy, significance of the crossing, troops and assets available, need for additional C2, and time available.
Assets required or available	● Assesses capabilities against the following requirements: ■ The BCT requires at least one (normally two for HBCT) MAC for hasty crossings. ■ The MRBC is required for gaps greater than 18 meters. ■ The engineer terrain team analysis of each gap along maneuver routes is critical in determining gap-crossing requirements.
Duration of emplacement	● Considers the different purposes and support capabilities of tactical and support bridging.
Sustainment of crossing equipment	● Performs the necessary maintenance and inspections required for the crossing equipment.

DELIBERATE

E-2. A BCT can do a deliberate crossing; but in most cases, a division or higher organization provides C2 for the crossing because it involves more than one BCT. Deliberate crossings usually involve gaps greater than 20 meters and normally require support bridging. (See figure E-1 for the categories of bridging.) The deliberate gap crossing (wet or dry) is conducted when a hasty crossing is not feasible or has failed.

E-3. A deliberate gap crossing is characterized by—

- A significant contiguous obstacle.
- Strong enemy resistance.
- The necessity to clear entry and exit crossing points of enemy forces.

E-4. A deliberate gap crossing involves—

- Centralized planning and control by the division or BCT.
- Thorough preparations, including the time to perform extensive reconnaissance and rehearsals.
- The massing of forces and crossing equipment.

E-5. The BCT operates as one of the following elements during a deliberate crossing if it is a division operation (see figure E-2, page E-4, for a sample deliberate gap crossing):

- **Assault force.** The assault force seizes the objective farside and eliminates enemy direct fires on the crossing site.
- **Assured mobility force.** This element provides crossing means, traffic control, and obscuration. This force usually consists of maneuver, engineer, military police, and CBRN units.
- **Bridgehead force.** The bridgehead force attacks from an attack position farside to secure the bridgehead, eliminating enemy direct fire and observed indirect fire on the crossing area.
- **Breakout force.** Once the gap crossing is complete and the bridgehead line is secured, a breakout force crosses the gap behind the bridgehead force and attacks out of the bridgehead. This element is not usually part of the unit that conducts the gap crossing.

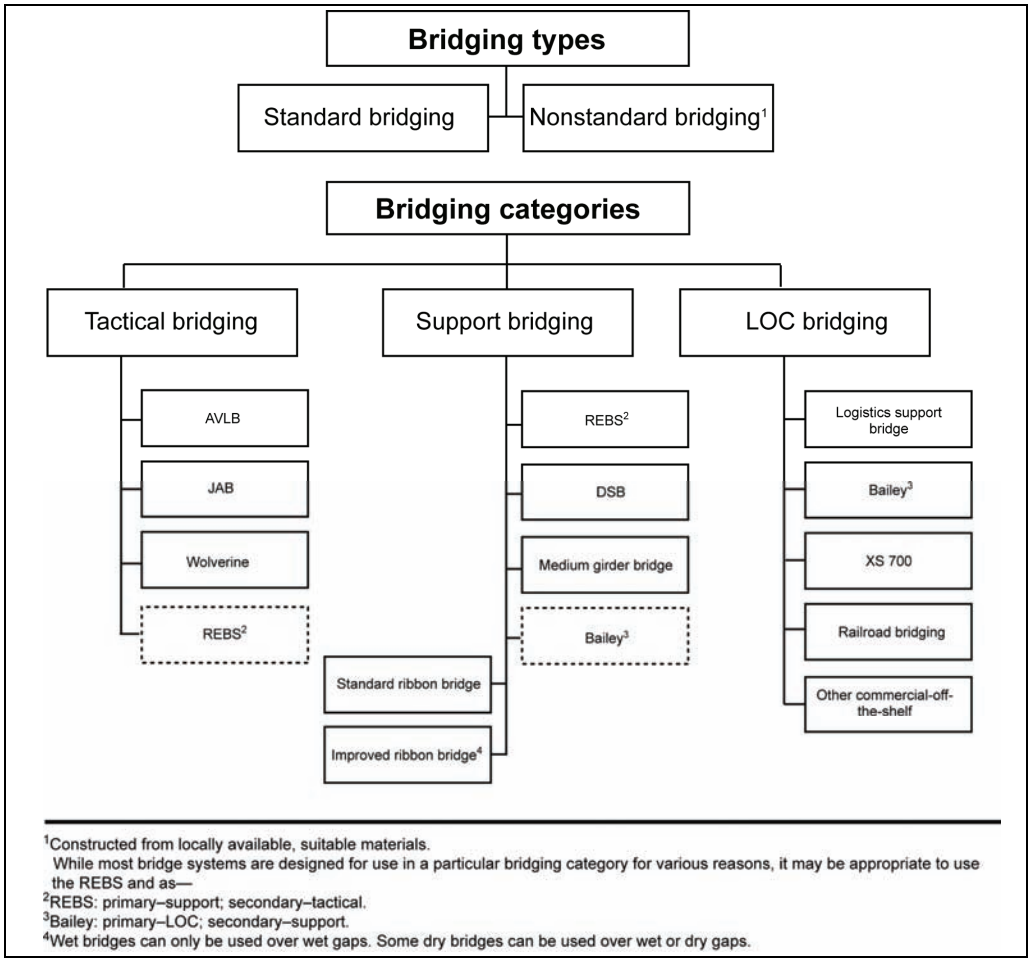


Figure E-1. Type and categories of bridging

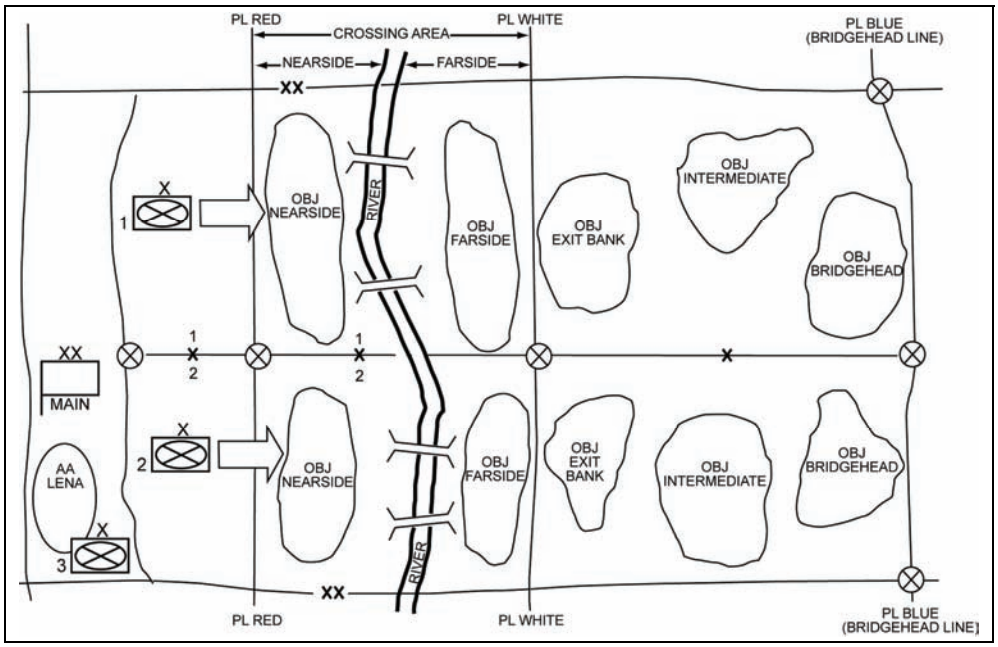


Figure E-2. Sample deliberate gap crossing

HASTY

E-6. A hasty gap crossing (wet or dry) is possible when enemy resistance is weak and the gap is not a severe obstacle. The BCT may seize existing fords or bridges or use organic or expedient crossing means. Hasty gap crossings are typically for, but are not limited to, gaps 20 meters or less in width and can be overcome by self-bridging assets (organic or augmented) within the BCT. They are normally done through tactical bridging (AVLB, joint assault bridge [JAB], Wolverine, or rapidly emplaced bridge system [REBS]). The SBCT has four organic REBSs, each capable of spanning 13 meters and crossing vehicles up to military load classification (MLC) 40 (caution crossing). Neither the HBCT nor IBCT has organic gap-crossing capability, so they require augmentation. Coordination for additional gap-crossing support from the division must be made as early as possible prior to the crossing.

E-7. A hasty gap crossing is preferable to a deliberate crossing because there is no intentional pause to prepare. Planned, organized, and executed much like a hasty breaching operation, the unit must consider the integration of crossing assets in their movement formation, redundancy in crossing means, traffic flow across the gap, and recovery of crossing assets. To accomplish a gap crossing efficiently, bridging assets should be located in a position within the maneuver formation where positive control can be maintained. Because a gap crossing constricts and splits the maneuver force at the crossing site, the plan must be flexible enough for the commander to be able to make execution decisions based on acceptable opportunity and threat variances.

Hasty (Wet)

E-8. The depth and width of the wet gap, bank conditions, and current velocity are major factors in determining the maneuver unit's ability to conduct a hasty (wet) gap crossing. These factors determine if the maneuver force can cross by fording or swimming, if expedient materials can be used, or if specific bridging assets are required. Identifying wet gaps early and deploying the required resources allow hasty crossings of known or anticipated gaps to occur.

Hasty (Dry)

E-9. Typical dry gap obstacles that maneuver forces encounter include AT ditches, craters, dry river beds, partially blown bridges, and similar obstacles. Maneuver forces can use the ACE to push down the sides of ditches or fill in craters. Substantial fill material placed in dry gaps allows the passage of tracked vehicles. The crossing site can be improved and maintained for wheeled traffic use by follow-on forces. The AVLB, Wolverine, JAB, or REBS are also well suited for hasty (dry) gap crossings. As with any hasty crossing, consideration must be given to the need for replacement bridging so that the maneuver unit can maintain its assets for follow-on, gap-crossing requirements.

In-Stride

E-10. An in-stride gap crossing is merely a variation of a hasty gap crossing (wet or dry) with the unique requirement for a company, team, or lower to do the gap crossing in a drill-like fashion. In-stride gap crossings can occur when a given gap is not the same as the unit planned or anticipated. To conduct an in-stride gap crossing, the unit must be well trained, have established SOPs, and be task-organized with the proper assets and capabilities. A battalion is the principal unit to plan, coordinate, and control an in-stride gap crossing, but a company normally conducts the actual crossing.

COVERT

E-11. The covert gap crossing is used to overcome gaps (wet or dry) without being detected by the enemy. It is used when surprise is essential to infiltrate across a gap and when limited visibility and gap conditions present an opportunity to complete the crossing without being seen. The covert gap crossing is normally accomplished by a battalion-size element or smaller (dismounted or in wheeled vehicles), as a BCT is typically too large to maintain the level of stealth necessary to conduct a successful covert gap crossing.

E-12. The primary purpose of a covert gap crossing is to move forces across a gap undetected to infiltrate forces to the farside. It should not be confused with the assault phase of a deliberate gap-crossing operation. While a covert crossing can precede a deliberate or hasty gap crossing by a like-sized or larger element, it is planned and conducted as a separate operation. Common crossing means to facilitate a covert crossing include rope bridges, infantry foot bridges, boats, fording and swimming, or aerial insertion. Whatever means is used, consideration must be given to the recovery of crossing assets. Plans (contingencies) should also be made to deal with the possibility that the covert crossing may be compromised.

PLANNING

E-13. Gap-crossing fundamentals are the same for all gap crossings, but their application varies. Crossing fundamentals must be applied to ensure success when conducting any type of gap crossing (see table E-1, page E-1).

E-14. Gap-crossing considerations are those things that the commander should, as a minimum, consider before making a crossing that involves crossing equipment or procured materials (see table E-2, page E-8).

E-15. Units plan gap-crossing operations in the same fashion as any tactical operation, with one major difference—force allocation against enemy units has an added dimension of time as affected by rate. Friendly forces can only arrive on the battlefield as quickly as which they can be brought across the gap. The rate at which combat forces need to cross directly affects the number of crossing sites.

E-16. Planners perform crossing calculations at least twice—once during initial planning, where simple calculations are used to produce quick buildup information and the second time, after the commander selects a specific COA and planners begin to develop detailed crossing plans. Crossing calculations are critical during COA evaluations to ensure that force buildup supports the COA.

E-17. During mission analysis and after the staff has recognized that a gap-crossing operation is necessary, they conduct an initial IPB by—

- Identifying key terrain affecting the crossing.
- Creating a template of the enemy defense at the gap.

- Estimating the crossing capability of the area using terrain data and available crossing means.
- Calculating force crossing rates for each crossing area using the troop list.
- Reviewing available bridging assets.

E-18. During COA development, the staff—

- Uses the commander's guidance to sketch out several COAs.
- Develops the scheme of maneuver, fire plan, and support plan for each COA, considering crossing capabilities and the order of crossing (see figure E-3).

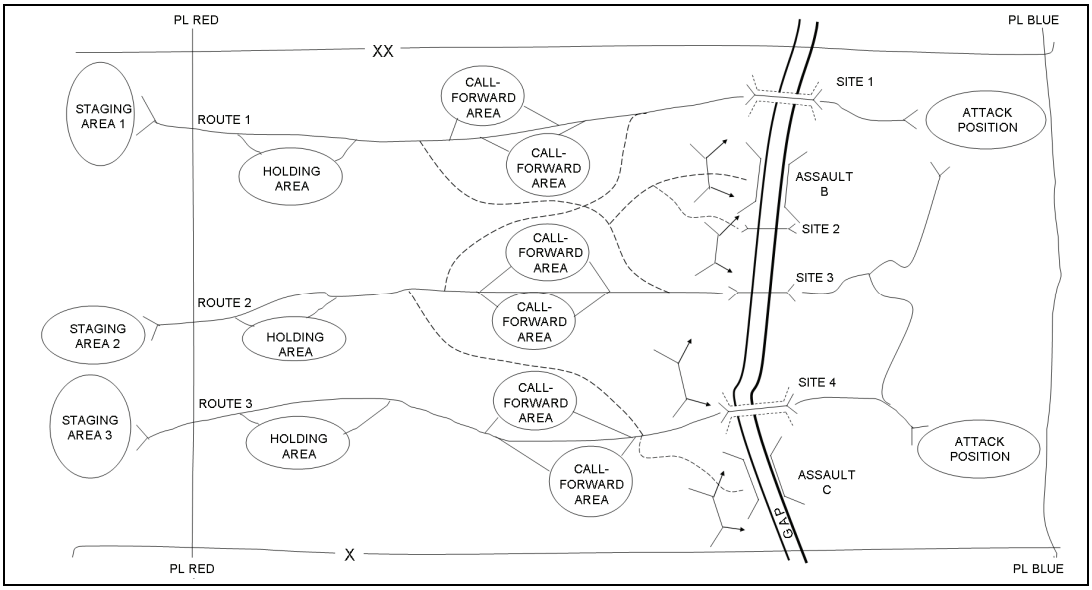


Figure E-3. Sample BCT crossing area overlay for a COA

E-19. The staff performs COA analysis and comparison as for any other tactical operation. Once a COA is selected, the ENCOORD develops a detailed crossing plan to support the operation. (See FM 3-90.12 for detailed information on developing a crossing plan.)

