ATP 3-34.22

ENGINEER OPERATIONS—BRIGADE COMBAT TEAM AND BELOW

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Contents

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Figures

Tables

Preface

ATP 3-34.22 provides a doctrinal foundation for the conduct of engineer operations in support of unified land operations, focused on tactical maneuvers at the brigade combat team (BCT) level and below. The engineer organizations organic to the BCT are optimized to perform combat engineering tasks (primarily mobility with limited capabilities in countermobility and survivability), with geospatial engineering teams providing organic capability. Additional engineering support (combat and general) comes from engineer organizations that are task-organized to the BCT or that provide support from echelons above brigade (EAB) organizations. This manual is aligned with current BCT doctrine (see FM 3-96) and describes engineer support for the armored brigade combat team (ABCT), infantry brigade combat team (IBCT), and Stryker brigade combat team (SBCT). Although the security force assistance BCT and its respective engineer battalions are not addressed in detail, the basic principles of this manual also apply to those organizations.

The principal audience for ATP 3-34.22 consists of commanders, officers, noncommissioned officers (NCOs), and staff at the BCT level and below as well as EAB units that support BCTs. ATP 3-34.22 is a primary manual for instructional purposes within the United States Army Engineer School and assists other Army branch schools in teaching the integration of engineer capabilities into Army operations.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate in accordance with the law of war and rules of engagement. (See FM 6-27.)

ATP 3-34.22 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which ATP 3-34.22 is the proponent publication (the authority) are marked with an asterisk (*) in the glossary. Definitions for which ATP 3-34.22 is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

ATP 3-34.22 applies to the Active Army, Army National Guard/Army National Guard of the United States and United States Army Reserve unless otherwise stated.

The proponent of ATP 3-34.22 is United States Army Engineer School. The preparing agency is the Fielded Force Integration Directorate (FFID), Doctrine Division, Maneuver Support Center of Excellence (MSCoE). Send comments and recommendations on Department of the Army (DA) Form 2028 (*Recommended Changes to Publications and Blank Forms*) to Commander, FFID, Doctrine Division, MSCoE, ATTN: ATZT-FFD, 14000 MSCoE Loop, Suite 270, Fort Leonard Wood, Missouri 65473-8929 or by e-mail to usarmy.leonardwood.mscoe.mbx.engdoc@mail.mil, or submit an electronic DA Form 2028.

Introduction

This manual provides engineer doctrine for operating at the BCT level and below and within the framework of unified land operations. This manual also provides greater detail for commanders and staffs at brigade echelons and below as well as for supporting EAB enabling engineer units to ensure the synchronization of engineer capabilities across the range of military operations.

BCTs, with unified action partners, conduct land operations to shape security environments, prevent conflict, prevail in large-scale combat, and consolidate gains. BCTs provide the Army with multiple options for responding to and resolving crises. The BCT and its enablers, within the division or corps scheme of maneuver, defeat enemy forces, control terrain, secure populations, and preserve joint force freedom of action. Organic and attached engineer forces support BCT missions throughout the assessment, planning, and execution phases.

Brigade engineer battalions (BEBs), in conjunction with the BCT commander and functional staff counterparts, have been asked to effectively manage a diverse set of organic and EAB skill sets. Many of the tactical tasks associated with combat, general, and geospatial engineering support have remained constant, although the focus is now on maneuver and the employment of forces in the operational area to achieve a position of advantage with respect to the enemy (see JP 3-0). Applying tactics usually entails acting under time constraints with incomplete information. Tactics always require judgement in application; they are always descriptive, not prescriptive.

This manual incorporates the significant change in Army doctrinal terminology, concepts, constructs, and proven tactics developed during recent operations. It also incorporates doctrinal changes and terms based on ADP 3-0, ADP 3-90, FM 3-0, and FM 3-96.

This manual is not meant to be a substitute for thought and initiative among engineer leaders. Regardless of how robust the doctrine is or how advanced the new engineer capabilities and systems are, the engineer Soldier must understand the operational environment (OE), recognize gaps in capabilities, and adapt to the situation on the ground. Adaptable and professional Engineer Regiment Soldiers are important to our future, and they must be able to successfully perform basic skills and accomplish the mission with or without the assistance of technology. Following is a brief introduction and summary of changes by chapter.

- **Chapter 1** outlines engineer support to BCT missions in all phases of decisive action. Section I outlines the operational overview of engineer support to the BCT. Section II provides an overview of BCT organizations, BEB units, and attached enabler requirements in Army operations; the OE; and the integration of elements of combat power. It discusses the threat as a fundamental part of an overall OE for any operation. It includes the alignment of engineer doctrine that supports BCTs.
- **Chapter 2** outlines new changes to the restructure of engineer organizations within each of the three types of BCTs, describes BCT engineers and BEB staff roles and responsibilities, and provides a summary of each company and specialized platoon. Section I outlines the BEB organization and describes the headquarters and headquarters company (HHC) and the forward support company (FSC). Section II outlines the capabilities and considerations for each company and specialty platoon.
- **Chapter 3** summarizes the types of enablers that are task-organized to BCTs.
- **Chapter 4** outlines engineer missions required to support BCT in all phases of decisive action. Engineer support includes tactical enabling tasks; forms of maneuver; and engineer support during shaping OEs, preventing conflict, prevailing in large-scale ground combat, and consolidating gains. It includes the alignment of engineer knowledge, skills, and attributes that support company/troop, task force, and BCT tactical operations. Chapter 4 also discusses command and control (C2) and the many types of command and support relationships. Leader checklists from the receiving and supporting units are also included to help staffs track and manage many task-organization changes.

- **Chapter 5** discusses engineer integration into maneuver planning and targeting cycles. Engineers must know the military decisionmaking process (MDMP) steps and their roles and responsibilities. Engineer estimates update mission analysis and help commanders visualize the battlefield. This chapter also includes information about lessons learned for information management, battle-tracking, plans, orders, and engineer reachback available to help engineers in unique and ever-changing environments. Task force engineer lessons learned, included the roles of engineer leaders and staff engineers are also covered in this chapter.
- **Chapter 6** addresses sustainment considerations and includes a discussion on required supply rate (RSR) and controlled supply rates (CSR) differences; sustainment issues during phase transitions; and the roles and responsibilities of BEB, BCT, and FSC leaders.

Chapter 1
Engineer Support to the Brigade Combat Team

Engineers who support maneuver forces today face unique challenges, not only with the unpredictability of the OE in which they operate, but also in the adaption of the organizational restructuring of the Army as it continues to transform to compete in large-scale combat. Within the BCT, this forces the organic BEB to adapt to diverse missions, integrate enablers to support the brigade, and rely 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) throughout the warfighting functions to generate combat power in combined arms activities.

SECTION I—OPERATIONAL OVERVIEW

1-1. *Unified land operations* is the simultaneous execution of offense, defense, stability, and defense support of civil authorities across multiple domains to shape operational environments, prevent conflict, prevail in large-scale ground combat, and consolidate gains as part of unified action (ADP 3-0). In unified land operations, Army forces adapt to the requirements of the OE and conduct operations by using decisive action to defeat adversaries by means of Army core competencies. Integrated engineer support is not only critical in conducting combined arms activities in decisive action, but it also adds to the combined arms commander's understanding of OE requirements.

OPERATIONAL ENVIRONMENT

1-2. ADP 3-0 describes an OE in terms of eight operational variables (political, military, economic, social, infrastructure, information, physical environment, and time). 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, civil considerations [METT-TC]). After a mission or warning order is received, an analysis of the OE (in terms of mission variables) provides the relevant information that commanders use to frame tactical problems. Engineers must understand operational and mission variables to best understand how to leverage the capabilities task-organized into the engineer formations in order to advise the BCT commander and support the BCT mission. See FM 3-34 for engineer-specific tasks.

1-3. Understanding the OE is essential to successful operations. As with other leaders, engineers are challenged to understand the OE that they face and to apply their knowledge and capabilities to support the force. They must also be prepared to face future adversaries that are adaptive and have a wide array of capabilities that allow them to successfully fight a technologically superior force. In the OE, engineers have difficulty predicting an enemy course of action (COA) based on threat templates. Engineers must be able to describe an enemy force in terms of the function (fixing, assaulting, exploiting, shielding) of subelements, not in terms of where it might be found on a contiguous battlefield. Engineers must develop methods to discern and identify threat patterns of behavior as the conflict continuum and range of military operations increase. Figure 1-1, page 1-2, depicts the conflict continuum.

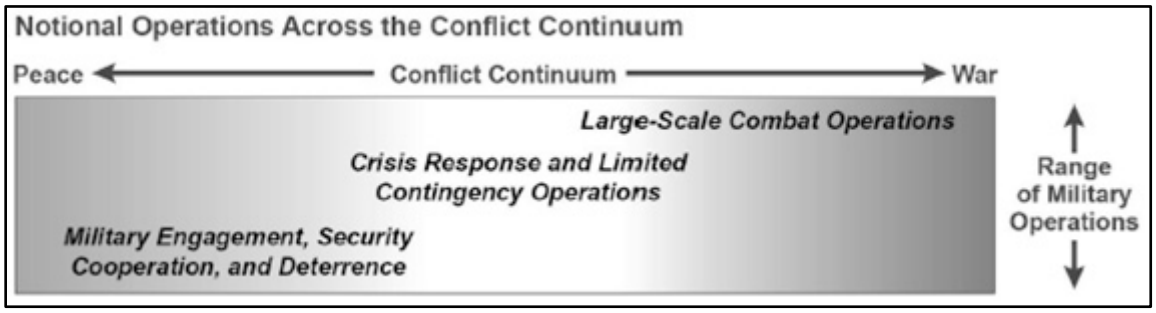

Figure 1-1. Conflict continuum and the range of military operations

1-4. Maneuver commanders rely on the three engineer disciplines—combat, general, and geospatial engineering—to add breadth and depth to the overall understanding of the OE. The engineer perspective shares a general understanding of the OE and adds a degree of focus on aspects from an engineering background. Guided by a common understanding, the engineer perspective seeks to identify the potential challenges and opportunities that are associated with variables that affect the OE. Engineer capabilities are significant force multipliers in joint operations, facilitating the freedom of action necessary for the joint force commander to meet mission objectives. Engineer activities modify, maintain, provide understanding of, and protect the physical environment. In doing so, they—

- Assure the mobility of friendly forces.
- Alter the mobility of adversaries.
- Enhance the survivability 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.
- Identify potential hazards of the OE through a lens of geospatially related attributes of terrain (natural and man-made hazards). Chemical, biological, radiological, and nuclear (CBRN) and seasonally affected areas are included.