PHASES OF A DELIBERATE GAP CROSSING

E-20. An offensive, deliberate gap crossing operation has five phases. They are distinct phases for planning, but there is no pause between them in execution. (See figure E-4 for an overview of a deliberate gap crossing.) The phases are as follows:

- **Advance to the gap (Phase I).** The first phase is the attack to seize the objective nearside.
- **Assault across the gap (Phase II).** The second phase involves units assaulting across the gap to seize the objective farside, eliminating direct fire into crossing sites (typically, when rafting can begin).
- **Advance from the farside (Phase III).** The third phase is the attack to secure the exit bank and intermediate objectives that eliminate direct and observed indirect fires into the crossing area (typically, when rafting transitions to bridging).
- **Secure the bridgehead line (Phase IV).** The fourth phase of the gap-crossing operation involves units that secure bridgehead objectives to protect the bridgehead against counterattack. This gains additional time and space for the buildup of forces for the attack out of the bridgehead.
- **Continue the attack (Phase V).** The fifth phase is the attack out of the bridgehead to defeat the enemy at a subsequent or final objective. It is considered a phase of gap-crossing operations because the timing and initiation of this phase typically depends on the success of the other four phases.

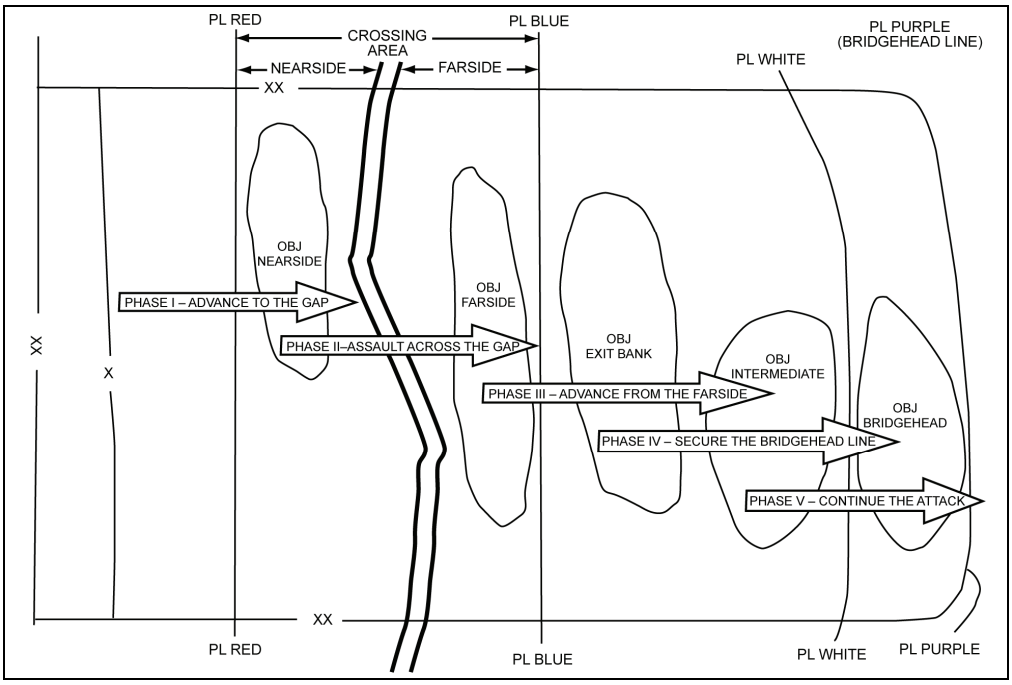


Figure E-4. Overview of a deliberate gap crossing

CONTROL ELEMENTS

E-21. Division and brigade commanders are responsible for crossing their formations. They organize their staffs and subordinate commanders to help them control the crossing. Division and brigade headquarters operate from a command group, main CP, and TAC CP. At the division level, an engineer brigade or an additional MEB is normally designated as the crossing area headquarters for the execution of a deliberate gap crossing. In a deliberate gap-crossing operation, it may be necessary to collocate a center for movement control to assist crossing area headquarters in monitoring traffic and routes between release lines (RLs). Some hasty (dry) gap crossings may not require all of the control elements discussed. (See table E-2, page E-8.)

Table E-2. CP tasks

Phase/CP	*Advance to the River*	*Assault Across the River*	*Advance From the Farside*	*Secure the Bridgehead Line*	*Continue the Attack*
Division main CP	• Coordinates operations to isolate division advance to the gap-crossing site. • Sustains the fight.	• Coordinates operations to isolate the crossing area and the farside objectives. • Sustains the fight.	• Coordinates operations to isolate the exit bank and intermediate objectives. • Sustains the fight.	• Coordinates operations to isolate the bridgehead. • Sustains the fight.	• Coordinates operations to isolate enemy attack against corps objectives. • Sustains the fight.
Division TAC CP	• Advances to the river. • Coordinates division seizure of the objective nearside.	• Assaults across the river. • Coordinates the division dismounted assault of the gap to attack positions on the farside.	• Advances from the farside. • Assists BCTs in the transition to seize and secure the exit bank and the intermediate and bridgehead objectives.	• Secures the bridgehead line. • Coordinates the lead brigade attack to seize and secure bridgehead objectives.	• Continues the attack. • Directs the attack and integrates follow-on BCTs into the attack.
Engineer brigade or MEB (division crossing-area headquarters)	• Coordinates marking, control, and improvement of routes from the staging areas to the crossing sites. • Lays out staging, holding, and call-forward areas. • Establishes ERPs and TCPs.	• Facilitates BCT assault crossings. • Coordinates the preparation of farside exit sites. • Begins rafting operations. (If indirect fire is suppressed, bridging may begin.)	• Coordinates marking, control, and improvement of routes and the establishment of holding areas in the farside crossing area. • Transition to bridging operations. • Continues crossing operations.	• Continues crossing operations.	• Continues crossing operations.
BCT TAC	• Coordinates the lead TF attack to seize and secure objective nearsides.	• Coordinates the dismounted assault crossing to secure farside objectives.	• Coordinates the TF attack to seize and secure the exit bank and intermediate objectives.	• Coordinates the TF attack to seize and secure of bridgehead objectives.	• Prepares to reorganize and follow the breakout force attack out of the bridgehead toward division objectives.

Table E-2. CP tasks (continued)

Phase/CP	*Advance to the River*	*Assault Across the River*	*Advance From the Farside*	*Secure the Bridgehead Line*	*Continue the Attack*
BCT main CP (brigade crossing-area headquarters)	● Moves into the crossing area to provide traffic control, crossing means, and obscuration.	● Coordinates assault crossing means for dismounted TFs and continues the obscuration of crossing sites.	● Controls follow-on TFs passing through the crossing area into attack positions.	● Controls the passage of brigade units into the crossing area and prepares to cross breakout forces.	● Passes crossing-area control to division TAC CP.

DIVISION HEADQUARTERS

E-22. One of the deputy commanding generals (DCGs) is typically designated to provide C2 for the division deliberate gap crossing as the crossing area commander (CAC). His primary function is to control the gap-crossing operation, including synchronizing forces and integrating the warfighting functions as they pertain to the crossing operation. The division TAC CP is normally established to provide C2 for the lead BCT attack across the gap and to subsequent objects. The division main CP prepares the gap-crossing plan and directs operations to isolate the bridgehead from enemy reinforcements and counterattacking formations. The division crossing-area engineer is typically the commander of the engineer brigade or the senior engineer of the MEB that is supporting the division deliberate gap crossing. The division headquarters usually serves as division crossing-area headquarters. Under the direction of the division CAC, the division gap-crossing activities are coordinated within the crossing area.

BRIGADE COMBAT TEAM HEADQUARTERS

E-23. The BCT TAC CP controls the advance to the gap and the attack across the gap. It displaces across the gap as soon as practical after the assault to control the fight for the exit side and the intermediate and bridgehead objectives. The BCT main CP controls the crossing of the remaining BCT. It prepares the BCT crossing plan and provides the staff nucleus to coordinate it. For BCT crossings, the S-4 (assisted by the supporting military police platoon leader, the company commander, or the BCT PM and engineers if available) organize a small, temporary traffic control cell within the BCT main CP to coordinate with the division movement center for movement control. Once the lead battalions assault across the gap and secure the objective farside, the crossing area is activated. The BCT CAC, normally the BCT DCO or XO, controls the movement of forces inside the crossing area. The BCT main CP controls the assured mobility force that normally consists of an engineer battalion headquarters with bridge companies and other engineer capabilities, military police, and perhaps CBRN units that have obscuration capabilities. This leaves the BCT commander free to direct key activities while the DCO runs the crossing. The CAC controls the—

- Movement and positioning of all elements transiting or occupying positions within the crossing area.
- Security elements at crossing sites.
- Assured mobility forces (engineer, military police, and CBRN units) within the crossing area.

E-24. Each forward BCT is normally task-organized for the crossing operation with an engineer battalion headquarters and subordinate elements. The engineer battalion commander is responsible to the BCT CAC for the engineer crossing means and sites and generally functions as the BCT crossing area engineer (CAE). While unlikely, if multiple engineer battalions are required to carry out a BCT deliberate crossing, an engineer brigade would typically provide C2 and the engineer brigade commander would serve as BCT CAE. The CAE informs the CAC of changes due to equipment or operator difficulties or threat variances that render a crossing means inoperable or reduce its capacity. He commands those engineers tasked to move BCT forces across the gap. They remain there as the attack proceeds beyond exit side objectives. Task-organized combat engineers within the maneuver battalions remain under the C2 of those organizations to support their movement and maneuver after the gap crossing.

CROSSING-SITE COMMANDER

E-25. Each crossing site has an engineer, typically a company commander or a platoon leader, who handles the crossing of the units sent to the site. Normally, the crossing-site commander (CSC) is the company commander for the bridge unit operating the site. He commands the engineers operating the crossing means and the engineer regulating points (ERPs) at the call-forward areas for that site. He maintains the site and decides on the immediate action needed to remove broken-down or damaged vehicles that interfere with activities at the site. The CSC is responsible to the CAE and keeps him informed on the status of the site.

UNIT MOVEMENT CONTROL OFFICER

E-26. Each battalion or separate unit commander designates a movement control officer who coordinates unit movement according to the movement control plan. He provides staff planners with detailed information on unit vehicle types and quantities.

CONTROL MECHANISMS

E-27. A major control mechanism category is graphic control measures. The commander uses the following graphic control measures (see figure E-5) to delineate AORs for subordinates and to ease traffic control:

- **RLs.** RLs are used to delineate the crossing area. RLs are located on the farside and the nearside, within 3 to 4 kilometers of the gap, and indicate a change in the headquarters that is controlling movements. Typically, they are graphically identified as PLs and located on easily identifiable terrain when possible.
- **Crossing areas.** Crossing areas are normally brigade-size, controlled-access areas for gap-crossing operations that are designed to decrease traffic congestion at the gap. They normally extend 3 to 4 kilometers on each side of the gap, are METT-TC-dependent, and are defined by BCT boundaries and RLs.

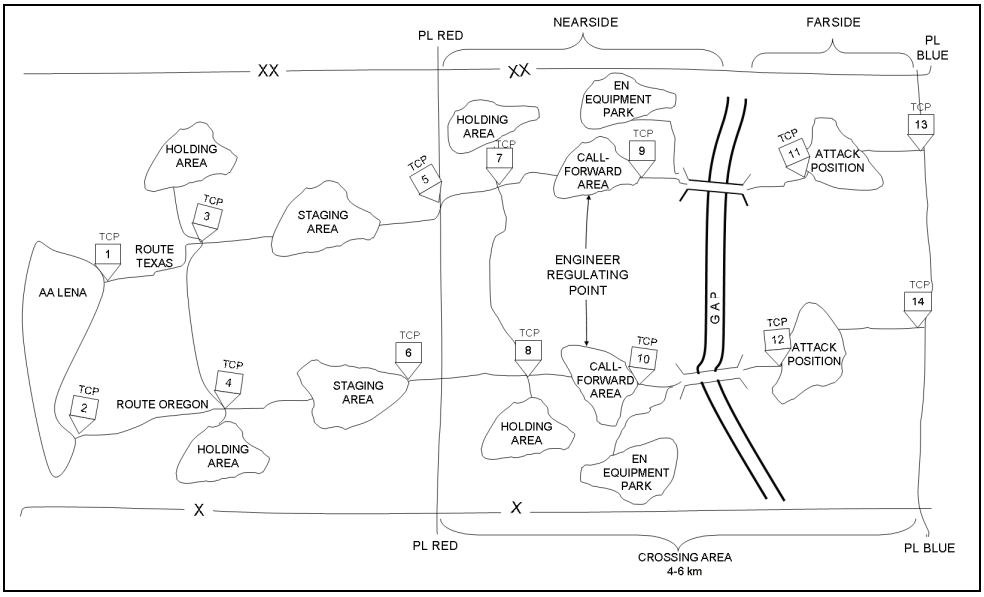


Figure E-5. Graphic control measures

- **Engineer equipment park (EEP).** An EEP is an area near (at least 1 kilometer away) the crossing site that is used to assemble, prepare, and store bridging or crossing equipment and material. EEPs are positioned where they do not interfere with traffic to the crossing sites and where equipment can be dispersed and concealed.
- **ERP.** The ERP is a checkpoint, manned by engineers, that ensures vehicles do not exceed the capacity of the crossing means and provides drivers with final instructions before crossing. ERPs report to the CSC. TCPs are collocated with the ERP to ensure that vehicles clear call-forward areas. As a minimum, each crossing site requires an ERP at its own call-forward area.
- **TCP.** A TCP is a manned post on both sides of the gap that is used to preclude the interruption of traffic flow or movement along designated routes. TCP personnel assist crossing-area headquarters by reporting and regulating the movement of units. TCPs are normally positioned at critical crossroads, road junctions, staging areas, holding areas, and ERPs.
- **Waiting areas.** Waiting areas are located adjacent to routes that are used for concealing vehicles, troops, and equipment while an element is waiting to resume movement. They are located on both sides of the gap, close to crossing areas. Commanders use the following waiting areas:
  - **Staging area.** A staging area is a battalion-size area where forces wait to enter the crossing area.
  - **Call-forward area.** A call-forward area is a company-size waiting area within the crossing area where engineers make final preparations.
  - **Holding area.** A holding area is a battalion-size area outside the crossing area or a company size area within it that is used to disperse units during traffic interruptions.
  - **Attack position.** An attack position is the last position within the bridgehead before leaving the crossing area.
  - **Assault position.** An assault position is the last covered and concealed position where final preparations are made before assaulting the objective.
  - **Assembly area.** An assembly area is an area that a unit occupies to prepare for an operation that offers good road access, cover, and concealment.

This page intentionally left blank.

Appendix F

Engineer Running Estimate

As previously discussed in chapter 2, the running estimate is a logical thought process and extension of the MDMP. RI in the engineer running estimate supports the commander's visualization and decisionmaking. The ENCOORD prepares and refines the running estimate concurrently with the planning process of the supported maneuver force and maintains it continuously throughout planning, preparation, execution, and assessment. This appendix provides more detail on how mission analysis, facts, assumptions, and variables furnish the structure for the running estimate and how the estimate supports the planning, preparation, execution, and assessment of operations. Commanders are rarely briefed on the contents of every staff section running estimate. The ENCOORD only briefs the part of the estimate that applies to the situation and the issue or decision being addressed. During operations, running estimates are usually presented orally, especially during preparation and execution. Written estimates may be prepared to support contingency planning during peacetime. Even then, they are normally prepared only at higher level headquarters. (Written estimates follow the generic format in FM 5-0, figure E-1. See FMs 3-0, 5-0, and 6-0 for more information on the running estimate.)

PLANNING

F-1. Prior to receiving a mission, the engineer staff running estimate consists of the ENCOORD's broad assessment of the OE and SA of engineer capabilities. Once a mission is assigned, the estimate becomes focused on RI to assist the commander in decisionmaking.

Mission analysis (MDMP, Step 2) enables commanders to refine their SU of the OE and determine their mission. Mission variables (see FM 6-0) are considered during mission analysis. From the engineer perspective (see chapter 1), mission analysis equates to seeing the tactical problem and sharing the engineer view of the OE, identifying engineer requirements, and determining what engineer capabilities are required to solve the problem. Once the problem is identified, the balancing of requirements versus capabilities and the integration of engineer capabilities into the concept of the operation become the objectives during COA development and implementation.

F-2. As stated in chapter 2, the running estimate parallels the MDMP. Mission analysis, facts, and assumptions, and variables (METT-TC) furnish the structure for the running estimate. The engineer running estimate is initiated by—

- Analyzing the higher-headquarters order.
- Conducting IPB.
- Analyzing the engineer mission.
- Conducting a risk assessment.

ANALYZE THE HIGHER-HEADQUARTERS ORDER

F-3. The ENCOORD thoroughly analyzes the higher-headquarters order by initially focusing on the engineer annex, which conveys the overall maneuver unit mission, commander's intent, and concept of the operation (two levels up). Analysis includes understanding—

- The current situation (enemy and friendly).
- The maneuver unit mission, commander's intent, and concept of the operation (two levels up).
- The engineer mission, intent, and scheme of engineer operations (two levels up).
- The assigned AO (normally prescribed by boundary lines).
- The estimated time available.
- The missions of adjacent units and their relation to the higher-headquarters plan.
- How engineers (by task and purpose) contribute to the mission, commander's intent, and concept of the operation (two levels up).
- The assets available.

CONDUCT INTELLIGENCE PREPARATION OF THE BATTLEFIELD

F-4. IPB is an integrating process and is critical to the success of planning. IPB is a systematic, continuous process of analyzing the threat and environment, which includes terrain, weather, and civil considerations. The IPB centers on creating a maneuver template of the enemy, anticipating its capabilities, and predicting its intentions based on threat doctrine norms and the order of battle. Defining the OE identifies the characteristics of the environment that influence friendly and threat operations. The engineer must understand the S-2 doctrinal template and SITEMP to analyze enemy engineer capabilities. Engineer reconnaissance (as discussed in chapter 3) may be required to support IPB, and the ENCOORD must be proactive in recognizing these requirements and tasking the appropriate engineer elements. The four steps of the IPB are as follows:

- **Step 1. Define the OE.** This includes identifying characteristics that influence friendly and threat operations. It helps determine the AI and identifies gaps in intelligence. It is also the basis for analyzing terrain, weather, civil considerations, and threat forces.
- **Step 2. Describe environmental effects.** This involves evaluating the effects of all aspects of the environment and includes an examination of terrain, weather, and civil considerations.
- **Step 3. Evaluate the threat.** This is a detailed study of enemy forces and their composition, organization, tactical doctrine, weapons, and equipment, and supporting systems. Threat evaluation determines enemy capabilities and limitations and how they prefer to fight.
- **Step 4. Develop possible enemy COAs.** This involves developing possible enemy COAs, based on analysis of the previous steps.

F-5. IPB is conducted by the entire staff, with each staff member providing input based on their areas of expertise and focus. The ENCOORD focuses on terrain, weather, and civil consideration analysis and enemy mission and M/CM/S capabilities.

Terrain, Weather, and Civil Consideration Analysis

F-6. The ENCOORD analyzes the terrain, weather, and civil considerations and assesses their impact on military and engineer operations. As the terrain-visualization expert, he coordinates for geospatial products from the geospatial engineering team to enhance the commander's visualization of the terrain and enable decisionmaking. The object of terrain analysis is to determine the impact that the terrain and weather have has on mission accomplishment. The engineer supports the S-2 in this process. For tactical operations, terrain is analyzed using the five military aspects of terrain (OAKOC). (See FM 6-0 for a detailed discussion of OAKOC.)

F-7. Existing and reinforcing obstacles are analyzed during the IPB and running estimate processes, but the focus is on existing obstacles. Obstacles define AAs; create cross compartments in AAs; and can turn, fix, block, or disrupt a maneuver. Some examples of obstacles are—

- Natural.
  - Swamps.
  - Dense forests.
  - Deep, steep-sloped ravines.
  - Rivers.

  - Streams.
  - Hills or mountains with excessive slopes.
- Cultural.
  - Urban areas.
  - Quarries.
  - Railroad beds.
  - Built-up or elevated roads.
  - Potential EHs (gas storage sites).

F-8. Reinforcing obstacles are those constructed, emplaced, or detonated to enhance existing obstacles or terrain. Some examples are—

- Minefields.
- Tank ditches.
- Abatis.
- Tank walls.
- Road craters.
- Wire entanglements.

F-9. A weather analysis determines the effect of weather on the mission (see table F-1). Snow, dust, humidity, and temperature extremes have an impact on Soldier efficiency and limit the potential of weapons and equipment. Poor visibility affects the integration of obstacle emplacement with survivability positions in EA development. Inclement weather usually favors an attacker because defenders are less alert; however, it degrades mobility and C2 and weapons are less effective. The attacker can close with the defender more easily in limited visibility conditions.

Table F-1. Weather effects

Weather Condition	*Area/Element Affected*
Temperature	Soldiers, weapons, equipment, and civil disorder
Humidity	Soldiers and equipment
Precipitation	Soldiers, trafficability, and equipment
Visibility	Observation and integration of obstacles and survivability
Light data	Observation and survivability construction rate
High winds (greater than 35 knots)	Damaged materiel and structures; reduced visibility (blowing sand, dust, and battlefield debris), impaired vehicle movement, improved traffic ability (causing soil to dry faster), and temperatures below 40° (makes wind chill a critical consideration)
Cloud cover	Friendly close air support (2,500-foot ceiling), threat close air support (300-foot ceiling), visibility, smoke or chemical-agent employment, and temperature

F-10. Civil considerations comprise the influence of man-made infrastructure, civilian institutions, and attitudes and activities of civilian leaders, populations, and organizations within an AO on the conduct of military operations (see FM 6-0). The ENCOORD analyzes the effects of civil considerations to understand the population (demographics and culture), government, economics, NGOs, history, and other factors. This analysis influences the selection of objectives, movement of forces, and positioning of units for current operations and future plans. Civil considerations comprise six characteristics (ASCOPE). (See FM 6-0 for a detailed discussion of ASCOPE.)

Enemy Mission and Mobility, Countermobility, and Survivability Capabilities

F-11. Threat evaluation and integration are major components of the IPB. Enemy mission and M/CM/S capabilities are subcomponents of the threat evaluation and integration process. The ENCOORD supports the S-2 during the threat evaluation by focusing on enemy engineer capability as it relates to the enemy mission. When executing this component of the running estimate, the ENCOORD must first understand the

anticipated enemy mission (attack or defend) and consider how enemy engineers are doctrinally employed. The ENCOORD then develops an estimate of enemy engineer capabilities. To do this, the ENCOORD uses the S-2 order of battle and knowledge of enemy engineer forces and other assets (combat vehicle reconnaissance effort or self-entrenching capabilities) that may impact engineer operations. The ENCOORD must also consider intelligence pertaining to recent enemy engineer activity or TTP.

F-12. The ENCOORD uses the S-2 SITEMP and enemy capability estimate to plot the enemy engineer effort (obstacle or survivability effort) and its probable location. Coordinating with the S-2, the ENCOORD recommends IR that confirms or denies enemy engineer capability in the SITEMP. A summary of the enemy mission and M/CM/S capabilities are as follows:

- Anticipate enemy engineer operations and their impact on the battle.
- Assess threat patterns and capabilities in an asymmetric environment.
- Consider enemy mission and doctrinal-employment of engineers.
- Estimate enemy engineer capabilities based on the—
  - S-2 order of battle.
  - Threat engineer organizations.
  - Personnel and equipment capabilities.
  - Recent activity or newly developed TTP.

F-13. Based on the S-2 SITEMP, enemy patterns, and enemy engineer doctrine (TTP), the ENCOORD plots enemy—

- Mobility assets and their relative location within enemy formations.
- Mine capability (tactical and protective obstacle effort), mine systems, and firing ranges of artillery-delivered SCATMINEs.
- Engineer reconnaissance assets based on doctrine organization within enemy maneuver units.
- HVTs (bridging assets, breaching assets, SCATMINE delivery systems).

ANALYZE THE ENGINEER MISSION

F-14. Analyze the engineer mission by—

- Identifying specified and implied M/CM/S and general engineering tasks.
- Analyzing friendly mission and M/CM/S capabilities.
- Determining constraints.
- Determining risk, as applied to engineer capabilities.
- Conducting time analysis.
- Developing essential tasks for M/CM/S.

IDENTIFY SPECIFIED AND IMPLIED TASKS

F-15. The ENCOORD identifies specified and implied tasks for M/CM/S, which ultimately results in the development of essential tasks for M/CM/S (discussed previously in chapter 2).

F-16. Specified tasks are specifically assigned to a unit by higher headquarters. They may be found in the base order, annexes (ISR annex), and overlays. For engineers, this could include—

- Obstacle zones.
- Obstacle belts with intents.
- Required number of breach lanes.
- Type of breach designated by the higher commander.

F-17. Implied tasks must be performed to accomplish a specified task or the mission, but are not stated in the higher-headquarters order. For engineers, this could include—

- Obstacle handover coordination during a relief-in-place mission.
- UXO removal or assistance with EOD removal.
- Gap-crossing operation support if the crossing of a river is necessary to accomplish the mission.

Analyze Friendly Mission and Capabilities

F-18. The ENCOORD must understand the friendly mission, commander's intent, and concept of the operation and understand how engineer capabilities contribute to the mission. To estimate the friendly mission and M/CM/S capabilities, the ENCOORD must—

- Consider the friendly mission.
- Evaluate friendly engineer capabilities and their impact on accomplishing the mission.
- Estimate the available engineer assets based on the task organization of—
  - Maneuver forces.
  - Engineer forces.
  - Higher engineer headquarters.
  - Adjacent engineer units.
  - HN or contractor capabilities.
- Consider the availability of critical resources.
- Estimate the total engineer capability based on engineer planning.

F-19. The ENCOORD considers all assets that can provide engineer capability, including task-organized engineer units, nonengineer unit assets have (mine plows), assets under the control of higher engineer headquarters (HN and contracted civilian support), and adjacent units. This understanding facilitates requests for additional resources based on shortfalls identified during mission analysis and COA development.

F-20. Having determined the assets available, the ENCOORD works with the S-3 to determine the estimated time available. The ENCOORD can apply standard planning factors or known unit work rates to determine the total engineer capability. For example, in the offense, the ENCOORD focuses on the total amount of breaching equipment (MICLICs, AVLBs, engineer platoons, and any engineer augmentation) and translates that into the number of breach lanes. In the defense, the ENCOOD determines the number of minefields (or linear effort in kilometers), hull or turret defilade positions, and tank ditches that engineers could construct with available resources. In stability operations, the focus may be on the number of clearing teams that can be created. The ENCOORD uses these capability estimates during COA development.

F-21. The ENCOORD combines the analysis of terrain and weather, and the analysis of the enemy and friendly mission, and M/CM/S capabilities to form facts and assumptions about the—

- Likely enemy engineer effort.
- Most probable enemy COA.
- Potential enemy vulnerabilities.
- Critical friendly requirements.
- Impact of the preceding factors on the mission.

Determine Constraints

F-22. Constraints are restrictions placed on a unit by higher headquarters. They dictate an action or inaction, thus restricting the freedom of action a subordinate commander has for planning. Constraints can take the form of a requirement to do something. For engineers, this could include designated reserve targets, obstacle belts (with intents), and lane requirements. Constraints can also prohibit action, such as stated approval authority for use of SCATMINEs. Obstacle zones and belts are also examples of constraints because they limit the area in which tactical obstacles can be placed.

Determine Risk

F-23. Risk (tactical and accidental) consideration begins during planning, as commanders designate and weigh the decisive operation. To do this, they accept risk elsewhere to mass the combat power needed to accomplish the mission. A commander may specify an acceptable risk to accomplish the mission. For

instance, the priority obstacle effort in a defense may be employed on the most likely enemy AA, while situational obstacles are to be planned on the most dangerous AA as an economy-of-force measure. The ENCOORD must understand how a risk involving an engineer capability specifically impacts combined arms operations and must advise the commander accordingly. One such risk is the decision to employ or not employ ERTs to support the ISR process. (FM 3-90 and FM 6-0 discuss tactical risk.)

Perform Time Analysis

F-24. The ENCOORD must ensure that engineer operations are included in the combined arms time analysis. The time analysis has several steps. The first step is to determine the actual time available. The ENCOORD establishes an assumption of the time available while preparing the friendly capabilities portion of the running estimate and then refines the time analysis. This technique assists the ENCOORD in accurately refining the estimate of time available and adjusting the friendly engineer capability accordingly. A good tool to use in this process is a basic timeline sketch that includes the—

- Supported unit OPORD.
- Engineer unit OPORD.
- Movement times.
- LD or prepare-to-defend times.
- Rehearsals.
- Hours of darkness or limited visibility.