SPECIFIC TERRAIN CONSIDERATIONS

1-5. Offensive and defensive activities may be conducted in complex terrain. Each environment presents its own challenges to planning and executing engineer tasks and may require engineers to employ specialized knowledge, skills, techniques, and equipment. The following paragraphs present characteristics of complex terrain that impact the missions that engineers are tasked to execute. See ATP 3-34.80 for additional information about complex terrain.

COMPLEX TERRAIN PLANNING CONSIDERATIONS

1-6. Engineer planners must assess the restrictions on engineer capabilities imposed by the rules of engagement and the presence of noncombatants. Not all engineer systems can be used in an urban environment or restrictive terrain, such as a subterranean condition, with the emphasis on limiting collateral damage. Depending on the threat, the noncontiguous nature of complex terrain requires the additional allocation of security forces to protect vulnerable general engineers executing tasks outside secured areas. The setting also requires additional emphasis on route and area clearance missions to enable the freedom of mobility (movement or maneuver).

1-7. The urban setting provides opportunities for additional resources and services that are not always available in other environments. The engineer considers the availability of host-nation (HN) equipment, construction materials, fortification resources, civilian workforce assets, and civilian subject matter experts. Materials and resources may also come from other sources, such as nongovernmental organizations. Engineer planners look at the availability of ammonium nitrate, acetylene, propane, lumber yards, Jersey barriers, vehicles, and construction equipment that can influence friendly and enemy activities. See ATP 3-06, ATP 3-34.81, and TC 2-91.4 for discussions of engineer reconnaissance and resource assessments.

MOUNTAINOUS TERRAIN AND COLD-WEATHER ENVIRONMENTS

1-8. Operations in mountainous terrain are conducted for three primary purposes: to deny an enemy a base of operations, to isolate and defeat the enemy, and to secure lines of communication (LOCs). Enemy tactics in this environment involve short, violent engagements followed by a hasty withdrawal through preplanned routes. The enemy often strikes quickly and fights only as long as the advantage of the initial surprise is in its favor. Attacks may include direct fires, indirect fires, or the employment of unconventional weapons against stationary or moving forces. The design of the landscape, coupled with climatic conditions, creates a unique set of mountain operations considerations that are characterized by close fights with dismounted infantry, decentralized small-unit operations, degraded mobility, increased movement times, restricted LOCs, and operations in thinly populated areas. Cold climates also require additional planning and preparation due to encountering conditions not present in other environments, climates, and locations. Care must be taken to counter the effects on petroleum, oil, and lubricants; impacts on demolitions; and challenges to satellite communications, particularly at higher elevations and north and south through the polar zones. Refer to ATP 3-21.8, ATP 3-21.50, and ATP 3-90.97 for additional information on mountain terrain and cold-weather environments. See TM 3-34.82 for more information on demolitions employment in cold climates and at higher elevations.

DESERT TERRAIN

1-9. Operations in desert terrain require adaptation to the terrain and climate. Equipment must be adapted to a dusty and rugged landscape with extremes in temperature and changes in visibility. The BCT orients on primary enemy approaches but prepares for an attack from any direction. Considerations for operations in desert terrain include a lack of concealment, the criticality of mobility, the use of natural obstacles (which are limited) to anchor a defense, strong points to defend choke points and other key terrain, and mobility and sustainment. See FM 90-3 for more information on desert terrain.

JUNGLE TERRAIN

1-10. Operations in jungle terrain combine dispersion and concentration. For example, a force may move out in a dispersed formation to find the enemy. Once the force makes contact, its subordinate forces close on the enemy from all directions. Operations are enemy-oriented, not terrain-oriented. Forces should destroy the enemy wherever found. If the force allows the enemy to escape, the friendly force must find the enemy once again, and expose itself to the risks involved. The same defensive fundamentals are used for jungle operations as for other defensive operations. Considerations for offensive and defensive tasks in a jungle environment include limited visibility and fields of fire, ability to control units, and limited and restricted maneuver. (Refer to ATP 3-90.98 for additional information.)

SUBTERRANEAN AREAS

1-11. Subterranean areas can be found in all four OEs described above. Subterranean areas are areas below ground level that may consist of underground facilities, passages, subway lines, utility corridors or tunnels, sewers and storm drains, caves, or other subterranean spaces. This dimension includes areas below the ground and below water. Additional subterranean areas include drainage systems, cellars, civil defense shelters, mines, military facilities, and other various underground utility systems. In older cities, subsurface areas include ancient hand-dug tunnels and catacombs. An understanding of the environment is required to exploit the advantages of subsurface areas. Maximization of these areas could prove to be a decisive factor when conducting offensive and defensive tasks and operations in support of stability. See ATP 3-21.51 and TC 2-91.4 for information on hazardous subterranean structures existing or hidden, or when used in secret by an enemy or adversary.

UNDERSTANDING THE THREAT

1-12. Threats are a fundamental part of an overall OE. A *threat* is any combination of actors, entities, or forces that have the capability and intent to harm United States forces, United States national interests, or the homeland (ADP 3-0). In general, the various actors in any area of operations (AO) can qualify as a threat, an enemy, an adversary, a neutral actor, or a friend. An *enemy* is a party identified as hostile against which the

use of force is authorized (ADP 3-0). An enemy is also called a combatant and is treated as such under the law of war. An *adversary* is a party acknowledged as potentially hostile to a friendly party and against which the use of force may be envisaged (JP 3-0). A neutral is a party identified as neither supporting nor opposing friendly or enemy forces. Land operations often prove complex because a threat, an enemy, an adversary, a neutral party, or a friend can intermix, often with no easy means to distinguish one from another.

THREAT COMPOSITION, DISPOSITION, AND INTENTION

1-13. The BCT commander must understand threats, criminal networks, enemies, and adversaries, to include both state and nonstate actors, in the context of the OE. When the BCT commander understands the threat, the commander can visualize, describe, direct, and assess operations to seize, exploit, and retain the initiative and consolidate tactical gains. The commander and staff must develop and maintain running estimates of the situation (see chapter 3). To develop and maintain running estimates of the situation as the basis for continuous adaptation, the commander and staff must consider their own forces within the realm of emerging threats as well as the mission, terrain, friendly forces, and civilian populations.

1-14. Interactions of various actors affect the BCT AO in terms of interrelated operational variables, a comprehensive set of information categories used to define an OE. Some of these actors include—

- Unified action partners.
- Nongovernmental organizations.
- Private volunteer organizations.
- International and private security organizations.
- Media.
- Multinational corporations.
- Transnational criminal organizations.
- Insurgents.
- Violent extremist organizations.
- Tribes, clans, and ethnic groups indigenous to the AO.
- Regional influences, such as other nation-state actors.

1-15. See FM 3-96 for a further breakdown of potential threat groups including states, nonstate organizations, criminal networks and opportunists, and individuals.

THREAT CAPABILITIES, TACTICS, AND TECHNIQUES

1-16. In order to accurately predict threat activities in time and space, the BCT commander and staff must first understand threat capabilities, tactics, and techniques. Current and future enemies will employ a series of integrated tactical and technical countermeasures to counter friendly operational and tactical advantages. Countermeasures include deception operations, dispersion, concealment, and the intermingling with civilians in urban terrain. The enemy also employs technological countermeasures, such as cyberattacks and Global Positioning System jamming, to evade and disrupt the friendly force's ability to develop the situation, seize the initiative, and consolidate tactical gains into favorable outcomes. See FM 3-13 for more information.

1-17. Enemy forces operate within complex terrain to evade friendly weapon systems, advanced combined arms, and air-ground capabilities. They operate in and among the population to evade detection, preserve their combat power, and retain their freedom of movement. The enemy often establishes relationships with local, regional, and transnational criminal organizations, and violent extremist organizations to finance their operations and gain access to illicit trafficking networks to move illegal weapons, munitions, weapons of mass destruction, people, narcotics, or money.

1-18. Enemy forces use a variety of tactics and techniques that may include deception, cover and concealment, and smoke or other obscurants when conducting operations. They move in small, dispersed units, formations, groups, or cells to avoid detection. They conduct short engagements with three- to 10-man elements that break contact before friendly forces can respond with indirect fire or airborne strike platforms. The enemy creates false battlefield presentations and reduces signatures through deliberate and expedient means of deception to frustrate friendly information collection efforts. The enemy uses hardened and buried

facilities and multispectral decoys to mask the signatures of high-value systems (such as short-range ballistic missiles and surface-to-air missiles). The enemy also exploits safe havens within hostile states or in ungoverned areas and takes advantage of subsurface means (tunnels, underground facilities, sewers, drainage systems, and other subterranean spaces) to avoid detection. As enemies evade U.S. and coalition forces, they seek freedom of movement by exploiting popular support or using intimidation and coercion. The enemy may exploit civilian populations and cultural sites to hide key weapon systems.

1-19. Enemy forces employ combinations of lethal and other actions to disrupt BCT efforts to shape the OE. Lethal actions, which can be offensive or defensive in nature, can be employed through a decisive force. Other actions that can be employed include agitation, dissemination of propaganda, and exploitation of the local population. Enemies employ integrated and networked combined arms teams to offset friendly capabilities. They employ small, dispersed, squad size teams armed with technologically advanced weapons. Weapons include rocket-propelled grenades, antitank guided missiles, and man-portable air-defense systems to conduct short engagements and to defend against friendly armored and counter-manned and unmanned aircraft system (UAS) capabilities. Enemies seek opportunities to mass forces against vulnerable targets such as small combat outposts, dismounted patrols, and logistic convoys where they believe they can achieve quick victories with little risk of decisive engagements. When available, enemy forces employ armored or technical vehicles to increase their tactical mobility, protection, and firepower. Enemies integrate indirect fires such as rockets, mortars, and artillery into their operations.

1-20. Enemies augment their small combined arms team tactical capabilities by employing inexpensive, locally sourced countermeasures such as unconventional weapons systems (improvised explosive devices, Molotov cocktails, suicide bombers, and fire and smoke). They may use peaceful civilian demonstrations and riots as countermeasures as well. Enemies use these countermeasures to impede the ability of friendly forces to move and maneuver or to prevent and delay friendly forces from conducting operations. Enemies seek to acquire technologies such as UAS, satellite sensors, forward-looking infrared/thermal imaging systems, and electronic warfare systems or platforms. Enemies use UAS for intelligence and precision strikes, forward-looking infrared/thermal imaging, satellite imagery, cyberattacks, and electronic warfare systems or platforms.