Develop Essential Tasks for Mobility, Countermobility, and Survivability

F-25. As discussed in chapter 2, an essential task for M/CM/S is a specified or implied M/CM/S task that is critical to combined arms mission success. These tasks are identified from the specified and implied tasks. From these tasks, combined with the maneuver commander's guidance, the ENCOORD and other staff representatives recommend essential tasks for M/CM/S to the maneuver commander during the mission analysis brief. At the conclusion of the mission analysis brief, the commander approves those essential tasks for M/CM/S that are considered relevant. (See chapter 2 for essential tasks for M/CM/S.)

CONDUCT RISK ASSESSMENT

F-26. CRM is an integrating process and occurs during all operation activities. CRM is the process of identifying, assessing, and controlling hazards (risks) that arise from operational factors and balancing that risk with mission benefits (see FM 5-19). CRM involves the following steps:

- **Step 1.** Identify hazards.
- **Step 2.** Assess hazards to determine risk.
- **Step 3.** Develop controls and make risk decisions.
- **Step 4.** Implement controls.
- **Step 5.** Supervise and evaluate.

Note. Step 3 is accomplished during COA development, analysis, comparison, and approval. In Step 4, controls are implemented through mission orders, mission briefings, running estimates, and SOPs. Step 5 is conducted continuously throughout the operation.

F-27. Commanders integrate CRM into the MDMP and TLP. During mission analysis, the focus is on performing the first two steps, which are assessment steps. Hazards are identified using METT-TC as a standard format. Hazards can be associated with enemy activity, accident potential, weather or environmental conditions, health, sanitation, behavior, and/or materiel or equipment. Hazards are assessed, and risk is assigned in terms of probability and severity. (See FM 5-19 for detailed information on CRM.)

PREPARATION AND EXECUTION

F-28. Maintaining the running estimate is one of the CP functions that directly contribute to assessing and directing ongoing operations and planning future operations. The construct of the running estimate also provides a framework for organizing and arranging information displays with the CP or cell.

F-29. During preparation and execution, staffs analyze the situation within their fields of interest in terms of mission variables to maintain running estimates. Maintaining a running estimate helps the staff make recommendations (within their areas of expertise) to support the commander's decisionmaking. Staffs also use the running estimate to offering recommendation (for information and assistance only) to other staff elements and subordinate commanders. Staff recommendations may be in writing, but are usually presented orally during preparation and execution. Presentations may be formal or informal and in the form of briefings, written estimates, or staff studies.

F-30. During preparation and execution, the engineer running estimate is updated based on new information that answers the IR established during planning. IR includes all information elements that the commander and staff need to address mission variables and successfully conduct operations. (Table F-2 shows the mission variables of METT-TC and some of the associated IR for each factor.)

Table F-2. IR in relation to METT-TC

Mission Variable	*IR*
Mission	● Status of engineer missions (focused on essential tasks for M/CM/S) ■ Planned ■ Prepared ■ Executed
Enemy	● Enemy disposition ■ Organization ■ Strength ■ Location ● OBSTINTEL ■ ISR results ■ Engineer reconnaissance ■ Mine strikes ● Enemy capabilities (new TTPs) ● Enemy vulnerabilities ● Probable enemy COAs
Terrain and weather	● Updated terrain information to reflect the effects of combat ● Environmental considerations
Troops and support available	● Current task organization ● Engineer combat power ■ Unit readiness (normally two levels down) (personnel strength [critical MOS], maintenance status, and supply status) ■ M/CM/S capabilities ● Supplies and support available ■ Joint, multinational, and interagency forces ■ DOD or DOS civilians ■ Contractors

Table F-2. IR in relation to METT-TC

Mission Variable	*IR*
Time available	● Information related to how much time is available to plan, prepare, and execute operations
Civil considerations	● Influences and immediate impacts on engineer operations in the AO ■ Areas (district boundaries, economic centers, religious or tribal enclaves) ■ Structures (bridges, dams, power plants, cultural sites) ■ Capabilities (status of essential services, HN resources, and services that can support military operations) ■ Organizations (nonmilitary groups or institutions that can influence the population) ■ People (attitudes and activities of civil leaders and populations) ■ Events (holidays, elections, natural or man-made disasters)

F-31. During preparation, running estimates continue to track resource status. Priority for assessment is on answering PIR, FFIR, priority civil information requirements and, especially, CCIR that fall within the engineer area of expertise.

F-32. During execution, running estimates focus on identifying variances, assessing their effect on achieving the end state, and recommending corrective actions to keep the operation within the commander's intent. Assessments also address the supportability of sequels and future operations.

Appendix G

Orders and Annexes

Plans and orders are critical components to mission command. They foster mission command by clearly conveying the commander's intent, assigning tasks and purposes to subordinates, and providing the minimum coordinating measures necessary to synchronize the operation. Plans and orders encourage initiative by providing the "what" and "why" of a mission and leave the "how to" to subordinates. To maintain clarity and simplicity, plans and orders include annexes only when necessary and if they pertain to the entire command. Annexes contain the details of support and synchronization necessary to accomplish the mission. Because of their design and purpose, annexes are not suitable as a supporting unit OPORD. This appendix provides the format and a brief explanation for producing the engineer annex and engineer unit orders. (See FM 5-0 for more information on planning and orders.)

ENGINEER ANNEX

G-1. The engineer annex contains information that is not included in the base order but is critical to the engineer plan or required for subordinate engineer planning. It does not include instructions or orders directly for engineer units, but covers critical aspects of the entire engineer plan. The engineer annex is not a replacement for engineer unit orders. For example, it does not give subunit orders and service support instructions. The engineer annex should meet the following general criteria:

- Includes critical information derived from the running estimate process.
- Contains all critical information and tasks not covered elsewhere in the order.
- Does **not** contain items covered in SOPs unless the mission requires a change to the SOP (unless required to inform augmenting units).
- Avoids qualified directives.
- Provides information that is clear, complete, brief, and timely.
- Includes only information and instructions that have been fully coordinated in other parts of the plan or order.

G-2. The engineer annex includes any combination of written instructions, matrices, or overlays to convey the necessary details of the engineer plan. The engineer annex shown in figure G-1, page G-2, is oriented toward combat operations, but the format remains applicable for stability and civil support operations though the actual content may differ.

G-3. Matrices may be used as part of the body of the engineer annex or as separate appendixes. Matrices are used to quickly convey or summarize information that does not need explanation, such as logistics allocations, obstacle zone priorities and restrictions, or task summaries (execution matrix). The use and format of matrices should be explained in unit SOPs so that nonorganic units have a quick point of reference for adapting to supported or augmented unit procedures. Overlays are used to give information or instructions and expedite integration into the overall combined arms plan. Figure G-2, page G-4, provides a sample matrix and overlay. At the tactical level, information included on overlays may include, but is not limited to—

- All existing and proposed friendly obstacles and control measures (obstacle zones, restrictions, and lanes; directed or reserve targets; situational obstacles with the associated NAI or TAI; and decision points).
- Known and plotted enemy obstacles (must also be on the SITEMP).

- Sustainment locations and routes, as they apply to engineer operations.
- CBRN-contaminated areas.
- Areas affected by environmental considerations.

[Classification]
(Place the required classification at the top and bottom of every page of the annex.)

Copy ___ of ___ copies
Issuing headquarters
Place of issue
Date-time group of signature
Message reference number

ANNEX F (ENGINEER) TO OPERATION ORDER NO_____.

1. **SITUATION.**
   a. **Enemy forces.** Include a detailed description of enemy engineer units and assets and known obstacles. Refer to Annex B (Intelligence) as required.
   b. **Friendly forces.** State the higher-headquarters concept of engineer support and provide the adjacent unit concept of engineer support.
   c. **Environment.**
      (1) **Terrain.** Describe how the terrain affects engineer operations.
      (2) **Weather.** Describe how the weather affects engineer operations.
      (3) **Civil considerations.** Describe the impacts of civil considerations on engineer operations.
   d. **Attachments and detachments.** List all attached and detached M/CM/S assets to clarify task organization. Highlight changes in engineer task organization occurring during operations and the effective times or events.
2. **MISSION.** State the engineering mission in support of the operation.
3. **EXECUTION.**
   a. **Scheme of engineer operations.** Same scheme as in the base order.
      - Provide a narrative of M/CM/S, general engineering, and geospatial engineering tasks required to enable success of the supported scheme of maneuver.
      - List the essential tasks for M/CM/S (include task and purpose for each) and explain how each supports the scheme of maneuver.
      - Ensure that the scheme of engineer operations corresponds to the maneuver unit concept of operations, which provides the foundation and structure for engineer operations. If the operation is phased, the scheme of engineer operations is also phased using the same phases. If the operation is not phased, use the same format as the supported unit concept of operation.
      - Address required areas under each phase in order of priority by phase. If there is no support provided in an area during a phase, do not mention that area. The engineer effort addressed under each phase applies to the supported unit during that phase, regardless of when the effort is completed. For example, engineers emplace obstacles during the preparation phase of the defense, though the obstacle intent is mentioned during the execution phase.
        - **General comments.** Provide a brief, one sentence comment that broadly describes engineer support for the phase.
        - **Mobility.** Explain each mobility task (breaching, reducing obstacles, marking lanes, providing guides, maintaining a route), relative location (route, objective), priority of reduction asset used (use plows first, then MICLICs), and that maneuver unit being supported.
        - **Countermobility.** Identify each obstacle belt, group, or individual in order of priority, intent (target, relative location, and effect), maneuver unit responsible, and indirect fires allocated. Provide execution criteria for reserve targets and situational obstacles.
        - **Survivability.** Identify each survivability task, its relative location (BP, EA), and the unit it supports. This includes smoke operations when used for survivability purposes; for example, obscuration during breaching.

Figure G-1. Engineer annex

- **General engineering.** Identify each general engineering task, its location, its priority, the unit it supports, or how it supports the operation.
- **Geospatial engineering.** Identify specific geospatial engineering tasks, their purpose, and the priorities of support as appropriate.

b. Tasks to subordinate units. List engineer tasks not included in the base order to be accomplished by a specific subordinate unit. Provide the task and purpose for specific engineer assets that are task-organized to a subordinate unit, as necessary to ensure unity of effort. Tasks in the annex should be subtasks or supporting tasks to those assigned in the base order and listed as necessary to clarify or ensure the unity of effort. All essential tasks for M/CM/S must be captured in the base order.

c. Coordinating instructions. Include—

- Critical engineer instructions common to two or more maneuver units not already covered in the base OPORD.
- SOP information if needed for emphasis.
- Times or events in which obstacle control measures become effective if they differ from the effective time of the order.
- Engineer-related PIR that must be considered or reported by subordinate engineer elements.
- Obstacle restrictions.
- Mission reports needed to support the operation if not covered in the signal paragraph or unit SOP.
- Explanation of engineer work lines if used.
- References to countermobility and survivability timelines, as necessary.
- Lane marking if not covered in the supported unit SOP.
- Relevant environmental considerations.

4. SERVICE SUPPORT.

a. Command-regulated classes of supply.

- Highlight subunit allocations of command-regulated classes of supply that impact on the CSR.
- May summarize in a matrix or table.

b. Supply distribution plan.

- State the method of supply (supply point, tailgate, or service station) to be used for Class IV and V (obstacle) supplies for each subunit.
- Give tentative locations for Class IV and V supply points or locations for linkup of corps push packages directly to units.
- Give the allocation of Class IV and V supplies by group.
- May summarize in a matrix or table.

c. Transportation. List the allocation and priority of support for the supported unit haul or airlift assets dedicated to moving Class IV and V supplies and any requirements for subordinate units to supplement the transportation of mission loads.

d. HSS. Address the concept of support for engineer elements operating within the AO, especially those under higher-headquarters control providing DS and GS to the supported unit.

e. Host nation.

- Type and location of HN engineer facilities, assets, and support.
- Procedures for requesting and acquiring HN engineer support.
- Limitations or restrictions on HN support (HN personnel not authorized forward of a specific PL).

5. COMMAND AND SIGNAL.

a. Command. Designate the headquarters that controls engineer effort within work lines on an area basis. Clearly identify the release authority for special munitions and mines. State the location of key engineer leaders by phase.

Figure G-1. Engineer annex (continued)

b. Signal.

- Identify communication networks monitored by the ENCOORD and engineer unit CPs if different than the SOP.
- Identify engineer reporting requirements if not covered in the SOP.
- List task organization linkup times, places and signals.

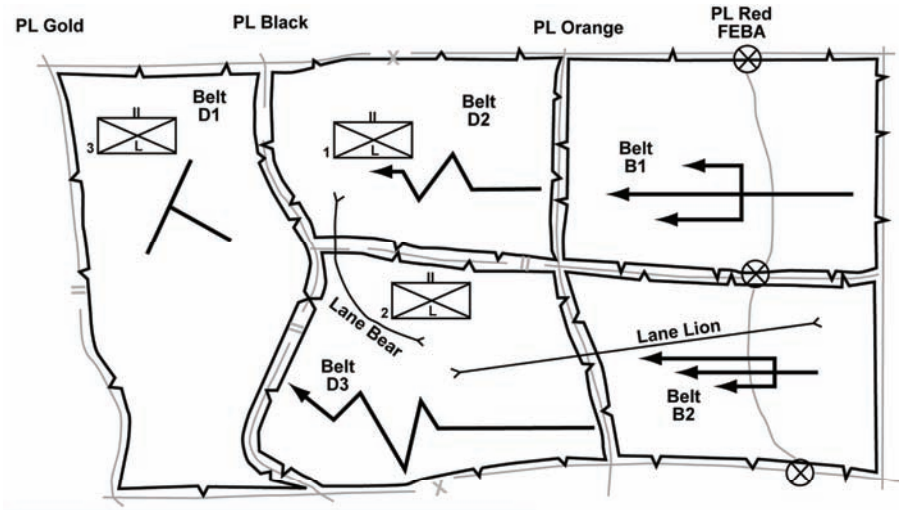
ACKNOWLEDGE: (if distributed separately from the base order)
[Authenticator's last name]
[Authenticator's rank]

APPENDIXES:
1. Engineer overlay.
2. Environmental considerations.
3. GI&S.
4. Mobility execution matrix and timeline.
5. Countermobility execution matrix and timeline.
6. Survivability execution matrix and timeline.
7. General engineering integration.

DISTRIBUTION: (if distributed separately from the base order)

[Classification]
(Place the required classification at the top and bottom of every page of the annex.)