Countering Adaptations and Retaining the Initiative

1-21. Countering enemy adaptations and retaining the initiative in armed conflicts requires that the BCT commander and staff understand the threat and the OE. Accurately depicting how an enemy employs forces requires an understanding of the enemy organization, the enemy capabilities, and the employment of enemy forces in the past. It also includes the identification of friendly vulnerabilities and the denial of the enemy ability to identify and exploit them. Overcoming increasingly sophisticated area denial actions and capabilities requires an effective information collection effort to develop the enemy situation and threat engineers within the BCT AO.

1-22. To understand the social, economic, informational, and political variables within the OE, the commander's understanding must extend beyond enemy organizations and their capabilities. This understanding includes ethnic groups, political factions, tribes or clans, religious sects, and ideological movements and their agendas. Identifying and distinguishing these groups and the associated subvariables is extremely difficult and requires a detailed, in-depth information collection effort through every phase of the operation.

1-23. While in contact with the enemy and in close proximity to the population, the BCT fights for information to understand and develop the situation. Complementary and integrated information collection capabilities (reconnaissance, surveillance, security operations, and intelligence operations) assist the commander in identifying opportunities to seize, retain, and exploit the initiative and dominate in increasingly challenging and complex environments.

UNDERSTAND, SHAPE, INFLUENCE, AND CONSOLIDATE GAINS

1-24. BCT leaders must understand the OE, shape the OE through action, influence the population and its leaders, and consolidate gains to seize, retain, and exploit the initiative throughout the range of military operations. Regardless of which element of decisive action (offense, defense, or stability) currently

dominates, unit leaders conduct multiple missions to shape the OE and seek to achieve a common goal and end state that correspond with higher-command objectives.

1-25. Engineers must understand the physical OE in order to better help and advise the commander regarding competing interests within the operational and information environment to determine what is of value to competitive parties (to include identified adversaries or enemies) and entities within the BCT AO. Understanding competing interests helps the commander develop courses of action (COAs) that influence the populace and political structure, enhance the security situation, and lead to mission success. The BCT consolidates gains and sets favorable conditions to seize and exploit weaknesses, capitalize on opportunities, and further ally interests to secure stable political settlements and objectives complementary to desired outcomes. Within a backdrop of the conflict continuum, this section addresses those operations primarily focused on the protection of civil populations.

UNDERSTAND THE OPERATIONAL ENVIRONMENT

1-26. Interests are motivations that provide insight to perceived rights, influences, responsibilities, and power. Interests influence how populations perceive physical security, political systems, economic influence, tribal and religious identity, self-serving actions, or some combination. The BCT commander and staff develop an understanding of operational variables (political, military, economic, social, information, infrastructure, physical environment, and time) and mission variables (METT-TC) through information collection to enhance situational awareness and understanding of competing interests. At the tactical level, intelligence operations, reconnaissance, security operations, and surveillance are the four primary means of information collected. The commander and staff can frame a problem if they understand competing interests within the AO. They seek to understand the motivations and recognize that there are multiple perspectives for each interest. The commander and staff consider political interests from multiple perspectives to operate effectively under conditions of complexity and in close contact with enemies and populations. Understanding interests assists the commander and staff in synchronizing capabilities that shape the OE and in modifying behaviors to further sustainable objectives.

1-27. Understanding interests requires analysis of operational and mission variables within a particular region. It also requires an appreciation of the complex, humanistic, and political environments of the OE. The BCT commander and staff employ psychological operations and intelligence capabilities to aid in developing an understanding of cultural communication techniques of the local audience to communicate effectively. This helps commanders and staffs to understand that the most important aspect of cultural communication is the way in which the population receives the information rather than the way in which the unit transmits the information. Determination of valued interests within an AO provides options for the BCT to establish programs that incentivize cooperation that leads to mission accomplishment. Understanding interests allows commanders to create disincentives and coerce and persuade adversaries, enemies, and neutral parties with interests counter to the objectives that the BCT and higher echelons have established. The understanding and acknowledgement of interests help to better employ information-related capabilities.

1-28. The BCT conducts information collection through intelligence operations, reconnaissance, security operations, and surveillance means that focus on information requirements to bridge information gaps. Gaps identified during intelligence preparation of the battlefield (IPB) develop into information requirements through aggressive and continuous operations to acquire information. The BCT staff considers operational and mission variables, with emphasis on civil considerations, to understand the interests within the AO. Information requirements that develop situational understanding of the interests within an AO are defined and collected by focusing civil considerations within the construct of areas, structures, capabilities, organizations, people, and events. The commander uses staff estimates and assessments to understand the OE. Civil considerations (a mission variable) and operational variables are evaluated to understand the nuances and particulars of the areas, structures, capabilities, organizations, people, and events within the AO. Capabilities such as civil affairs (CA) and psychological operations assets provide expertise to evaluate operational and mission variables in order to develop estimates and assessments.

1-29. Engineers use country studies, analysis of infrastructure, and key local national engineer leaders to create a baseline knowledge that increases situational awareness and identifies potential areas of friction before deployments. HN transportation, contracting, and engineer partners provide valuable insight into the values, beliefs, specialties, and interests. As these organizations are composed of the people, their native

fluency in the customs, cultures, and procedures provides the partnering perspective that develops an understanding of the OE. See the TC 7 series publications for country- and equipment-specific information on worldwide threat armies.

1-30. Geospatial engineers generate, manage, analyze, and disseminate geospatial data and information related to the five military aspects of terrain: observation and fields of fire, avenues of approach, key terrain, obstacles, and cover and concealment. At the BCT level, the geospatial engineer team, with guidance and oversight from the engineer staff officers, provides geospatial data, information, and knowledge to commanders and staffs, which should help provide awareness, understanding, and visualization of the physical terrain from the initial planning throughout execution of operations. Analysis and understanding of the terrain/physical environment prior to the execution of an operation can influence intelligence and reconnaissance plans, task organization, critical-asset placement, and allocation of resources to best support an operation. See ATP 3-34.80 and TC 3-34.80 for additional information on terrain analysis and situational understanding of the physical environment.

SHAPE THE ENVIRONMENT

1-31. Setting conditions to shape the OE requires an understanding of competing dynamics within the AO. The BCT commander and staff consider the competitive environment of the AO and shape the OE to set conditions to seize, retain, and exploit the initiative. Different political entities, personalities, tribal dynamics, religious interests, economic motivations, sources of security, and potential havens of refuge for enemies all contribute to the competitive nature of the OE. Not all of these interests are parallel and mutually supportive of the objectives and end state for a particular region. The commander and staff develop situational understanding and influence personalities and organizations to achieve objectives to shape the environment. Shaping the environment includes persuading and empowering other personalities and organizations to modify behaviors and actions consistent with the BCT commander's intent and objectives. Setting conditions is an enduring process throughout all phases of an operation.

1-32. The BCT commander and staff understand operational and mission variables within the AO through analysis enhanced and developed through information collection. The commander and staff seek to understand the interests and motivations of the populations and to identify pillar organizations that provide guidance, inspiration, and strength to the population. The BCT must understand who in the AO is influential enough to engage leaders, modify behaviors, and persuade neutral and fringe groups to align with BCT objectives and plan and execute limited offensive operations that set conditions for future successes. Ultimately, greater understanding of operational and mission variables is essential to the development, planning, and execution of information-related capabilities that shape the OE.

1-33. The primary role of engineers is to shape the physical aspects of the OE. Engineers seek to understand competitive interests within an AO and how those interests influence desired outcomes and objectives. Engineer activities that shape the OE derive success in how effective the HN government is empowered to support the current infrastructure. Engagements with HN, local communities, and internal and external contracting companies help form relationships, clearly defined goals, and a common reference point for future engagements and activities.

INFLUENCE ENGINEER STAKEHOLDERS

1-34. The BCT commander ensures that actions, themes, and messages complement and reinforce each other to accomplish objectives. Themes guide messages and other information products. Message reinforce specific actions or objectives and are situation- or mission-dependent (see FM 3-61). A message is a verbal, written, or electronic communication that aligns with a specific theme focused on an audience. A message supports a specific action or objective. Actions, themes, and messages are inextricably linked. The commander ensures that actions, themes, and messages complement and reinforce each other and support operational objectives. The commander keeps in mind that every action may imply a message and avoids contradictory actions, themes, or messages.

1-35. A given theme directly leads to a narrative. Narratives provide a communication mechanism and are the unifying structures between action and communication with the populace and external individuals and groups, such as governments and populations in neighboring countries, allies, the international community,

the media, and others who can affect the course of an operation. Simple narratives tie the actions of the BCT together with unit objectives. Simple narratives provide a basis for informing and influencing leaders and pillars as to the purpose behind actions and activities conducted by HN forces and the BCT. Compelling narratives seek to address concerns and interests of the populace while explaining the methodologies undertook by the HN government and security forces in partnership with the BCT. All BCT leaders must understand the narrative, as they play a central role in key leader engagements and all information-related capabilities. Narratives explain and justify friendly actions while delegitimizing enemy and adversary actions. Narratives simultaneously serve as both communication mechanisms and counterpropaganda instruments that help to gain the populace support or, at least, noninterference.

1-36. Engineers help the BCT with efforts designed to bolster HN partner legitimacy among the populace and global audience. Helping HN improve their essential services and infrastructure legitimizes HN organizations and secures the support of their populace. Measureable and noticeable progress, however slight, enhances legitimacy that improves the security, law and order, essential services, economic situation, and social structure over time.

INFLUENCE OUTCOMES

1-37. The BCT commander and staff employ information-related capabilities within the BCT AO to empower the successful accomplishment of objectives. Influence alters public opinion, garnering support for military and diplomatic operations. All assets and capabilities at a commander's disposal have the capacity to achieve objectives and inform and influence to varying degrees. Some examples of resources that the commander may use include combat cameras, counterintelligence, maneuver, and network operations. Objectives encapsulate the results of activities and the expected or desired conclusion of missions and tasks. Use of information-related capabilities nested within tactical, operational, and strategic objectives reinforces narratives that inform and promote influence.

1-38. Continuous information collection by engineer reconnaissance teams and engineer units on the ground, followed by an analysis of the collected information, is essential to gain and implement influence. Engineer staffs ensure that any expected or desired outcomes of other activities and operations link and nest with that of influencing friendly mechanisms and narratives.

CONSOLIDATE GAINS

1-39. *Consolidate gains* are activities to make enduring any temporary operational success and to set the conditions for a sustainable security environment, allowing for a transition of control to other legitimate authorities (ADP 3-0). The consolidation of gains is an integral part of winning and achieving success across the conflict continuum and the range of military operations. Gains capitalize on success in military operations, the information environment, and combined operations to accomplish tactical, operational, and strategic objectives. Gains serve as the follow-through to achieve the commander's intent and are essential to retaining the initiative over determined enemies and adversaries.

1-40. The consolidation of gains is not a mission. It is an Army strategic role defined by the purpose of the tasks necessary to achieve enduring political outcomes to military operations and, as such, represents a capability that Army forces provide to the joint force commander. Consolidating gains enables a transition from the occupation of a territory and control of populations by Army forces that occurred as a result of military operations to the transfer of control to legitimate authorities. Activities to consolidate gains occur across the range of military operations and often continue through all phases of a specific operation.

1-41. To consolidate gains, the BCT commander reinforces and integrates the efforts of all unified action partners within the AO. The BCT staff deliberately plans and prepares for consolidating gains to capitalize on successes prior to an operation. Planning should address changes to task organization and the additional assets required in a specific situation. Additional engineer, military police, CA, Army special operations forces, and medical capabilities typically support the security and stability of large areas. In some instances, the BCT is in charge of integrating and synchronizing activities; in others, the BCT serve in a support role.

1-42. Consolidation of gains describes activities designed to make the achievement of the military objective enduring. Engineer support to offensive and defensive operations and a broad array of stability tasks may continue over time in specific OEs. Maneuver forces adjust their AO to mass effects and to ensure that C2

covers critical aspects of the AO. Engineers must deliberately plan and prepare for a shift in vital engineer resources to support the consolidation of gains that capitalizes on operational success. Engineers and their supporting enablers such as military police, explosive ordnance disposal personnel (EOD), medical personnel, and CA are expected to conduct stability or security operations.

1-43. Engineer C2 shifts to place headquarters nodes at key mission sites. Follow-on forces may bring critical units and resources that are not required for large-scale combat but are essential for supporting the consolidation of gains and stability of the region.

1-44. Engineer tasks that support the consolidation of gains are similar to the tasks of shape-and-prevent operations. These include—

- Assess civil infrastructure.
- Conduct area clearance to remove explosive hazards.
- Reconnoiter additional LOCs, roads, and bridges to support freedom of maneuver.
- Improve force protection measures for critical infrastructure.
- Improve combat roads and trails and replace tactical bridging with longer-term LOC bridging.
- Increase the number of contracts for Class IV supplies, construction equipment, or construction labor.
- Construct base camps and improve infrastructure as forces and logistics are relocated within the AO.

LARGE-SCALE COMBAT OPERATIONS

1-45. Large-scale combat operations (LSCO) are at the far right of the competition continuum and are associated with war. LSCO are intense, lethal, and brutal. Conditions include complexity, chaos, fear, violence, fatigue, and uncertainty. Battlefields include operations across the entire expanse of the land domain and noncombatants crowded in and around large cities. Enemies employ conventional tactics, terror, criminal activity, and information warfare to further complicate operations. Enemy activities in the information environment are inseparable from ground operations. LSCO historically present the greatest challenge for Army forces across the range of military operations.

1-46. Army forces constitute the preponderance of land combat forces. They are organized into corps and divisions during LSCO. Army forces seize the initiative, gain and exploit positions of relative advantage in multiple domains to dominate an enemy force, and consolidate gains. Corps and divisions execute decisive action (offense, defense, and stability) tasks, with offensive and defensive tasks making up the preponderance of activities conducted during combat operations. Corps and division commanders must explicitly understand the lethality of LSCO to preserve combat power and manage risk. Commanders use ground maneuver and other land-based capabilities to enable maneuver in the air, land, and maritime domains. Commanders leverage cyberspace operations, space capabilities, and information-related capabilities to support ground maneuver.

1-47. During LSCO, maneuver BCTs conduct offense, defense, and operations in support of stability operations throughout EAB operating areas. The BCT and its subordinate echelons concentrate on performing offensive and defensive tasks and necessary tactical enabling tasks. The BCT performs only the minimal essential stability tasks necessary to comply with the laws of land warfare. Within an operational framework, the BCT does not conduct operationally significant consolidation of gains activities unless assigned that mission in a consolidation area.

1-48. Engineer missions during LSCO support BCT offensive and defensive missions. Engineers shape the physical OE to optimize both friendly and enemy effects on the battlefield in favor of the friendly action. The BCT commander employs the appropriate offensive form of maneuver to close with an enemy to mitigate any disadvantage in capabilities. This typically requires rapid movement through close or complex terrain during periods of limited visibility. Subordinate unit combat formations move in as dispersed a manner as possible while retaining the capability to mass effects against enemy forces at opportune times and places.

1-49. Engineer support during offensive operations typically includes breaching, gap crossing, emplacing obstacles (preventing flank attacks), and other mobility-related tasks that support the maneuver unit's ability to penetrate enemy defenses or engage. During defensive operations, engineers construct obstacles and

enhance protection through engagement area development and the creation of fighting positions, ensuring integration with direct and indirect fires. Protective works and survivability positions ensure critical BCT assets are protected and can support both offensive and defensive operations.

1-50. Defending commanders direct the delivery of effects in multiple domains to establish the positions of relative advantage necessary for a successful counterattack. Defense plans at each echelon retain a reserve regardless of the defensive task assigned. The reserve is normally an uncommitted force available for commitment at the decisive moment during the operation. The division or BCT tasked to provide forward security normally conducts either a cover or guard mission or other offensive task to set conditions to regain the initiative and transition to the offense.

COMBINED ARMS

1-51. The application of combat power is dependent on combined arms to achieve its full destructive, disruptive, informational, and constructive potential. *Combined arms* is the synchronized and simultaneous application of arms to achieve an effect greater than if each element was used separately or sequentially (ADP 3-0). Through combined arms, the BCT commander integrates leadership, information, and each of the warfighting functions and their supporting systems. Used destructively, combined arms integrates different capabilities so that counteracting one makes the enemy vulnerable to another. Used constructively, combined arms multiplies the effectiveness and efficiency of Army capabilities used in operations in support of stability.

1-52. Combined arms operations use all Army, joint, and multinational capabilities (when available)—in the air, land, maritime, space, and cyberspace domains—in complementary and reinforcing ways. Complementary capabilities protect the weaknesses of one system or organization with the capabilities of a different warfighting function. For example, commanders use artillery (fires) to suppress an enemy bunker complex pinning down an infantry unit during tactical movement (movement). The infantry unit then closes with (maneuver) and destroys the enemy. In this example, the fires warfighting function complements the movement and maneuver warfighting function.

1-53. Combined arms capabilities multiply the effectiveness of Army forces in all operations. Units operating without support of other capabilities generate less combat power and may not accomplish their mission. Employing combined arms requires highly trained Soldiers, skilled leadership, effective staff work, and integrated information systems. Commanders synchronize combined arms through C2 to apply the effects of combat power to the best advantage. By enabling subordinates to execute missions, they conduct simultaneous combinations of offensive, defensive, and stability operations to defeat an opponent and establish conditions that achieve the commander's desired end state.

HASTY VERSUS DELIBERATE OPERATIONS

1-54. Army forces are specifically task-organized for an operation to provide a fully synchronized combined arms team. Combined arms teams conduct extensive rehearsals while also conducting shaping operations to set the conditions for the conduct of the decisive operation. Most operations lie somewhere along a continuum between two extremes—hasty operations and deliberate operations. A *hasty operation* is an operation in which a commander directs immediately available forces, using fragmentary orders, to perform tasks with minimal preparation, trading planning and preparation time for speed of execution (ADP 3-90). A *deliberate operation* is an operation in which the tactical situation allows the development and coordination of detailed plans, including multiple branches and sequels (ADP 3-90). Determining the right choice involves balancing several competing factors.

1-55. The decision to conduct a hasty or deliberate operation is based on the commander's current knowledge of the enemy situation and an assessment of whether the assets available (including time) and the means to coordinate and synchronize those assets are adequate to accomplish the mission. If they are not, the commander takes additional time to plan and prepare for the operation or bring additional forces to bear on the problem. The commander makes that choice in an environment of uncertainty, which always entails some risk. Ongoing improvements in C2 systems continue to assist in the development of a common operational picture (COP) of friendly and enemy forces while also facilitating decision making and the communication

of decisions to friendly forces. These improvements can help diminish the distinction between hasty and deliberate operations; they cannot make that distinction irrelevant.

1-56. Engineers must act under conditions of uncertainty while balancing various risks and taking advantage of opportunities. A lack of information about the terrain, weather, or available resources cannot paralyze the decision making process. Engineers who advise commanders to conduct hasty operations must mentally synchronize the employment of available resources before fragmentary orders (FRAGORDs) are issued. Available resources include tangible and intangible factors, such as the level of training and experience of subordinates, the commander's own experience, the perception of how the enemy will react, an understanding of time-distance factors, and a knowledge of the strengths of each subordinate and supporting unit. See ADP 3-90 for additional information.

ENGINEER CONSIDERATIONS FOR INFORMATION COLLECTION

1-57. If the BCT elects to conduct separate information operations, targeting meetings, or internal cell meetings before the BCT targeting meeting occurs, the assistant brigade engineer (ABE) or a representative participates. Engineer participation in targeting provides a medium for integrating the nonlethal effects of specific engineer capabilities. It also provides the ABE with an excellent opportunity to implement engineer requirements into the prioritization of information collection, public affairs activities, psychological operations, and the tasking of limited assets within the BCT.

1-58. Although not part of an information collection planning cell, the public affairs officer coordinates with nonlethal operations to ensure that disseminated information is not contradictory. The ABE coordinates with the public affairs officer for the inclusion of engineer operations within BCT public affairs programs, including HN and U.S. media coverage of engineering projects.

1-59. The ABE coordinates with the BCT psychological operations (PSYOP) officer for surveys in local communities to compare pending engineering projects with local population needs. PSYOP and public affairs personnel support each other by coordinating and deconflicting their activities, ensuring the credibility of the information provided to the general population by HN and U.S. forces, especially with regard to engineering projects. PSYOP forces can also reduce civilian interference with friendly military operations.

1-60. The engineer knowledge of public works and HN infrastructure (derived from participation in infrastructure reconnaissance and surveys) can assist the BCT staff in identifying information collection-specific high-value targets. Engineer planners also provide current information regarding the status and plans for engineer projects throughout the AO and area of interest. (See ATP 3-34.81 for additional information on infrastructure reconnaissance.)