Figure G-1. Engineer annex (continued)



Unit	Belt	Priority	Restrictions
1st Bn	B1 D2	5 2	Surface-laid mines only on/around Lane Bear
2d Bn	D2 D3	4 1	Surface-laid mines only on/around Lanes Bear Lion
3d Bn	D1	3	

Figure G-2. Sample matrix and overlay

ENGINEER UNIT ORDERS

G-4. The engineer commander uses a unit order to exercise control over subordinate engineer units. At the outset of an operation, the commander uses the order to—

- Affect the necessary task organization of engineers into the gaining or supported unit.
- Assign initial missions.
- Establish integration with the gaining unit sustainment structure.

G-5. Once task organization is effective (during operations), the engineer commander directs subsequent orders only to those engineer units under his command. Orders, missions, and instructions to engineer units in a command relationship to maneuver units are included in gaining unit orders.

WARNING ORDER

G-6. A WARNORD helps subordinate commanders and staffs initiate planning and prepare for an upcoming operation. The engineer commander issues WARNORDs to all supporting engineer units to facilitate parallel planning. WARNORDs do not authorize execution unless specifically stated. There are three prescribed WARNORDs produced during the MDMP, but only one when using TLP (see FM 5-0, chapter 4, for information on TLP). The number of WARNORDs is not fixed. As more information becomes available, leaders can and should issue additional WARNORDs. (The WARNORD format is shown in FM 5-0, appendix G.) (See FM 5-0, chapter 4, for the recommended information provided in an initial WARNORD issued below battalion level.) The minimum amount of information for each WARNORD is described below:

- **WARNORD 1.** WARNORD 1 is issued during Step 1 of the MDMP or Step 2 of TLP. WARNORD 1 includes—
  - Type of operation and general location.
  - Initial operational timeline.
  - Movements to initiate, especially for engineer heavy equipment or assets (bridging assets or construction materials) that travel slowly or must be moved long distances.
  - Collaborative planning sessions directed by the commander, which could entail planning with another engineer headquarters supporting an adjacent unit or operating at a higher echelon.
  - Initial IR or CCIR.
  - ISR tasks that could involve engineer reconnaissance.
- **WARNORD 2.** WARNORD 2 is issued at the conclusion of Step 2 of the MDMP. WARNORD 2 includes—
  - Approved unit mission statement.
  - Commander's intent.
  - Task organization changes, attachments, and detachments.
  - AO description (sketch, overlay).
  - CCIR and essential elements of friendly information (EEFI).
  - Risk guidance.
  - Surveillance and reconnaissance instructions.
  - Initial movement instructions.
  - Security measures.
  - Military deception guidance.
  - Mobility and countermobility guidance.
  - Specific priorities.
  - Updated operational timeline.
  - Guidance on collaborative events and rehearsals.

- **WARNORD 3.** WARNORD 3 is issued during Step 6 of the MDMP. WARNORD 3 includes—
  - Mission.
  - Commander's intent.
  - Updated CCIR and EEFI.
  - Concept of operations.
  - AO description (sketch, overlay).
  - Principal tasks assigned to subordinate units.
  - Preparation and rehearsal instructions not included in the SOP.
  - Final timeline for operations.

OPERATION ORDER

G-7. The engineer commander issues an OPORD to all subordinate engineer units. The engineer unit OPORD is shown in figure G-3. Figure G-4, page G-10, shows an engineer execution matrix. When the order is an OPLAN instead of an OPORD, the assumptions are included at the end of the situation paragraph.

FRAGMENTARY ORDER

G-8. The engineer commander frequently needs to modify the engineer unit OPORD to direct changes in engineer operations and allow subordinate units to take advantage of tactical opportunities. The engineer commander can do this by issuing a FRAGO, but only to engineer units under his command. Changes in instructions to engineers supporting maneuver units in command relationships are conveyed through input into the gaining unit FRAGO. The key to issuing a FRAGO is to maximize the use of the current OPORD by specifying only information and instructions that have changed. FRAGOs include all five OPORD paragraph headings (see FM 5-0, appendix G, for FRAGO format). After each heading, provide the new information or state "no change." The engineer commander may be afforded the opportunity to issue FRAGOs to subordinate leaders face to face. If not, FRAGOs are normally issued over the radio or in digital systems. The engineer company XO or 1SG may issue the FRAGO in person to subordinates to ensure that direct coordination is made and that graphics are distributed to platoon leaders. A FRAGO usually provides—

- Changes to unit task organizations.
- Changes in the current enemy and friendly situations, which usually gives the reason for the FRAGO.
- Changes to the scheme of engineer operations and corresponding changes to subunit tasks and changes in the commander's intent.

[Classification]

(Place the required classification at the top and bottom of every page of the OPORD.)

Copy___ of ___ copies
Issuing engineer headquarters
(Place [coordinates] country)
(Date-time group)
(Message reference number)

OPERATION ORDER (number) (code name if used)
References: Maps and other references required
Time zone used throughout the order
Task organization:

- Shown by phase.
- Include all engineer headquarters of units under supported unit control.
- List companies and special platoons task-organized to headquarters.
- Can list special equipment to clarify tasks to subordinate units.
- Indicate command and support relationships as appropriate.

1. SITUATION.

a. Enemy forces. Include—

- Macro picture of enemy forces facing the supported maneuver unit.
- Current disposition of enemy forces, including the location of major enemy units (known and plotted), strength, designation (if known), composition, and current activities.
- Enemy engineer activities and capabilities.
- Most probable enemy COA.

b. Friendly forces.

(1) Higher. Include—

- Maneuver unit mission and commander's intent (one and two levels up).
- Supported unit concept of the operation (at a minimum, the scheme of maneuver).
- Engineer mission, commander's intent, and scheme of engineer operations (one and two levels up).

(**2) Adjacent units.** Highlight missions of adjacent maneuver and engineer units that could impact operations.

c. Environment.

(1) Terrain. Describe how the terrain affects operations.
(2) Weather. Describe how the weather affects operations.
(3) Civil considerations. Describe the impact of civil considerations on operations.

d. Attachments and detachments.

- List attachments and detachments of organic and augmenting engineer assets, as necessary, to clarify task organization.
- Highlight changes in the task organization occurring during operations (by phase if applicable), along with effective times or events that trigger the change.

2. MISSION. This is the engineer unit mission statement and contains the elements who, what, when, where, and why.

3. EXECUTION.

a. Intent. The engineer commander's intent for the operation must be easy to remember and clearly understood two echelons down. Typically, it is three to five sentences long.

- Describe what constitutes success for the engineers in supporting the maneuver unit mission (linked to maneuver unit decisive operation). Includes the purpose of engineer operations and the conditions that define the end state.

Figure G-3. Engineer unit OPORD

- Provide subordinate leaders with the linkage between the engineer mission, scheme of engineer operations, and tasks to subordinate engineer units.
- Do not describe the scheme of engineer operations or subunit tasks.

b. Scheme of engineer operations.

- Write a clear, concise narrative of the engineer plan from the beginning to the end. Use the same phases of the supported maneuver unit's concept of operation (if the operation is phased) to organize the narrative.
- Focus on the essential tasks for M/CM/S.
- Do not entail a summary of all engineer tasks.
- Clearly identify the priority of effort and priority of support for each phase of the supported unit concept of operation.

(1) Obstacles.

- Supplement the narrative above, focusing specifically on the intent of the countermobility effort.
- Identify obstacle belts and groups used to support maneuver unit operations throughout the depth of the AO.
- Assign belt and group responsibilities, priorities, and restrictions to subordinate engineer units.
- Reference an obstacle matrix if used.
- Identify and assign responsibilities for directed and reserve obstacles.

(2) Situational obstacles.

- Describe the concept for the employment of situational obstacles, focusing on how they will be used to complement or augment conventional, tactical obstacle efforts.
- Provide details on NAIs, TAIs, decision points, and execution criteria or reference an obstacle matrix if used.
- Clearly state the headquarters maintaining the authority to use SCATMINEs and any restrictions on duration (by belt).

c. Tasks to subordinate units.

- State the missions or tasks assigned to each unit that reports directly to the headquarters issuing the order. Tactical tasks include a purpose that links it to the supported unit concept of operation.
- Use a separate subparagraph for each unit. Tasks are generally listed in the order they are executed during the operation.
- Clearly distinguish "be prepared" and "on order" tasks from normal tasks.

d. Coordinating instructions. Include tasks and instructions that are common to two or more subordinate units and not covered in unit SOPs, including—

- Time or condition when a plan or an order becomes effective.
- CCIR.
- Risk reduction control measures. These are measures unique to this operation. They are not included in unit SOPs and may include mission-oriented protective posture, vehicle recognition signals, and fratricide prevention measures.
- Rules of engagement (refer to an annex if required).
- Environmental considerations.
- Additional coordinating instructions, such as—
  - Pertinent coordinating instructions listed in the supported unit order.
  - Reporting requirements common to two or more units if not covered in the "signal" paragraph.
  - Authorization for direct coordination between subordinate or adjacent engineer-specific tasks.

Figure G-3. Engineer unit OPORD (continued)

4. SERVICE SUPPORT.

a. Support concept.

- Provide subordinates with the general concept of logistics support.
- Identify, in general, primary and backup (emergency) means of subordinate unit sustainment. Must address who (platoons and sections), how (area support, unit support, supply point distribution, and unit distribution), where (FSC/BSB), and what (classes of supply and critical services).
- Ensure consistency with task organization and command and support relationships.
- Make maximum reference to maneuver or support unit sustainment graphics.
- List the locations of key sustainment nodes as they apply to the concept for logistics support (FSCs/BSBs, combat and field trains, BSA, ASPs, ATPs) and planned subsequent locations if they change during the operation.

b. Materiel and services.

(1) Supply.

- List the allocation and CSR for each unit based on missions.
- List basic loads to be maintained by the unit.
- List the method of obtaining supplies if different from the general concept (mission logistics may be different than unit [scheduled] logistics).
- Address any special arrangements or plans to sustain specific mission needs (Class III, IV, or V supply push packages to sustain engineer operations).

(2) Transportation.

- List primary, alternate, designated, and contaminated MSRs.
- State allocations of haul assets.

(3) Services. List the location and means of requesting and obtaining each service.

c. HSS. Indicate the primary and backup means of CASEVAC or MEDEVAC, including locations of MTFs providing support of an area or a unit.

d. Personnel support.

- Identify the method of handling EPWs and the locations of EPW collection points.
- Identify the method of receiving mail, religious services, and graves registration.

e. Civil-military cooperation. Identify engineer supplies, services, or equipment provided by HN or civilian contractors.

5. COMMAND AND SIGNAL.

a. Command.

- List the location of supported unit and engineer company key leaders and CPs during the operation and planned movements.
- Designate the logical chain of command.

b. Signal.

- Identify communications peculiarities for the operation not covered in the SOP.
- Identify critical reporting requirements of subordinates if they are not covered in the coordinating instructions or SOP.
- Designate nets for mission and routine reports.

ACKNOWLEDGE:

(Commander's signature [optional])

(Commander's last name)

(Commander's Rank)

OFFICIAL:

[Authentication]

Figure G-3. Engineer unit OPORD (continued)

ANNEXES: See FM 5-0 as a guide for annexes and appendixes. Annexes may include but are not limited to—

- Engineer execution matrix.
- Enemy obstacle overlay or SITEMP.
- Supported unit maneuver and sustainment graphics.
- Directed, situational, and reserve obstacle matrixes and overlays.
- Survivability execution matrix or timeline.

DISTRIBUTION:

[Classification]

Place the required classification at the top and bottom of every page of the OPLAN or OPORD.

Figure G-3. Engineer unit OPORD (continued)

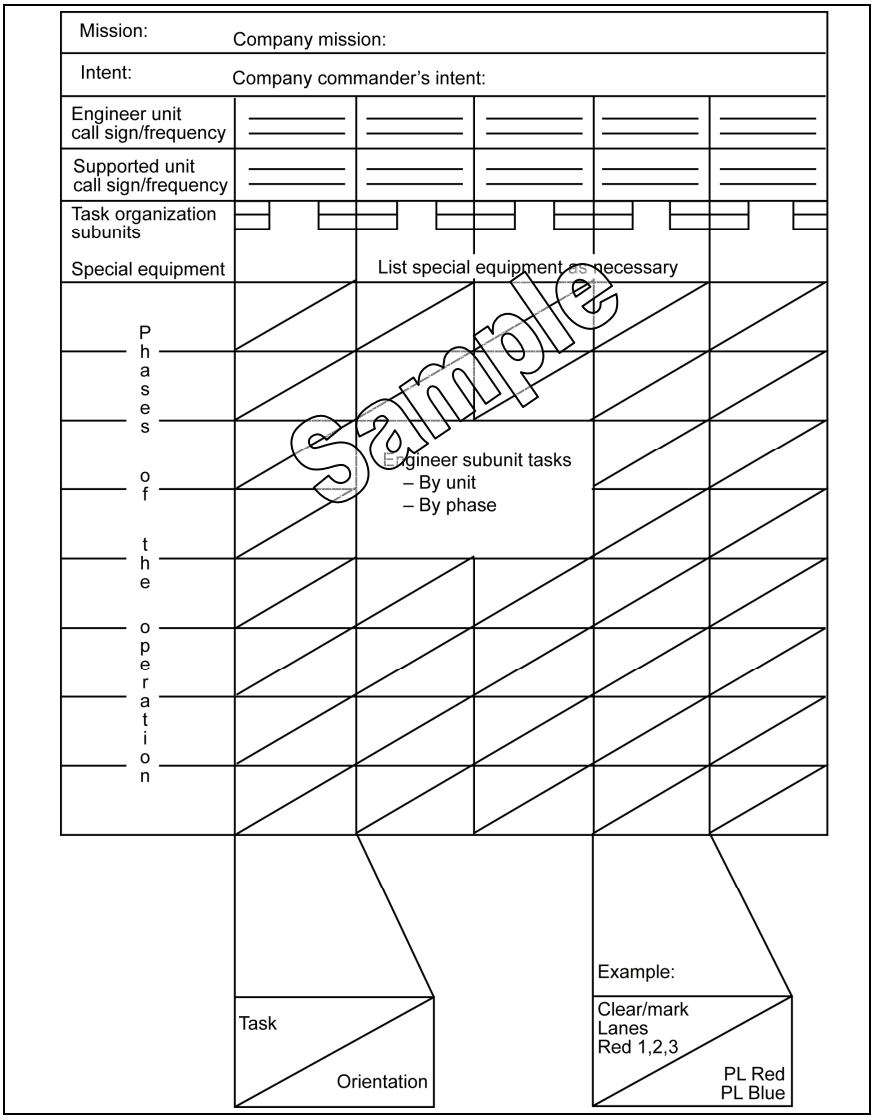


Figure G-4. Sample engineer execution matrix

Appendix H

Urban Operations

Army forces will likely operate in an urban environment. An urban environment is characterized by complex terrain, a concentrated population, and an infrastructure of systems. Each urban operation is unique and differs because of the multitude of combinations presented by the threat, the urban area itself, the major operation of which it may be part, and the fluidity of societal and geopolitical considerations. In other environments, commanders normally address the depth, breadth, and height of the AO in terms of airspace and surface. In an urban environment, they broaden their scope, including supersurface and subsurface areas that voluminously extend the AO. Engineers can expect a higher proportion of engineer capabilities within combined arms organizations at the lower-tactical levels, to include the task organization of engineer assets into combined arms teams at the platoon and squad levels. UO are planned, prepared for, and executed in the same basic fashion as any other type of environment; however, there are special considerations for engineers operating in urbanized terrain. (See FM 3-06 and FM 3-06.11 for more information.)

OPERATING IN AN URBAN ENVIRONMENT

H-1. UO are offense, defense, stability, and civil support operations conducted on terrain where man-made construction and high population density are dominant features. UO in future conflicts are very likely due to increasing world population and accelerated growth of cities. Operations in an urban environment usually occur when the—

- Urban area is between two natural obstacles and no bypass exists.
- Seizure or retention of an urban area contributes to the attainment of an overall objective.
- Urban area is in the path of a general advance and cannot be surrounded or bypassed.
- Political or humanitarian concerns require the control of an urban area or necessitate operations within an urban area.
- BCT assigned objective lies within an urban area.
- Defense from an urban area supports a more effective overall defense or cannot be avoided.
- Occupancy of the urban area and seizure or control of key terrain is necessary to prevent the enemy from occupying the urban area and establishing a presence, thus avoiding more difficult operations in the future.

H-2. Understanding the potential effects of the urban environment on warfighting functions allows the commander to better visualize the OE. The staff should be intimately familiar with the effects in their area of expertise and use that knowledge to understand the problem and develop creative and innovative solutions to achieve the commander's intent. Table H-1, page H-2, shows some likely effects that the urban environment can have on warfighting functions.

Table H-1. Effects of an urban environment on warfighting functions

Warfighting Function	*Likely Effects of an Urban Environment*
Movement and maneuver	• Urban terrain canalizes and compartmentalizes maneuvering forces. • Mounted movement is restricted to roadways. • Cover and concealment is provided by buildings and the population.
Intelligence	• More data points exist to examine during IPB. • Complex terrain must be analyzed. • Understanding the "C" in METT-TC and the effects on operations is important. • Each urban setting presents unique threat patterns and TTPs. • The terrain, society, and infrastructure are dynamic and changes based on friendly action or nonaction.
Fires	• Challenges to target acquisition exist. • Increased potential for collateral damage is present.
Sustainment	• Functional infrastructure, existing resource, and supportive civilians may facilitate sustainment activities. • Damaged infrastructure and a hostile population may hamper sustainment activities. • Innovative task organizations of engineer elements require an integrated approach to sustainment.
C2	• Noncontiguous operations dictate a mission C2 system. • UO characterized by junior leaders is executed, decentralized operations. • Frequency-modulated communication is degraded in urban terrain. • UO generate a large volume of information that can overload INFOSYS.
Protection	• Physical terrain offers increased survivability. • General engineers are required for high-end hardening. • Survivability support required for civilians (if tasked).

H-3. Army leaders follow the framework for urban operations outlined in FM 3-06. They identify the portion of the urban area that is essential to mission success, shape the area, precisely mass the effects of combat power to rapidly dominate the area, protect and strengthen initial gains without losing momentum, and transition control of the area to another agency. The Army framework for urban operations provides a means for conceptualizing the application of Army combat power and capabilities in the urban environment. It assists commanders in visualizing urban operations; it is not a planner's tool for phasing an operation.

CONSIDERATIONS WITHIN THE ARMY FRAMEWORK FOR URBAN OPERATIONS

H-4. In UO, engineers view the urban environment through the five components of the framework for urban operations (understand, shape, engage, consolidate, and transition) using the construct of the running estimate and application of engineer considerations provided in previous chapters for offensive, defensive, stability, and civil support operations.

Understand

H-5. Understanding requires continuous assessment (throughout planning, preparation, and execution) of the current situation and the progress and evaluation of an operation against MOE to make decisions and adjustments. Engineer planners use the running estimate and IPB process to assess and understand the urban environment. They observe and learn about the urban environment (terrain, society, and infrastructure) and mission variables (METT-TC).

Shape

H-6. Engineers help shape the AO by assuring the mobility of forces and helping to isolate objectives (physically, electronically, and psychologically) to deny enemy sources of support and freedom of movement. Engineers prevent an enemy unit from having contact with other enemy forces (cordon technique) and averting isolation points that are critical to freedom of action. Engineers also provide civil-military engineering and construction projects to influence a cooperative relationship with the civil political system and protect portions of the civil population or critical infrastructure. This is especially true in stability and civil support operations.

Engage

H-7. Engineers engage by applying the full range of engineer capabilities in support of friendly actions against decisive points leading to centers of gravity. In offensive operations, engineers support strikes against the enemy center of gravity (an enemy leader); enemy combat power; enemy communication capability; or a physical structure of cultural, political, or economic significance. The forms of offensive maneuver, types of offensive operations, and the engineer support and considerations of each (discussed in chapter 6) still apply in UO. In defensive operations, engineers support efforts to deny enemy control of the vital functions and critical infrastructure of the urban area. Engineers leverage defensive advantages of the urban terrain in controlling the enemy direction of attack by reinforcing natural and man-made obstacles.

H-8. In stability operations, the ability to engage depends on the type of operation. Techniques used for engagement vary according to the situation and as situations mature during long-term operations. Engineers are postured to provide the entire range of engineer capabilities in synchronization with the friendly concept of the operation. In civil support operations, engineers remain responsive and innovative in applying engineer capabilities, typically in support of the lead agency.

Consolidate

H-9. Army forces protect and strengthen initial gains and ensure retention of the initiative. This includes actions to eliminate isolated or bypassed threat forces and increase security and protect LOCs. It may include activities in support of the civilian population, such as the restoration of key urban infrastructure. A significant consolidation effort for engineers may be the reduction or elimination of numerous EHs within the urban area. Consolidation follows each critical activity.

Transition

H-10. When planning UO, commanders ensure that they plan, prepare for, and manage transitions. Transitions are movements from one phase of an operation to another or a change in responsibility from one unit, organization, or agency to another. Transitions occur in UO frequently and are complex, often involving agencies other than U.S. military organizations. For civil-military engineering and construction projects, transitions and transfers of authority can result in the loss of momentum and the inability to affect short-term objectives, due to the often lengthy lead times associated with various resourcing processes for different types of funding sources. Master planning and the development of mid- and long-term plans and their inclusion in budgeting cycles facilitate the short-term requirements for the organization or element assuming control.

FUNDAMENTALS

H-11. Though UO may differ from one operation to the next, the UO fundamentals shown in figure H-1, page H-4, are applicable regardless of the mission or level of command. These fundamentals are particularly relevant to an environment dominated by man-made structures and a dense noncombatant population. (See FM 3-06 for a detailed explanation of these fundamentals.) The fundamentals of controlling the essentials, minimizing collateral damage, preserving critical infrastructure, and restoring essential services are particularly important to engineers.

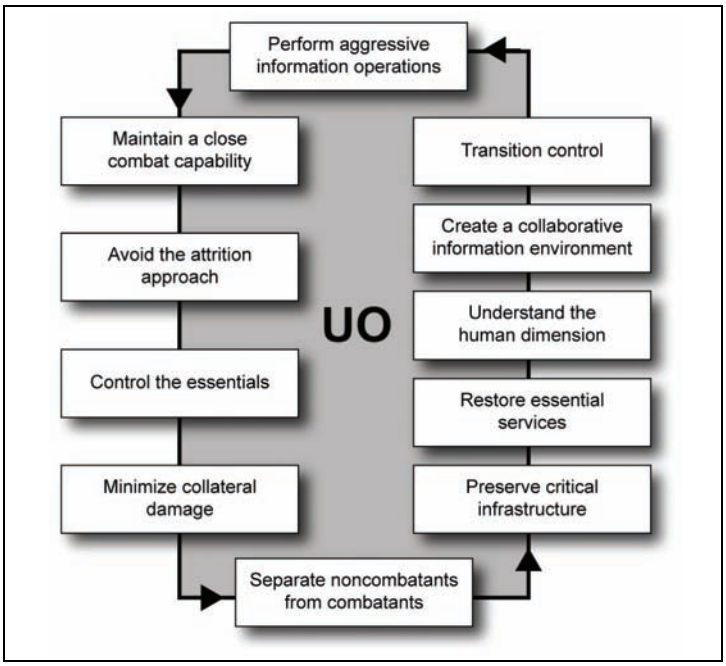


Figure H-1. UO fundamentals

Control the Essentials

H-12. Controlling the essentials pertains to the fact that many urban areas are too large to be effectively controlled without an enormous force. Engineers are particularly aware of the limited availability of engineer capabilities and rely on the determination of the essential tasks for M/CM/S to focus the application of engineer combat power. Engineers are important contributors in helping commanders understand key terrain from an engineer perspective, especially in determining the significance of critical infrastructure (public works, bridges, road networks), its functional importance to the population, and its potential impact on friendly operations.

Minimize Collateral Damage

H-13. With regards to minimizing collateral damage, engineers are keen to the often underestimated effects of collateral damage on infrastructure, including impacts on the environment and extensive resources inherent with the "you broke it, you fix it" ideology.

Preserve Critical Infrastructure

H-14. Preserving critical infrastructure is similar, but different than minimizing collateral damage. Engineers aid the commander in identifying critical infrastructure so that it can be preserved and protected from the enemy or hostile civilians. Engineer planners work together with CA and other planners in forecasting the effort to restore essential services (power, water, sewage) that were already nonfunctional or could be impacted during an operation. (See FM 3-34.170 for a discussion of infrastructure reconnaissance.)

Restore Essential Services

H-15. Engineers play an important role in restoration efforts, especially with their construction project management capabilities and contracting mechanisms. Army forces seek to transfer responsibility for providing essential services to other agencies, NGOs, or the local government as quickly and effectively as possible.

PLANNING FOR URBAN OPERATIONS

H-16. The complexity of the urban environment provides more data points for the IPB process to identify, evaluate, and monitor. The human and societal aspects of the environment and the physical complexity primarily cause this difference. Relationships between aspects of the environment, built on an immense infrastructure of formal and informal systems connecting the population to the urban area, are usually less familiar to analysts. Thus, the urban environment often requires more specifically focused intelligence resources to plan, prepare for, execute, and assess operations than in other environments. No two urban areas are alike physically (in population or infrastructure). Experiences gained in one area are not readily transferable to another urban area. Each characteristic of the urban environment (terrain, society, and infrastructure) is dynamic and can change in response to UO or external influences. Civilian populations pose a special challenge to commanders conducting UO. Civilians react to, interact with, and influence (to varying degrees) Army forces.

ENGINEER RUNNING ESTIMATE

H-17. UO are planned, prepared for, and executed in the same basic way as any other type of environment; however, the elements of the urban environment (terrain, society, and infrastructure) and the many variables and conditions associated with UO require special consideration. The running estimate discussed in chapter 2 and appendix E provides the framework for planning engineer support to UO.

Terrain

H-18. The running estimate assesses the impact of terrain on both friendly and enemy engineer capabilities. The military aspects of terrain (OAKOC) remain critical to the analysis of natural terrain in, under, and around urban areas (see table H-2, page H-6). LOS analysis is performed to identify possible sniper locations and observation posts. Planners use blueprints of buildings to analyze building compositions and determine their effects on weapon and breaching systems. The urban area is viewed with consideration to collateral damage (safety zones for unprotected civilians) and protected areas (churches, hospitals, and cultural sites). Geospatial engineer teams can facilitate decisionmaking and staff planning with geospatial products (3-D displays and LOS overlays). The use of special overlays (sewer, electric, and water systems) can also aid planning.

Table H-2. Terrain analysis in areas using OAKOC

Component	*Considerations Analysis*
Observation and fields of fire	● Smoke (fire), dust (explosions), and flying debris. ● Rubble. ● Engagement ranges (minimum safe distances, safety zones, backblast factors), ricochets. ● Elevations and depressions.
AA	● Mobility corridors (surface, supersurface, subsurface). ● General restriction to roadways.
Key terrain	● Landmarks and buildings with cultural, social, political, historical, or economic significance.
Obstacles	● Rubble. ● Civilian vehicles. ● Inadequate bridges and overpasses (structural integrity, weight and size restricted). ● Tunnels, underpasses, roadways (overhead clearance, narrowness, medians). ● Mines, IEDs, and other EHs. ● Rivers and lakes.
Cover and concealment	● Protection provided by buildings. ● Building composition and effects on weapon penetration. ● Civilians. ● Civilian vehicles.

Weather

H-19. Weather and its effects during UO are similar to other OEs. Uncontrolled ambient light of an urban area can affect night vision capabilities. Smog inversion layers are common over cities and can affect ground and air temperatures (thermal sighting during crossover periods), Soldier health, and visibility. Weather effects on civilians must also be considered. For example, rain and flooding may render certain areas unusable or may collapse sewage infrastructure, excessive snowfall can paralyze transportation infrastructure and impede human services (fire, police, medical), and excessive heat can overload power grids with increased usage of air conditioners.

Civil Considerations

H-20. Civil considerations take on added importance in UO. The mere presence of urban residents creates conditions for restrictive ROE, increases stress on Soldiers and logistic capabilities, and confuses threat identification. The six characteristics of civil considerations (see FM 6-0) are expressed in ASCOPE (see table H-3).

H-21. It is critical to know and understand which groups live in an urban area, what relationships exist among them, and how each population group responds to friendly and threat activities. Societal understanding (see FM 3-06, appendix B) must go beyond a superficial awareness of gestures and taboos to develop a thorough understanding of the organizing principles that make the urban society hold together and function as a coherent entity (or not). Geospatial products can help graphically visualize demographic features within an area.

Table H-3. Civil considerations using ASCOPE

Component	*Considerations*
Areas	● Areas defined by political boundaries (districts, municipalities). ● Locations of government centers. ● Social, political, religious, or criminal enclaves. ● Agricultural and mining regions. ● Trade routes. ● Possible sites for temporary settlement of dislocated civilians or other civil functions.
Structures	● Effects of structure location, function, and capabilities on operations. ● Traditional HVTs (bridges, communication towers, power plants, dams). ● Cultural (protected) sites (churches, mosques, hospitals). ● Military usefulness (jails, warehouses, television and radio stations, print plants).
Capabilities	● Status of essential services. ● HN resources and services (interpreters, construction material and services) that can support military operations.
Organizations	● Nonmilitary groups or institutions within the HN that can influence the population (labor unions, service organizations, criminal organizations). ● Organizations from outside the AO (UN agencies, U.S. government agencies, NGOs) that can provide specialized capabilities.
People	● Attitudes and activities of civil leaders and populations. ● Ethnicity. ● Culture. ● Religion. ● Needs and intentions of the people.
Events	● Routine, cyclical, planned, or spontaneous activities that significantly affect organizations, people, and military operations (holidays, elections, celebrations, natural or man-made disasters).