1-61. 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 desired nonlethal effects. These projects can facilitate positive targeting of local leaders and 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, which legitimizes that leader's position. The target (local leader) then becomes more favorable to friendly operations, followed by more favorable reactions by the local population. As friendly forces receive local support and as legal agreements with the HN are secured, successful operations increase. See ATP 3-55.4 and FM 3-55 for additional information on information collection.

SECTION II—BRIGADE COMBAT TEAM—ENGINEER SUPPORT STRUCTURE

BRIGADE COMBAT TEAM ENGINEER STAFF ORGANIZATION

1-62. BCT staff sections are organized into functional and integrating cells. This organization may vary, depending on the BCT type or the mission assigned to the BCT. The BCT staff usually organizes the following five functional cells:

- Movement and maneuver.
- Intelligence.

- Fires.
- Sustainment.
- Protection.

1-63. The BEB commander is the brigade engineer in the BCT. The BEB commander advises the maneuver commander on the best way to employ engineer capabilities. The BEB provides organic engineer, military intelligence, signal, and CBRN planning and execution capabilities to the BCT.

ASSISTANT BRIGADE ENGINEER SECTION

1-64. The ABE is the senior engineer on staff and is tasked with coordinating engineer support to combined arms operations. The ABE normally works in the battalion or brigade operations staff officer (S-3) section at the tactical operation center (TOC) or tactical CP. The ABE integrates specified and implied engineer tasks into the maneuver force plan. The ABE ensures that supporting engineer units are integrated into mission planning, preparation, execution, and assessment activities. The ABE prepares Annex G (Engineer) to the operation order (OPORD). (See chapter 6.)

1-65. The ABE section, located in the main command post (CP) and BCT tactical CP must coordinate priorities and resources with the BEB commander and their staff in order to synchronize efforts across the BCT area of responsibility. See FM 3-96 for additional details on staff functions and procedures.

1-66. The primary duty of the ABE is to coordinate engineer activities in support of the BCT. The ABE section must understand the full array of engineer capabilities (combat, general, and geospatial engineering) that are available to the force and synchronize them to meet the needs of the maneuver commander. The ABE section 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 the task organization, the ABE section is accountable for planning and monitoring engineer units that support the maneuver unit. During the conduct of engineer missions, the BEB staff and ABE conduct the operations process (plan, prepare, execute, and assess).

1-67. When planning for operations, the ABE section—

- Assists the battalion or brigade intelligence staff officer (S-2) with IPB, which includes obtaining information from the preparation of the engineer running estimate.
- Determines and evaluates critical aspects of the engineer situation.
- Formulates COAs or schemes of engineer operations for engineer support to meet the maneuver commander's intent.
- Prioritizes engineer missions supporting 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 decision making.
- Advises the commander on—
  - Using organic and nonorganic engineer assets.
  - Employing and reducing obstacles.
  - Implementing survivability efforts.
  - Employing engineer reconnaissance.
- Recommends task organization support requirements from EAB engineer capabilities.
- Informs the maneuver commander about the capabilities, limitations, and employment considerations of supporting engineers and related assets.
- Develops a scheme of engineer operations that is concurrent with maneuver COAs.
- Recommends—
  - Engineer priorities of effort and support.
  - Essential tasks for mobility, countermobility, and survivability.
  - Acceptable tactical and operational levels of risk.
- Recommends the engineer organization, command and support combat relationships, and task organization changes throughout the operation.

- Visualizes the future state of engineer activities within the supported maneuver unit.
- Integrates the engineer functions of combat, general, and geospatial engineering into future plans of the supported maneuver unit.
- Develops a plan for engineer support if the BCT tactical CP deploys separately.
- Develops an obscuration support plan for offensive and defensive mission employment.

1-68. When preparing for operations, the ABE section—

- Trains engineers assigned to the main CP and BCT tactical CP.
- Issues timely instructions and orders to subordinate engineer units through the maneuver unit base order to simplify preparation and integration.
- Develops the necessary input to maneuver unit orders and annexes and engineer unit orders.
- Coordinates the production and distribution of maps and terrain products.
- Recommends information requirements to the S-2.
- Participates in the targeting process.
- Participates in appropriate working groups.
- Plans and coordinates the integration of obstacles and fires with the fires cell.
- Recommends main supply routes (MSRs) and logistics areas to the battalion or brigade logistics staff officer (S-4) based on technical information derived from the terrain analysis.
- Coordinates to support the mobility, countermobility, and survivability effort.
- Coordinates with the maneuver unit S-4 to support base camp, facility, 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.
- Assists the commander in integrating environmental considerations into decision making.
- Recommends when engineer dive support may facilitate specific engineer reconnaissance in support of the maneuver unit mission.
- Ensures that enablers tasked with rendering explosive hazards (EOD) safe, military working dogs, electronic warfare officers, explosive ordnance clearance agent (EOCA) are integrated into operations.
- Conducts coordination with division engineer staff and adjacent engineer units.

1-69. When executing operations, the ABE section—

- Uses the feedback received from subordinate maneuver and engineer units to develop alternative COAs in the engineer plan for the BCT commander.
- Provides operational readiness and location 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.
- Monitors the execution of engineer orders and instructions by tracking current CP operations.

1-70. When assessing operations, the ABE section—

- Tracks and disseminates planned and known obstacles from higher, lateral, and lower echelons, scatterable mines, survivability conditions, route conditions, engineer missions, lane conditions, and other engineer-specific information.
- Establishes and maintains a continuous, open link among engineer cells, engineer staffs, and supporting engineer CPs.
- Uses the running estimate and the continuous link with supporting engineer staffs and units to compute resource and force requirements and to recommend engineer task organization.
- Monitors the execution of engineer orders and instructions by tracking current operations and assessing impacts to future operations.
- Uses reports from engineer units to measure and analyze engineer performance and anticipate changes and unforeseen requirements.

1-71. The ABE plays a vital role in targeting lethal and nonlethal effects. Preparation and focus are keys to successful targeting meetings. The primary role of the ABE is to ensure that lethal effects integrate with obstacles to provide desired effects and to plan and coordinate artillery-delivered and tactical aircraft-delivered scatterable mines. The ABE ensures that these obstacles meet the BCT commander's intent and that they are in the most advantageous location in relation to reinforcing terrain. The ABE also—

- Participates in the targeting working group.
- Coordinates for establishing critical friendly zones at planned breach and crossing sites.
- Coordinates the survivability effort to protect critical BCT assets, such as radars and C2 nodes.
- Advises the BCT commander and fires cell on environmental considerations (including cultural properties) as the integrator that may be affected by lethal fires.
- Advises the staff on possible damage to local infrastructure as the integrator that may adversely affect the attitude of the local population.
- Advises the BCT commander of the impacts to friendly mobility caused by lethal effects (such as remote antiarmor mines [RAAM] employed on mobility corridors).

Note. Other terrain-shaping obstacle systems are available on the Korean Peninsula.

- Gathers technical information, including relative locations, on enemy engineer units and equipment that are potential high-payoff target nominations.
- Provides recommendations for air tasking order nominations (normally based on a 72-hour cycle) for tactical, air-employed scatterable mines.
- Assists in developing named areas of interest (critical infrastructure, obstacle locations, enemy engineer equipment).
- Updates the engineer portion of the intelligence update, which is derived from new information on enemy engineer units, activities, or obstacles (known or predicted) based on results of information collected or engineer reconnaissance conducted.
- Provides updates for friendly and enemy effects of terrain and weather based on engineer information on terrain or reconnaissance.
- Provides geospatial products supporting targeting decisions.

BRIGADE COMBAT TEAM GEOSPATIAL ENGINEER TEAM

1-72. All 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. The geospatial engineer team maintains the foundational geospatial information that supports the brigade COP on the brigade server and synchronizes updates to the brigade portion of the theater geospatial database with the organizational higher headquarters geospatial engineer. The team primarily supports the S-2 and S-3 (especially the ABE), but also supports other staff and subordinate units as directed. The geospatial engineering team is organic within the BCT S-2, where the teams, along with the geospatial-intelligence imagery analysts, form the BCT geospatial intelligence cell. The geospatial intelligence cell focuses on converging, correlating, and analyzing imagery, imagery intelligence, and geospatial information to create products or display timely, accurate, and relevant intelligence. The geospatial engineering team requires access to the classified tactical local area network and secret internet protocol router network 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.
- Provide updates to the theater geospatial database.
- Update maps.
- Produce tactical decision aids.

- Produce IPB overlays.
- Operate on a 24-hour basis.

1-73. Geospatial engineering provides commanders with terrain analysis and visualization, which improves situational awareness and enhances decision making during planning, preparation, execution, and assessment. Some example applications of tactical decision aids include—

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

BRIGADE ENGINEER BATTALIONS

1-74. The BEB in each BCT provides a baseline of engineer capabilities, which are augmented by capability and capacity from EAB engineer units. The ABE section within the BCT staff identifies the required augmentation and coordinates its application. Additional Army, joint, multinational, interagency, and other engineering capabilities may be available and task-organized to augment the BCT for various phases of the operation. Additional Army engineering capabilities are organized within an engineer force pool. The construct of the Army engineer operational force is a complementary and interdependent relationship between four unit categories (organic engineer, engineer headquarters, baseline engineer, and specialized engineer).

1-75. Brigade special troop battalions have converted to BEBs in all components, yet some legacy techniques and practices regarding the use of BEBs in support of BCT missions remain. BEBs help the BCT commander gain C2 over many of the attached enablers a BCT receives. Normally employing a mission command approach BEBs headquarters and staff manage diverse and complicated missions. Commanders, staffs, and units must quickly adapt, reframe, and refocus capabilities and resources on unique and diverse missions across increasingly larger areas of responsibility.

1-76. The BEB has C2 of assigned and attached engineer companies and is assigned a military intelligence company (MICO), a signal company, and a CBRN reconnaissance platoon (located in the headquarters and headquarters company). The BEB provides capabilities for bridging, breaching, route clearance, explosive-hazards identification, and limited horizontal construction.

ECHELON ABOVE BRIGADE ENABLERS

1-77. BCTs typically require engineer augmentation for deliberate offensive and defensive missions. The ABE assesses the requirement of additional engineer capability and capacity during mission analysis and provides input on recommended augmentation. Recommended capabilities may include combat, general, and specialized engineering capabilities to support BCT maneuvers.

1-78. Stability and defense support of civil authorities (DSCA) change the nature and focus of much of the engineer support to the BCT. While the augmentation of selected combat engineering skills remains essential, the likely requirement from EAB enablers normally centers on general engineering organizations (including the United States Army Corps of Engineers [USACE]) and capabilities. As with support for combat operations, engineer augmentation may occur in the form of teams, sections, platoons, or companies or under the C2 of a task-organized, multifunctional, battalion size engineer task force headquarters. The focus of an engineer battalion task force will likely be on general engineering support, with special emphasis on reestablishing infrastructure within the AO.

1-79. Chapter 3 details specific capabilities that may be task-organized to the BEB or BCT. A BEB may be task-organized with the following capabilities and units:

- Additional engineer headquarters.
- EAB engineer baseline units.
- EAB specialized engineer units.
- A sapper company.

- A mobility augmentation company.
- A clearance company.
- A mine dog detachment.
- An engineer support company.
- Horizontal- and vertical-construction companies.
- An EOD detachment.
- A military police platoon or company.
- A CBRN platoon or company.
- An air defense artillery (ADA) unit.
- A CA team or company.
- A military information support operations company.
- A cyber and cyberspace support team.

SISTER SERVICE ENGINEER CAPABILITIES

1-80. Each Service has baseline engineering units and capabilities that stem from traditional roles and associations to meet specific operational needs and to support the accomplishment of a variety of mission requirements in an OE.

1-81. The engineering capabilities of each Service component may be used to provide engineering support to other components to meet joint force requirements. See JP 3-34 for additional information on other Service engineer capabilities.

MARINE CORPS ENGINEERS

1-82. The primary tasks of the U.S. Marine Corps engineers are combat engineering and limited general engineering in support of Marine air-ground task forces. The Marine Corps has limited geospatial engineering capabilities that reside in the intelligence branch of the Marine Corps, with one topographic platoon supporting each Marine expeditionary force. See MCWP 3-34 for more information on Marine Corps engineer capabilities.

NAVY ENGINEERS

1-83. U.S. Navy construction battalion engineers, also known as Seabees, organized under the naval construction force, have rapidly deployable, general engineering units of various sizes and configurations tailored to provide responsiveness and flexibility. Seabees provide advanced base construction, including—

- LOC.
- Maintenance upgrades.
- Battle damage repairs.
- Underwater and amphibious structures.
- Logistics facilities.

1-84. 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. See NWP 4-04 for more information on Navy engineering capabilities.

AIR FORCE ENGINEERS

1-85. The primary tasks for U.S. Air Force engineers are 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 only with organic capabilities to support airfield operations. 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.

1-86. These same units can deploy as detached units that operate in support of specific missions and operational tasks, including—

- Airfield pavement evaluation.
- Crash and fire rescue.
- EOD.
- Emergency management response.
- Airfield damage repair.
- Facility construction and maintenance.
- Utility system construction and maintenance.
- Aircraft arresting system installation and maintenance.
- Airfield lighting and marking.
- Navigation aid installation.

1-87. Air Force engineers are organized as prime base engineer emergency force and rapid engineer deployable heavy operational repair squadron engineer units, which provide a broad array of general and geospatial engineering capabilities.

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Chapter 2
Brigade Engineer Battalions

Engineer commanders and planners must understand the resource limitations within the BEB task organization and request support that is specific to maneuver element needs from the EAB. Providing precise and timely engineer support across the brigade AO creates unique C2 challenges. Commanders and planners must understand this setting and the inherent C2 challenges they face when integrating engineer capabilities into support operations. This chapter focuses on the engineer application of organic and augmenting engineer units, engineer commanders, and engineer planners; discusses planning; and provides considerations for engineers as integrated members of the combined arms team. The essential tasks for mobility, countermobility, survivability, and the engineer staff running estimate are highlighted to assist engineer planners in integrating engineers. This chapter also provides an overview of integrating processes and continuing activities and their contribution to the overall operations process.

SECTION I—BRIGADE ENGINEER BATTALION TYPES AND STRUCTURES

2-1. The BEB in each BCT provides a baseline of combat capabilities that can be augmented with specialized units from the EAB. The ABE section within the BCT staff identifies the required augmentation and coordinates its application with the BEB commander and staff. Each BCT has organic geospatial engineering capabilities to provide a baseline of geospatial support. Additional Army, joint, multinational, interagency, and other engineering capabilities may be available and task-organized to augment the BCT for various operational phases. Additional Army engineering capabilities are organized within an engineer force pool. The construct of the Army engineer operational force consists of a complementary and interdependent relationship between four major unit categories (organic engineer, engineer headquarters, baseline engineer, and specialized engineer).

BRIGADE COMBAT TEAM

2-2. Though similar, engineers must understand the mission, capabilities, limitations, and internal organization within each of the three types of BCTs—the infantry brigade combat team (IBCT), the Stryker brigade combat team (SBCT), and the armored brigade combat team (ABCT). There is also a security force assistance brigade with a BEB structure that is vastly different than these BCTs. See FM 3-96 for more detail on each BCT type, and see ATP 3-96.1 for information on security force assistance brigades.

2-3. The IBCT is an expeditionary, combined arms formation optimized for dismounted operations in complex terrain—a geographical area consisting of an urban center more extensive than a village and/or of two or more types of restrictive terrain or environmental conditions occupying the same space (see ATP 3-34.80). The IBCT can conduct entry operations by ground, air landing, air assault, or amphibious assault (via surface and airborne vehicles) into austere AO with little or no advanced notice. Airborne IBCTs can conduct vertical envelopment by parachute assault. The dismounted capability of the IBCT in complex terrain separates the IBCT from other functional brigades and maneuver BCTs.

2-4. The IBCT performs complementary missions to SBCTs and ABCTs. The IBCT is optimized for offense against conventional, hybrid, and irregular threats in severely restrictive terrain. The IBCT performs missions such as reducing fortified areas, infiltrating and seizing objectives in the enemy rear, eliminating enemy force remnants in restricted terrain, securing critical facilities, and conducting tasks supporting

stability in the wake of maneuver forces. The IBCT field artillery battalion is much different than that of an ABCT.

2-5. The SBCT is an expeditionary combined arms force organized around mounted infantry. SBCT units operate effectively in most terrain and weather conditions due to their rapid strategic deployment and mobility. The role of the SBCT is to close with the enemy, using fire and movement to destroy or capture enemy forces or repel enemy attacks by fire, close combat, and counterattack to control land areas, including populations and resources. The SBCT can gain the initiative early, seize and retain key terrain (an identifiable characteristic whose seizure or retention affords a marked advantage to either combatant [see ADP 3-90]), and conduct massed fire from several weapons directed at a single point or small area (see JP 3-02) to stop the enemy.

2-6. SBCTs balance combined arms capabilities with significant mobility. The SBCT primarily fights as a dismounted infantry formation that includes three SBCT infantry battalions. The SBCT infantry battalion has three SBCT infantry rifle companies, each with three SBCT infantry rifle platoons. Each SBCT infantry rifle company has a section of organic 120-millimeter Stryker mortar carrier vehicles with 60-millimeter dismounted mortar capabilities and a Raven UAS team. The HHC also has a mortar platoon equipped with 120-millimeter Stryker mortar carrier vehicles with 81-millimeter mortar dismounted capabilities. The HHC has a scout platoon, fire support team, sniper squad, and medical platoon. Refer to ATP 3-21.11 and ATP 3-21.21 for additional information.

2-7. The SBCT weapons troop combat power resides within its three antitank guided missile platoons and three mobile gun system platoons. It has a headquarters section with an assigned infantry carrier vehicle. The antitank guided missile platoons engage the enemy using long-range antiarmor fires and maneuvers to destroy or repel enemy assaults by fire and counterattack. The platoons have three antitank guided missile vehicles. The mobile gun system platoons provide precise long-range direct fire to destroy or suppress hardened enemy bunkers, machine gun positions, sniper positions, and long-range threats. They also create infantry breach points in urban; restricted; and open, rolling terrain. The 105-millimeter main gun of the mobile gun system provides the platoon with limited antiarmor, self-defense capabilities.

2-8. The ABCT role is to close with the enemy, using fire and movement to destroy or capture enemy forces or repel enemy attacks by fire, close combat, and counterattack to control land areas, including populations and resources. The ABCT is organized to concentrate overwhelming combat power. Mobility, protection, and firepower enable the ABCT to conduct offensive operations with great precision and speed. The ABCT performs complementary missions to the IBCT and SBCT. The ABCT conducts sustained and LSCO within the foundations of unified land operations. The ABCT can fight without additional combat power but can be task-organized to meet the precise needs of its mission.

BRIGADE ENGINEER BATTALION

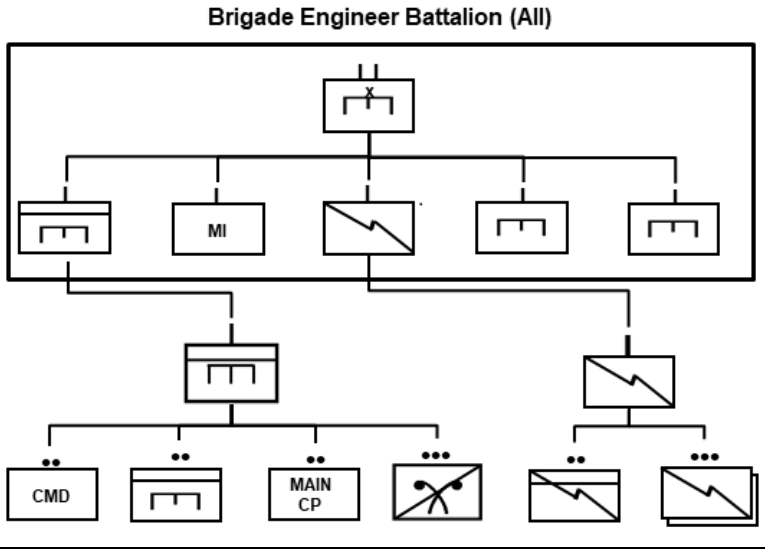
2-9. The BEB has an HHC, two engineer companies, a signal company, a MICO, a tactical unmanned aircraft system (TUAS) platoon, and a CBRN reconnaissance platoon (located in the HHC). The command and support relationship between these units dictates whether the BEB logistically supports or coordinates support with the BCT, the brigade support battalion (BSB), or another higher headquarters. Unless the BCT directs otherwise, the BEB retains command and support relationships with organic and attached units, regardless of location on the battlefield. Companies may be further task-organized to maneuver task forces or a subordinate company or troop.

2-10. By its design, the BEB provides an array of BCT level support. The diversity of this organic and augmented support, spanning many functional areas and multiple BCT level staff sections, presents the need to integrate with BCT staff functions. Training the BEB staff to successfully integrate expertise and enabler capabilities is required to employ diverse and unique BEB missions and tasks. Chapter 3 discusses enabler integration and the planning of task organization procedures and challenges.