Enemy Mission and Mobility, Countermobility, and Survivability Capabilities

H-22. The process of analyzing the enemy mission and engineering capabilities previously discussed as part of the running estimate remains the same for UO. The major difference that requires added focus is the impact of civilians. Distinguishing the enemy from noncombatants may be virtually impossible. The enemy is not concerned with the ROE and is not constrained to minimize collateral damage. Each urban environment (terrain, society, and infrastructure) presents unique challenges and opportunities.

Engineer Mission Analysis

H-23. Just as in planning for other environments, identifying the essential tasks for M/CM/S is critical to analyzing the engineer mission in UO. An overall assessment of the engineer requirements will likely reveal that engineers are required in higher proportions at the lower tactical level in response to the noncontiguous and decentralized operations inherent within UO. It will also likely be discovered that general engineering capabilities are necessary in manipulating urban terrain. General engineers will be in greater demand in UO to improve or restore the infrastructure in supporting force bed-down requirements and providing the necessary hardening to protect facilities and critical infrastructure.

H-24. Engineer planners must assess the restrictions on engineer capabilities imposed by the ROE and the presence of noncombatants. Not all engineer systems can be utilized in an urban environment with the

emphasis on limiting collateral damage. Depending on the threat, the noncontiguous nature of UO also requires the additional allocation of security forces to protect vulnerable general engineers conducting operations outside secured areas. The setting also requires additional emphasis on route and area clearance missions to enable the freedom of movement.

H-25. The urban setting provides opportunities for additional resources and services not always available in other environments. The engineer considers the availability of HN equipment, construction materials, fortification resources, civilian workforce assets, and civilian subject matter experts (SMEs). Materials and resources may also come from other sources, such as NGOs. Engineer planners look at the availability of ammonium nitrate, acetylene, propane, lumber yards, Jersey barriers, vehicles, and construction equipment that can influence friendly defensive operations and the enemy. (See FM 3-34.170 for a discussion of engineer reconnaissance and resource assessments.)

SPECIAL CONSIDERATIONS FOR ENGINEER LEADERS

H-26. UO provides numerous opportunities and challenges for engineers. Engineer leaders at all levels must—

- Identify special equipment needs for platoons and squads supporting the combined arms team.
- Develop engineer squad UO kits (see FM 3-06.11 and FM 3-06.20) that include—
  - Bolt cutters, grapnels, lane-marking kits, and cutting tools.
  - Expedient reduction tools.
  - Forced-entry tools (hooligan tools, crowbars, sledgehammers).
  - Satchel charges (field-expedient).
  - Rope ladders or other lightweight, foldable ladders.
  - Marking material (paint, chalk, engineer tape, chemical lights).
  - Field-expedient and special breaching charges of common urban barriers (see FM 3-06.11).
  - Rifle-launched entry munitions or battering rams.
  - Additional light sources for operating inside buildings and subsurface structures.
- Ensure that time is available to conduct combined arms rehearsals at the lowest level.
- Train engineer junior leaders to enable decentralized operations (team leader level).
- Ensure that ROEs are simple and easily understood by every Soldier.
- Conduct demolition cross training throughout the combined arms team.
- Share lessons learned and TTPs obtained through recent or current operations throughout the force and training institutions (training at replacement centers, staging bases).

Source Notes

This section lists sources by page number. Where material appears in a paragraph, both the page number and paragraph number are listed. Boldface indicates titles of vignettes.

1-1 "My engineers can do anything. There just aren't enough of them." Major General Raymond Odierno, Commander, 4th Infantry Division, Operation Iraqi Freedom.

2-1 "The instruments of battle are valuable only if one knows how to use them." Colonel Ardant du Picq [Online]. Available: <http://www.military-quotes.com/database/a.htm>.

3-1 "Know your enemy and know yourself; in a hundred battles you will never be in peril." Sun Tzu [Online]. Available: <http://www.stormingmedia.us/46/4670/A467074.html>.

4-1 "Strategy is the art of making use of time and space. Space we can recover; lost time, never." Napoleon Bonaparte [Online]: <http://www.readwriteweb.com/archives/napoleons_glanc.php>.

5-1 "The clever combatant imposes his will on the enemy, but does not allow the enemy's will to be imposed on him."Sun Tzu : <http://www.school-for-champions.com/competition/art_of_war_06.htm>.

6-1 "The tactician determines his solution by a thorough mastery of doctrine and existing TTP, tempered and honed by experience gained through training and operations. He uses his creativity to develop solutions for which the enemy is neither prepared, nor able to cope." FM 3-90 [Online]. Available: <http://www.globalsecurity.org/military/library/policy/army/fm/3-90/ch1.htm>.

7-1 "Dominance on the battlefield will be squandered if the United States does not have the tools to win hearts and minds and secure lasting peace out of its military engagements." Robert C. Orr. As quoted. in the Whitehouse, Anthony W., "Enlarging the Cadre of Deployable Federal Civilians for Stabilization and Reconstruction Operations," 15 March 2006, U.S. Army War College [Online]. Available: <www.strategicstudiesinstitute.army.mil/pdffiles/ksil539.pdf>.

8-1 "Good logistics is combat power." Lieutenant General William G. Pagonis, Director of Logistics, Gulf War, 1991 [Online]. Available: <http://www.civilwarinteractive.com/ArticleShermanAtlanta.htm>.

This page intentionally left blank.

Glossary

The glossary lists acronyms/abbreviations and terms with Army or joint definitions, and other selected terms. Where Army and joint definitions are different, (Army) follows the term.

SECTION I – ACRONYMS AND ABBREVIATIONS

1SG	first sergeant
3-D	three-dimensional
AA	avenue of approach
ABL	authorized basic load
AC2	airspace command and control
ACE	armored combat earthmover
ACR	armored cavalry regiment
ADA	air defense artillery
ADAM	area-denial artillery munition
AFATDS	advanced field artillery tactical data system
AFCESA	Air Force Civil Engineering Support Agency
AGM	attack guidance matrix
AHD	antihandling device
AHS	Army health system
AI	area of interest
ALO	air liaison officer
AO	area of operations
AOR	area of responsibility
AP	antipersonnel
APOE	aerial port of embarkation
AR	Army regulation
ARNG	Army National Guard
ARNGUS	Army National Guard of the United States
ASCOPE	areas, structures, capabilities, organizations, people, and events
ASP	ammunition supply point
AT	antitank
ATM	advanced trauma management
ATP	ammunition transfer point
ATT	Army tactical task
attn	attention
AVLB	armored, vehicle-launched bridge

BAE	brigade aviation element
BCS3	Battle Command Sustainment Support System
BCT	brigade combat team
BDA	battle damage assessment
BFT	Blue Force Tracker
BHL	battle handover line
BJA	brigade judge advocate
BM	benchmark
bn	battalion
BP	battle position
BSA	brigade support area
BSB	brigade support battalion
BSMC	brigade support medical company
BSTB	brigade special troops battalion
C	combat
C2	command and control
CA	civil affairs
CAB	combined arms battalion
CAC	crossing area commander
CAE	crossing area engineer
CAS	close air support
CASEVAC	casualty evacuation
CAT	civil affairs team
CAT-B	civil affairs team–bravo
CBRN	chemical, biological, radiological, and nuclear
CBRNE	chemical, biological, radiological, nuclear, and high-yield explosives
cbt	combat
CCD	camouflage, concealment, and deception
CCIR	commander's critical information requirements
cdr	commander
CEA	captured enemy ammunition
CFZ	critical friendly zone
CIC	command information center
CID	criminal investigation division
CK	containerized kitchen
CLS	combat lifesaver
CMOC	civil-military operations center
co	company
COA	course of action
COMSEC	communications security

const	construction
CONUS	continental United States
COP	common operational picture
CP	command post
CPM	critical path method
CRM	composite risk management
CSC	crossing-site commander
CSR	controlled supply rate
CTA	common table of allowances
CTOP	common topographic operating picture
CW2	chief warrant officer two
cy	cubic yard(s)
D3A	decide, detect, deliver, and assess
DA	Department of the Army
DCG	deputy commanding general
DCGS-A	Distributed Common Ground System–Army
DCO	deputy commanding officer
DCP	detainee collection point
dd	doctrine division
DD	Department of Defense
DEA	Drug Enforcement Agency
DEUCE	Deployable, universal combat earthmover
div	division
DOD	Department of Defense
DOS	Department of State
DS	direct support
DSB	dry support bridge
DTSS-B	Digital Topographic Support System–Base
E3	private first class
E4	specialist
E5	sergeant
E6	staff sergeant
E7	sergeant first class
EA	engagement area
EAB	echelons above brigade
ECU	environmental control unit
EEFI	essential elements of friendly information
EEP	engineer equipment park
EFSP	engineer forward supply point
EH	explosive hazard

EHCC	explosive hazards coordination cell
EHDB	explosive hazards database
EHT	explosive hazard team
EI2RC	Engineering Infrastructure and Intelligence Reachback Center
eMILPO	electronic military personnel office
EMT	emergency medical treatment
EN	engineer
ENCOORD	engineer coordinator
eng	engineer
EOCA	explosive ordnance clearance agent
EOD	explosive ordnance disposal
EPLRS	Enhanced Position Location Reporting System
EPW	enemy prisoner of war
ERDC	Engineer Research and Development Center
ERP	engineer regulating point
ERT	engineer reconnaissance team
ESV	engineer squad vehicle
EW	electronic warfare
FA	field artillery
FAC	forward air controller
FACE	forward aviation combat engineering
FARP	forward arming and refueling point
FBCB2	Force XXI battle command–brigade and below
FC	fires cell
FDC	fire direction center
FEBA	forward edge of the battle area
FFE	field force engineering
FFIR	friendly force information requirement
FID	foreign internal defense
FM	field manual
FMC	field maintenance company
FMI	field manual interim
FMT	field maintenance team
FOB	forward operating base
FOD	foreign object damage
FRAGO	fragmentary order
FS	fire support
FSC	forward support company
FSCOORD	fire support coordinator
FSE	fire support element

FSMT	forward support medical evacuation team
FSO	fire support officer
FST	forward surgical team
GCCS-A	Global Command and Control System–Army
GEOINT	geospatial intelligence
GI&S	geospatial information and services
GS	general support
GSAB	general support aviation battalion
HBCT	heavy brigade combat team
HCA	humanitarian and civic assistance
HCP	health and comfort package
HHC	headquarters and headquarters company
HHT	headquarters and headquarters troop
HLD	homeland defense
HLS	homeland security
HLZ	helicopter landing zone
HM	hazardous materials
HMA	humanitarian mine action
HMMWV	high-mobility, multipurpose, wheeled vehicle
HN	host nation
HNS	host nation support
HPT	high-payoff target
HPTL	high-payoff target list
HQ	headquarters
HSS	health service support
HUMINT	human intelligence
HVT	high-value target
HW	hazardous waste
IBCT	infantry brigade combat team
IED	improvised explosive device
IM	information management
IN	infantry
INFOSYS	information systems
IO	information operations
IPB	intelligence preparation of the battlefield
IR	intelligence requirements
ISP	intelligence synchronization plan
ISR	intelligence, surveillance, and reconnaissance
JAB	joint assault bridge
JOA	joint operations area

JTF	joint task force
km	kilometer(s)
LAN	local area network
LD	line of departure
LMTV	light medium tactical vehicle
LNO	liaison officer
LOA	light observation aircraft
LOC	line of communications
LOGCAP	logistics civilian augmentation program
LOGPAC	logistics package
LOS	line of sight
LR	long range
LRP	logistics release point
LZ	landing zone
m	meter(s)
M/CM/S	mobility, countermobility, and survivability
MAC	mobility augmentation company
MAGTF	Marine air-ground task force
maint	maintenance
MANSCEN	Maneuver Support Center
MBA	main battle area
MC4	medical communications for combat casualty care
MCB	mine clearing blade
MCIP	Marine Corps information publication
MCOO	modified combined obstacle overlay
MCP	maintenance collection point
MCS	Maneuver Control System
MDMP	military decision-making process
MEB	maneuver enhancement brigade
MEDEVAC	medical evacuation
MEF	Marine expeditionary force
METT-TC	mission, enemy, terrain and weather, troops and support available, time available, and civil considerations
MF	management facility
MGS	mobile gun system
MI	military intelligence
MICLIC	mine-clearing line charge
MLC	military load classification
MMPV	medium mine-protected vehicle
MOE	measure of effectiveness
MOP	measure of performance

MOPMS	Modular-Pack Mine System
MOS	military occupational specialty
MRBC	multirole bridge company
MRE	meal, ready to eat
MSR	main supply route
MTC	movement to contact
MTF	medical treatment facility
MTOE	modified table(s) of organization and equipment
MWR	morale, welfare, and recreation
NAI	named area of interest
NATO	North Atlantic Treaty Organization
NAVFAC	Naval Facilities Engineering Command
NCF	Naval construction force
NCO	noncommissioned officer
NEO	noncombatant evacuation operations
NET	new equipment training
NGO	nongovernmental organization
no.	number
NOK	next of kin
O3	captain
O4	major
OAKOC	observation and fields of fire, avenues of approach, key terrian, obstacles, and cover and concealment
OBJ	objective
OBSTINTEL	obstacle intelligence
OE	operational environment
OEF	Operation Enduring Freedom
OGA	other governmental agency
OIF	Operation Iraqi Freedom
OP	observation post
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
OPS	operations
OPSEC	operations security
PA	public affairs
PAO	public affairs officer
PASR	personnel accounting and strength reporting
PBUSE	property book unit supply–enhanced
PEO	peace enforcement operations
PERSITREP	personnel situation report

PIR	priority intelligence requirements
PKO	peacekeeping operations
PL	phase line
PLL	prescribed load list
PM	provost marshal
PMCS	preventive-maintenance checks and services
PMESII-PT	political, military, economic, social, infrastructure, information , physical environment, and time
PMO	provost marshal officer
PO	peace operations
POL	petroleum, oil, and lubricants
POP	point of penetration
Prime BEEF	prime base engineer emergency force
PS	personnel services
PSG	platoon sergeant
PSYOP	psychological operations
PX	post exchange
PZ	pickup zone
QRF	quick-reaction force
RDE-L	rapidly deployable equipment–light
RDE-M	rapidly deployable equipment–medium
RDSP	rapid decision-making and synchronization process
REBS	rapidly emplaced bridge system
RED HORSE	rapid engineers deployable heavy operations repair squadron, engineers
RFI	request for information
RI	relevant information
RL	release line
ROE	rules of engagement
ROI	rules of interaction
RP	release point
RRR	rapid runway repair
RS	reconnaissance squadron
RSO&I	reception, staging, onward movement, and integration
RSR	required supply rate
S-1	personnel staff officer
S-2	intelligence staff officer
S-3	operations staff officer
S-4	logistics staff officer
S-5	plans staff officer
S-6	communications staff officer
S-7	information operations staff officer