2-11. In some instances, the BCT commander may direct the BEB to secure one or both of the BCT CPs, assign the BEB to its own AO, or hold the BEB responsible for a base perimeter or area defense. A significant change to the engineer battalion mission may affect its ability to provide engineer support to the BCT. The BCT staff balances the level of risks associated with these missions and may recommend additional engineer augmentation from EAB units to mitigate potential adverse effects. These support area missions could

diminish the BEB ability to operate as a functional headquarters or reduce engineer support to combined arms battalions and cavalry squadrons. If the BEB assumes responsibility for these special missions, the fundamental role of the BEB changes from that of a supporting unit in the BCT to that of a supported unit of the BCT. To mitigate risk, the BEB staff may recommend additional engineer augmentation from EAB units and staff. The BEB can defeat Level I threats and, with augmentation, organize response forces to defeat Level II threats, which are more organized.

2-12. The BCT commander issues mission orders for organic and task-organized units. The command and support relationship dictates whether the BEB will logistically support, or coordinate support with, the BCT, the BSB, or another unit's higher headquarters. Unless the BCT directs otherwise, the BEB retains command and support relationships with organic and attached units, regardless of their location on the battlefield. The companies may be further task-organized to maneuver task forces, the cavalry squadron, or a subordinate company or troop. See figure 2-1 for the basic structure of the BEB.



Legend:	
CMD	command
CP	command post
MI	military intelligence

Figure 2-1. BEB

BATTALION HEADQUARTERS AND STAFF

2-13. The HHC consists of a battalion headquarters, company headquarters, CBRN reconnaissance platoon, sustainment medical section, and sustainment unit ministry team. The HHC commander assists the engineer battalion commander in designating the location of the HHC operations center. The company provides the necessary sustainment functions for the battalion to accomplish the mission. The battalion commander directs the location of the company. The company units (not including detachments) receive their missions from the battalion commander.

BATTALION HEADQUARTERS

2-14. The engineer battalion headquarters consists of a command section and staff sections. Staff sections consist of battalion or brigade personnel staff officer (S-1), S-2, S-3, S-4, and battalion or brigade signal staff officer (S-6). The staff is capable of 24-hour operations for an indefinite period. The BEB main CP is typically collocated with the BCT main CP to establish future and current operations and planning cells. The staff sections describe their setup in a tactical standard operating procedure (SOP). The BEB tactical CP center may be collocated with the BCT tactical CP.

COMMAND SECTION

2-15. The battalion command section consists of the commander, executive officer, and command sergeant major. In coordination with the commander, this section exercises C2 over subordinate companies, elements, and staff sections. The command section ensures that subordinate elements are provided with administrative and logistics support within the organization's capabilities. It also ensures that attached units are integrated into the battalion structure and supervises training and mission preparation.

Personnel

2-16. The S-1 conducts personnel administration and manages of military occupational skills within the battalion. The cross-leveling of specialized skills is difficult; therefore, the S-1 must promptly secure replacements. Other functions of the S-1 include—

- Monitoring and analyzing personnel strength and projecting future personnel requirements.
- Requesting, receiving, processing, and delivering replacement personnel.
- Preparing/reviewing the casualty estimate in coordination with the BCT S-1 and managing casualty affairs.
- Planning and supervising morale support activities, awards, and disciplinary actions.
- Providing personnel service support, including finance and postal services.
- Coordinating legal services through the brigade legal section.
- Providing public affairs functions when a public affairs team or detachment is not attached.

Intelligence

2-17. The S-2 focuses on a designated area of intelligence responsibility and conducts the collection and analysis of threat forces (particularly engineer) and activities in the area of intelligence responsibility. The S-2 recommends tasks for the MICO to the BCT S-2. The BCT S-2 focuses on intelligence throughout the BCT AO and area of interest. While the engineer battalion S-2 mirrors the focus of the BCT S-2, the analysis has a greater emphasis on engineer missions, signal support, and other enabler tasks of subordinate units from the BEB. Significant S-2 functions include—

- Coordinating with the BCT S-2 and ABE during IPB for staff planning, decision making, and targeting while focusing on the battalion sustainment area.
- Coordinating with the BCT S-2 and ABE and recommending priority intelligence requirements for the battalion commander's critical information requirements.
- Serving as the battalion collection manager (nominating collection tasks for battalion collection assets to the S-3).
- Coordinating directly with the BCT S-2 on local intelligence collection, analysis, and management.
- Providing information that fulfills the battalion commander's priority intelligence requirements.
- Monitoring and maintaining the current situation regarding the local enemy and environmental factors.
- Identifying and evaluating intelligence collection capabilities as they affect AO security, counter-surveillance, signal security, and protection (including back-briefings from patrols and detainee interrogation information).

2-18. The CBRN NCO provides the S-2 technical advice to the battalion commander and battalion staff. The CBRN NCO also—

- Advises the commander on CBRN readiness and the conduct of missions in CBRN environments.
- Predicts and constructs templates of contaminated areas and effects of enemy CBRN strikes.
- Disseminates information received via the CBRN Warning and Reporting System.

- Recommends—
  - Monitoring requirements.
  - The mission-oriented protective posture.
  - Operational exposure guidance requirements.
- Acts as the liaison between assigned and attached CBRN units and the battalion S-3 and S-4.

Operations

2-19. The S-3 is the principal staff element tasked with training, operations, and plans. The S-3 helps the ABE describe the terrain management plan within the BCT AO and develop the scheme of engineer operations. The S-3 also monitors and tracks each organic and attached element, regardless of its location or command relationship with another unit. Typical functions of the S-3 include—

- Directly assisting the commander in controlling, preparing for, and executing operations.
- Coordinating civil-military operations, when augmented.
- Coordinating requests for fire support.
- Coordinating requests for Army aviation and close air support.
- Coordinating with the commander, executive officer, and S-6 to establish, oversee, and supervise battle staff information management activities of the CP.
- Coordinating fires for scatterable mines for the BCT.
- Coordinating and directing terrain management (mobility, countermobility, and survivability).
- Coordinating and synchronizing the employment of BEB capabilities in support of BCT operations.
- Planning and coordinating for ammunition and demolition.
- Preparing, coordinating, authenticating, publishing, and distributing the tactical SOPs, OPORDs, FRAGORDs, warning orders, and other products involving contributions from different staff sections.
- Reviewing and coordinating subordinate plans and actions.
- Recommending priorities for allocating critical command resources and support.
- Staffing, executing, and supervising operational security.

Logistics

2-20. The S-4 is the primary staff element tasked with coordinating supply, maintenance, transportation, and services for the battalion and augmenting units. The S-4 supports many different complex, low-density unit requirements in the battalion, particularly in repair parts procurement and highly technical, contractor-supported equipment maintenance. The S-4 monitors the HHC support platoon activities in feeding, fueling, performing maintenance, and providing logistics support within the battalion. The S-4 is also tasked with—

- Projecting requirements and coordinating classes of supplies (except Class VIII [medical]) with the BCT or battalion S-3 and higher and lower sustainment staff according to the commander's priorities.
- Monitoring and analyzing the equipment and logistics readiness status within the battalion.
- Developing and synchronizing sustainment plans (supply, transportation, maintenance, services).
- Developing the logistics estimate.
- Informing the staff of mission supportability from a logistics viewpoint.
- Acquiring and assigning facilities.
- Managing the property book and ensuring that the command supply discipline program is integrated.
- Working with the BCT S-4 to manage engineer-specific Class IV and V material for the BCT.

2-21. In conjunction with the S-3, the S-4 prepares the unit administrative movement order. The S-4 develops and maintains administrative movement plans for all modes of transportation.

2-22. Unit movement plans include—

- Security requirements.
- Logistics coordination requirements.
- Vehicle, aircraft, and railcar load plans.
- Unit movement personnel duties.
- Transportation document preparation.
- Transportation packaging and marking requirements.
- Normal, oversized, and unusual cargo descriptions (with regard to weight, length, width, height).
- Contingency and spill response planning, equipment, and reporting requirements.

Communications

2-23. The S-6 is primarily tasked with the management of internal communications, including network management, information dissemination management, communications equipment management, and information assurance. The S-6 also coordinates directly with the BCT S-6 on brigade communications planning. Other duties of the S-6 include—

- Describing remote site security requirements for retransmission units.
- Advising the commander on communication requirements.
- Establishing, managing, and maintaining communication links.
- Planning and coordinating network terminals.
- Determining system requirements needed for support based on the tactical situation.
- Informing the commander of primary and alternate communication capabilities.
- Recommending database configurations.
- Establishing and enforcing network policies and procedures.
- Preparing signal estimates.
- Advising the commander and other users on the requirements, capabilities, and uses of available communications-related systems.
- Coordinating signal interfaces with those not operating with Army battle command systems.
- Monitoring the status of engineer battalion communications assets (including network equipment installed, operated, and maintained by the S-6) and other general-purpose, user-operated systems.
- Coordinating signal requirements for units attached to, or under the operational control of, the engineer battalion.
- Integrating the communication of attached units.

UNIT MINISTRY TEAM

2-24. The unit ministry team consists of a chaplain and a religious affairs specialist. The chaplain serves as a personal staff officer with direct access to the commander. The engineer battalion unit ministry team provides religious support to all assigned or attached Service members, Family members, and authorized civilians. The unit ministry team provides religious, moral, and ethical advisement to the command as it impacts both individuals and the organization mission. The unit ministry team coordinates with higher, subordinate, and adjacent unit ministry teams and chaplain sections for area and denominational coverage requirements. See ATP 1-05.01, ATP 1-05.02, ATP 1-05.03, ATP 1-05.04, ATP 1-05.05, FM 1-05, and FM 6-0 for additional information.

HEADQUARTERS AND HEADQUARTERS COMPANY

2-25. The HHC provides sustainment functions for the engineer battalion to accomplish the mission. The company headquarters consists of the commander, executive officer, first sergeant, and supply section. The headquarters company commander assists the battalion commander in locating, securing, and establishing the engineer battalion TOC.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR RECONNAISSANCE PLATOON

2-26. Within the HHC of the BEB, the CBRN reconnaissance platoon conducts mounted and dismounted CBRN reconnaissance and surveillance for the BCT. The CBRN reconnaissance platoon determines the presence and extent of CBRN contamination (see ATP 3-11.37). There are two variants of these platoons—a light platoon in support of the IBCT and a heavy platoon in support of the ABCT/SBCT. Both provide the capability to detect, locate, identify, mark, and report CBRN hazards. The capabilities of each are explained in detail in ATP 3-11.36.