S-8	financial management staff officer
S-9	civil affairs staff officer
SA	situational awareness
SAMS-E	Standard Army Maintenance System–Enhanced
SBCT	Stryker brigade combat team
SBF	support by fire
SCATMINE	scatterable mine
SEAD	suppression of enemy air defenses
SINCGARS	Single-Channel, Ground and Airborne Radio System
SIPRNET	Secret Internet Protocol Router Network
SIR	specific information requirements
SITEMP	situation template
SJA	staff judge advocate
SKO	sets, kits, and outfits
SME	subject matter expert
SOF	special operations forces
SOP	standing operating procedure
SOSRA	suppress, obscure, secure, reduce, and assault
SOW	statement of work
SP	start point
SPO	support operations officer
spt	support
STAMIS	Standard Army Management Information Systems
SU	situational understanding
sust	sustainment
TAC CP	tactical command post
TACP	tactical air control party
TAI	targeted area of interest
TAT	troop-carried munitions to accompany troops
TCMS	Theater Construction Management System
TCP	traffic control post
TEC	theater engineer command
TEOC	TeleEngineering Operations Center
TF	task force
TGD	theater geospatial database
TIM	toxic industrial material
TLP	troop-leading procedures
TOE	table(s) of organization and equipment
TP	target point
TPT	tactical psychological operations team

TRADOC	U.S. Army Training and Doctrine Command
TRP	target reference point
TSM	target synchronization matrix
TSS	target selection standard
TTP	tactics, techniques, and procedures
TVA	target value assessment
U.S.	United States
UAS	unmanned aerial system
UBL	unit basic load
UGR	unitized group ration
UMCP	unit maintenance collection point
UMT	unit ministry team
UN	United Nations
UO	urban operations
USACE	U.S. Army Corps of Engineers
USACE	U.S. Army Corps of Engineers
USAES	U.S. Army Engineer School
USAF	U.S. Air Force
USAR	U.S. Army Reserve
USC	United States Code
UXO	unexploded ordnance
VMDD	vehicle-mounted mine detector
WARNORD	warning order
WMD	weapons of mass destruction
XO	executive officer

SECTION II – TERMS

ASCOPE

A memory aid for the characteristics considered under civil considerations: areas, structures, capabilities, organizations, people, events. (FM 6-0)

area clearance

In land operations, the detection and, if found, the identification, marking and neutralization, destruction, or removal of mines or other explosive ordnance, improvised explosive devices and booby traps in a defined area to allow a military operation to continue with reduced risk. (FM 3-34.210)

assessment

The continuous monitoring and evaluation of the current situation, particularly the enemy, and progress of an operation. (FM 3-0)

assured mobility

A 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 achieve the mission. The assured mobility fundamentals–predict, detect, prevent, neutralize, and protect–support the implementation of the assured mobility framework. (FM 3-34)

board

A temporary grouping of selected staff representatives delegated decision authority for a particular purpose or function. (FMI 5-0.1)

breach area

The area where a breaching operation occurs. The breach area is established and fully defined by the higher headquarters of the unit conducting breaching operations. (FM 3-34.2).

clear

A tactical mission task that requires the commander to remove all enemy forces and eliminate organized resistance within an assigned area. (FM 3-90)

clearing operations

(joint) An operation designed to clear or neutralize all mines, other explosive hazards, or obstacles from a route or area. (FM 3-34.2)

combat engineering

Those engineering capabilities and activities that support the maneuver of land combat forces and that require close support to those forces. Combat engineering consists of three types of capabilities and activities: mobility, countermobility, and survivability. (JP 3-34)

control

1. In the context of command and control, the regulation of forces and warfighting functions to accomplish the mission in accordance with the commander's intent. (FM 3-0) 2. A tactical mission task that requires the commander to maintain physical influence over a specified area to prevent its use by an enemy. (FM 3-90) 3. An action taken to eliminate a hazard or reduce its risk. (FM 5-19) 4. In the context of stability mechanisms, to impose civil order. (FM 3-0)

counterinsurgency

Those military, paramilitary, political, economic, psychological, and civic actions taken by a government to defeat insurgency. (JP 1-02)

countermobility operations

Operations that deny the enemy freedom of maneuver through the employment of reinforcing obstacles. (FM 3-34).

engineer coordinator

The special staff officer, usually the senior engineer officer on the staff, responsible for coordinating engineer assets and operations for the command. (FM 3-34)

engineer functions

Categories of related engineer capabilities and activities grouped together to help joint force commanders integrate, synchronize, and direct engineer operations. The three engineer functions are combat engineering, general engineering, and geospatial engineering. (FM 3-34)

friendly forces information requirements

Information the commander and staff need about the forces available for the operation. (FM 6-0)

general engineering

(joint) Those engineering capabilities and activities, other than combat engineering, that modify, maintain, or protect the physical environment. Examples include: the construction, repair, maintenance, and operation of infrastructure, facilities, lines of communication and bases; terrain modification and repair; and selected explosive hazards activities. Also called **GE**. (JP 3-34)

geospatial engineering

(Army) The art and science of applying geospatial information to enable understanding of the physical environment for military operations. The art is the ability to understand mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC) and the geospatial information available, including intent of use and limitations, in order to explain the military significance of the terrain to the commander and staff and create geospatial products for decision -making; the science is the ability to exploit geospatial information, producing spatially accurate products for measurement, mapping, visualization, modeling, and all types of analysis of the terrain. (FM 3-34)

insurgency

An organized movement aimed at the overthrow of a constituted government through use of subversion and armed conflict. (JP 1-02)

measure of effectiveness

A criterion used to assess changes in system behavior, capability, or operational environment that is tied to measuring the attainment of an end state, achievement of an objective, or creation of an effect. (JP 3-0)

measure of performance

A criterion used to assess friendly actions that is tied to measuring task accomplishment. (JP 3-0)

METT-TC

A memory aid used in two contexts: (1) in the context of information management, the major subject categories into which relevant information is grouped for military operations: mission, enemy, terrain and weather, troops and support available, time available, civil considerations (2) in the context of tactics, the major factors considered during mission analysis. (FM 6-0)

mobility operations

Obstacle reduction by maneuver and engineer units to reduce or negate the effects of existing or reinforcing obstacles. The objective is to maintain freedom of movement for maneuver units, weapon systems, and critical supplies. (FM 3-34)

nonlethal fires

Any fires that do not directly seek the physical destruction of the intended target and are designed to impair, disrupt, or delay the performance of enemy operational forces, functions, and facilities. Psychological operations, electronic warfare (jamming), and other command and control countermeasures are all nonlethal fire options. (FM 6-20)

OAKOC

A memory aid associated with the five military aspects of terrain: observation and fields of fire, avenues of approach, key and decisive terrain, obstacles, cover and concealment. (FM 6-0)

PMESII-PT

A memory aid for the varibles used to describe the operational environment: political, military, economic, social, information, infrastructure, physical environment, time (operational variables). (FM 3-0)

priority intelligence requirement

An intelligence requirement, stated as a priority for intelligence support, that the commander and staff need to understand the adversary or the operational environment. (JP 2-0)

reconnaissance operations

Those operations undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographical or geographical characteristics and the indigenous population of a particular area. (FM 3-90)

relevant information

All information of importance to commanders and staffs in the exercise of command and control. (FM 3-0)

route clearance

The detection, investigation, marking and reporting, and neutralization of explosive hazards and other obstacles along a defined route to enable assured mobility for the maneuver commander. It is a combined arms operation that relies on a reconnaissance of the route to be cleared. (FM 3-34.210)

survivability operations

The development and construction of protective positions, such as earth berms, dug-in positions, overhead protection, and countersurveillance means, to reduce the effectiveness of enemy weapon systems. (FM 3-34)

terrorism

The calculated use of unlawful violence or threat of unlawful violence to inculcate fear; intended to coerce or to intimidate governments or societies in the pursuit of goals that are generally political, religious, or ideological. (JP 3-7.2) See FM 3-07.

working group

A temporary grouping of predetermined staff representatives who meet to coordinate and provide recommendations for a particular purpose or function. (FMI 5-0.1)

This page intentionally left blank.

References

SOURCES USED

These are the sources quoted or paraphrased in this publication.

ARMY PUBLICATIONS

AR 25-30, *The Army Publishing Program*, 27 March 2006.

AR 715-9, *Contractors Accompanying the Force*, 29 October 1999.

FM 1-0, *Human Resources Support*, 21 February 2007.

FM 2-0, *Intelligence*, 17 May 2004.

FM 3-0, *Operations*, 27 February 2008.

FM 3-06, *Urban Operations*, 26 October 2006.

FM 3-06.11, *Combined Arms Operations in Urban Terrain*, 28 February 2002.

FM 3-07, *Stability Operations*, 6 October 2008

FM 3-13, *Information Operations: Doctrine, Tactics, Techniques, and Procedures*, 28 November 2003.

FM 3-19.40, *Internment/Resettlement Operations*, 4 September 2007.

FM 3-20.96, *Cavalry Squadron (RSTA)*, 20 September 2006.

FM 3-34, *Engineer Operations*, 2 January 2004.

FM 3-34.2, *Combined-Arms Breaching Operations*, 31 August 2000.

FM 3-34.210, *Explosive Hazards Operations*, 27 March 2007.

FM 3-34.230, *Topographic Operations*, 3 August 2000.

FM 3-34.400, *General Engineering*, 9 December 2008.

FM 3-90, *Tactics*, 4 July 2001.

FM 3-90.5, *The Combined Arms Battalion*, 7 April 2008.

FM 3-90.6, *The Brigade Combat Team*, 4 August 2006.

FM 3-90.12, *Combined Arms Gap-Crossing Operations*, 1 July 2008.

FM 3-90.61, *The Brigade Special Troops Battalion*, 22 December 2006.

FM 3-97.6, *Mountain Operations*, 28 November 2000.

FM 3-97.61, *Military Mountaineering*, 26 August 2002.

FM 3-100.21, *Contractors on the Battlefield*, 3 January 2003.

FM 4-0, *Combat Service Support*, 29 August 2003.

FM 4-02.2, *Medical Evacuation*, 8 May 2007.

FM 4-02.17, *Preventive Medicine Services*, 28 August 2000.

FM 4-30.51, *Unexploded Ordnance (UXO) Procedures*, 13 July 2006.

FM 4-90.7, *Stryker Brigade Combat Team Logistics*, 10 September 2007.

FM 5-0, *Army Planning and Orders Production*, 20 January 2005.

FM 5-19, *Composite Risk Management*, 21 August 2006.

FM 5-103, *Survivability*, 10 June 1985.

FM 5-412, *Project Management*, 13 June 1994.

FM 6-0, *Mission Command: Command and Control of Army Forces*, 11 August 2003.

FM 7-0, *Training for Full Spectrum Operations,* 12 December 2008.

FM 7-15, *The Army Universal Task List*, 31 August 2003

FM 20-3, *Camouflage, Concealment, and Decoys,* 30 August 1999.

FM 31-70, *Basic Cold Weather Manual*, 12 April 1968.

FM 90-3, *Desert Operations*, 24 August 1993.

FM 90-5, *Jungle Operations*, 16 August 1982.

FM 90-7, *Combined Arms Obstacle Integration*, 29 September 1994.

FM 100-10-2, *Contracting Support on the Battlefield*, 4 August 1999.

FMI 1-0.01, *S-1 Operations*, 10 October 2007.

FMI 4-93.41, *Army Field Support Brigade Tactics, Techniques, and Procedures*, 22 February 2007.

FMI 5-0.1, *The Operations Process*, 31 March 2006.

JOINT AND MULTISERVICE PUBLICATIONS

FM 1-02, *Operational Terms and Graphics*, 21 September 2004.

FM 3-06.20, *Multi-Service Tactics, Techniques, and Procedures for Cordon and Search Operations*, 25 April 2006.

FM 3-24, *Counterinsurgency*, 15 December 2006.

FM 3-34.170, *Engineer Reconnaissance*, 25 March 2008.

FM 3-90.119, *Combined Arms Improvised Explosive Device Defeat Operations*, 21 September 2007.

FM 3-100.4, *Environmental Considerations in Military Operations*, 15 June 2000.

FM 4-30.16, *Multi-Service Tactics, Techniques, and Procedures for Explosive Ordnance Disposal in a Joint Environment*, 27 October 2005.

FM 5-34, *Engineer Field Data*, 19 July 2005.

JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001.

JP 2-0, *Joint Intelligence*, 22 June 2007.

JP 2-01, *Joint and National Intelligence Support to Military Operations*, 7 October 2004.

JP 2-03, *Geospatial Intelligence Support to Joint Operations*, 22 March 2007.

JP 3-0, *Joint Operations*, 17 September 2006.

JP 3-07.1, *Joint Tactics, Techniques, and Procedures for Foreign Internal Defense (FID)*, 30 April 2004.

JP 3-07.3, *Peace Operations*, 17 October 2007.

JP 3-28, *Civil Support*, 14 September 2007.

JP 3-34, *Joint Engineer Operations*, 12 February 2007.

JP 3-68, *Noncombatant Evacuation Operations*, 22 January 2007.

MISCELLANEOUS

Title 10, USC Armed Forces, Section 401, *Humanitarian and Civic Assistance Provided in Conjunction with Military Operations.*

Title 18, Crimes and Criminal Procedure, Section 1385, *Use of Army and Air Force as posse comitatus.*

DOCUMENTS NEEDED

DA Form 1156, *Casualty Feeder Card*

DA Form 2028, *Recommended Changes to Publications and Blank Forms*

DA Form 5988-E, *Equipment Inspection Maintenance Worksheet*

DA Forms are available on the APD web site (www.apd.army.mil).

DD Form 565, *Statements of Recognition of Deceased*

DD Form 1380, *US Field Medical Card*
DD forms are available on the OSD web site
(www.dtc.mil/whs/directives/infomgt/forms/formsprogram.htm).

READINGS RECOMMENDED

None

This page intentionally left blank.

Index

FM 3-34.22
11 February 2009

By order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
0902101

DISTRIBUTION:

Active Army, Army National Guard and U.S. Army Reserve: To be distributed in accordance with the initial distribution number (IDN) 115375, required for FM 3-34.22.