SUSTAINMENT MEDICAL SECTION

2-27. The sustainment medical section supplies the BEB with an organic medical capability that provides—

- Tactical combat casualty care.
- Management of trauma patients.
- Routine sick-call services.
- Triage for mass casualty operations.
- Ground medical evacuation from supported units/elements to the medical support section Role 1 medical treatment facility (MTF).
- Maintenance of field medical records.
- Class VIII supply/resupply within the BEB.
- Combat and operational stress control support and training.
- Behavioral health referrals.
- Clinical support and technical supervision for subordinate medical personnel/elements.

2-28. The medical support section is part of the support platoon of the HHC, BEB. The medical support section provides Role 1 Army health system support for the BEB and operates a Role 1 MTF for the BEB and attached units. The medical support section is composed of the treatment team, the evacuation squad, and has Role 1 medical personnel attached to the engineer and the military intelligence companies. (See FM 4-02 and ATP 4-02.3 for additional information.)

2-29. The treatment team establishes the Role 1 MTF for the BEB by providing routine sick call, tactical combat casualty care, and trauma patient management. This team is not capable of split-based operations. The treatment team coordinates patients' evacuation to the supporting Role 2 MTF that may require further treatment, consultation, or diagnostic referrals.

2-30. The evacuation squad provides medical evacuation teams for Role 1 ground medical evacuation from the point of injury, casualty collection point, ambulance exchange point, or other casualty/patient pick-up point within the BEB AO. The evacuation squad provides tactical combat casualty care and ground medical evacuation to the medical support section treatment team or closest MTF.

2-31. The combat medics attached to the engineer and military intelligence companies provide tactical combat casualty care and Role 1 medical support to the attached elements. The medical support section provides the Role 1 MTF, and the ground medical evacuation support provided to the combat medic section by the BEB medical support section. The physician assistant assigned to the BEB treatment team provides technical supervision and clinical support to the medical personnel attached to the engineer and military intelligence companies. The health care NCO (military occupational specialty 68W4O) provides mentorship, training, leadership, and supervision for the combat medics.

Note. The Army health system plan for the BEB must be synchronized with the overall BCT Army health system plan.

SECTION II—BRIGADE ENGINEER BATTALION COMPANY STRUCTURES

2-32. Armor, infantry, and Stryker BEBs have similar organizational structures, yet engineer and BCT leaders should know the differences, strengths, and limitations. Security force assistance brigade BEBs may

have a similar organizational chart, but their advising teams perform unique roles to support security force assistance brigade missions.

ENGINEER COMPANIES

2-33. Two engineer companies provide the BCT with the minimum capability to support offensive and defensive tasks, including—

- Bypassing, marking, and breaching obstacles.
- Assisting in the assault of fortified positions.
- Emplacing obstacles to shape terrain.
- Constructing or enhancing survivability positions.
- Conducting route reconnaissance and collecting information.
- Identifying and clearing explosive hazards.

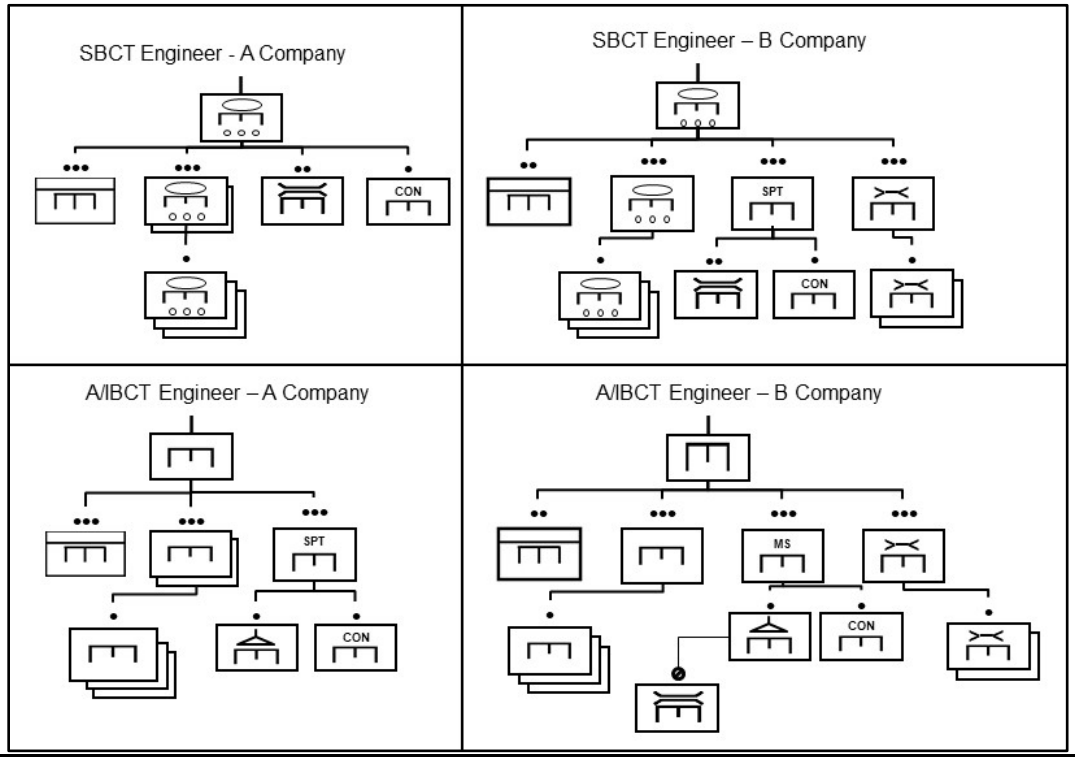
2-34. Engineer companies help maintain the BCT freedom of mobility and inhibit the enemy ability to mass and maneuver. Each company is slightly different, but the primary focus is to support the combat engineering discipline with limited mobility, countermobility, and survivability capabilities. The company integrates itself to a supported task force when a command support relationship is established and provides the supported unit with a capability briefing of resources. Engineer companies are not generally held in reserve and can be task-organized internally to the BCT to meet mission requirements.

COMPANY A

2-35. Company A provides combat engineer support and consists of a company headquarters, two combat engineer platoons, and one engineer support platoon. The company provides mobility, countermobility, and survivability, and limited construction support to the BCT. Combat engineer platoons provide the BCT with assets for breaching and emplacing obstacles. The engineer support platoon consists of a platoon headquarters; a horizontal squad that provides specialized engineer equipment to support limited general engineering tasks assigned to the company; and a breach squad that provides specialized equipment to support mobility, countermobility, and survivability tasks assigned to the company. Company A has a company headquarters, two combat engineer platoons, a horizontal-construction squad, and a bridge section in a Stryker BCT. The breach squad of the Stryker BCT is limited to mine-clearing line charges (MICLIC) and proofing equipment in the company. The Stryker BCT has an M-136 Volcano mine system. The infantry (airborne) and SBCT have a rapidly emplaced bridge system.

COMPANY B

2-36. Company B is slightly different in armor, infantry, infantry (airborne), and Stryker BCTs. Company B is generally the same composition as Company A, but one combat engineer platoon is replaced with a route clearance platoon. This platoon detects and neutralizes explosive hazards and reduces obstacles along routes that enable force projection and logistics. This route clearance platoon can sustain LOCs as a member of the combined arms team or autonomously in a permissive environment. The armor and infantry organization for this company is organized the same; however, the breach section contains different equipment and capabilities. The breach section conducts bridging, whereas the infantry BCT and infantry (airborne) BCT breach sections is responsible for MICLICs. The infantry BCT currently does not have a bridging capability and requires augmentation from EAB engineers if the capability is needed. The infantry (airborne) BCT has a rapidly emplaced bridge system. The Stryker BCT has an M-136 Volcano mine system. Figure 2-2 depicts the organizational variations of the BEB companies.



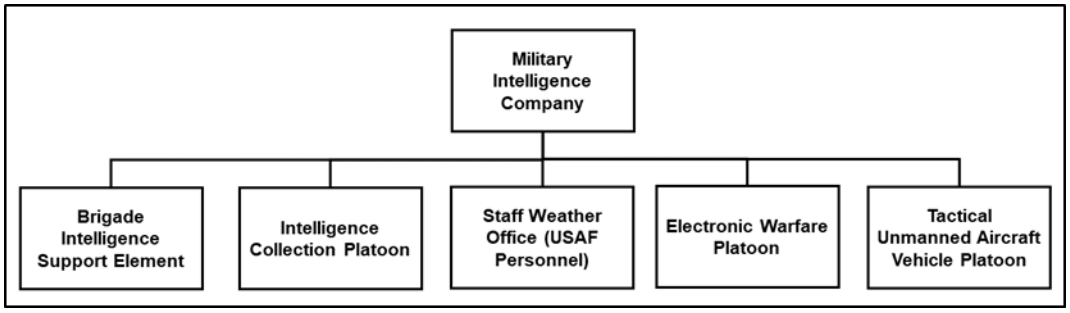
Legend:

A/IBCT	armored/infantry brigade combat team
CON	construction
MS	mobility support
SBCT	Stryker brigade combat team
SPT	support

Figure 2-2. BEB engineer companies

MILITARY INTELLIGENCE COMPANY

2-37. The MICO mission is to conduct analysis, full-motion video, signals intelligence, geospatial intelligence, and human intelligence activities. The MICO has a headquarters section, a brigade intelligence support element platoon (which consists of an analysis and fusion section, an intelligence-processing section, and an intelligence and electronic warfare systems integration [maintenance] section), an intelligence collection platoon (with a human intelligence collection section and a signals intelligence technical control and collection section), and a U.S. Air Force weather team. A TUAS platoon and an electronic warfare platoon are also attached to the MICO. In garrison, the MICO is assigned to the BEB. During exercises and operations, the brigade intelligence support element is normally under operational control to the brigade HHC to support the BCT S-2 by providing analysis and intelligence production and to support the BCT and its subordinate commands through collection, analysis, and dissemination of information and intelligence. Personnel from the MICO maintain the enemy portion of the COP; integrate intelligence operations as part of the information collection effort; and execute signals intelligence, human intelligence, and imagery collection. The MICO conducts intelligence operations to collect information about the intent, activities, and capabilities of threats and relevant aspects of the OE to support the BCT commander's decision making across the range of military operations. (Refer to ATP 2-19.4 for additional information.) See figure 2-3, page 2-10.



Legend:

USAF United States Air Force

Figure 2-3. MICO organization

BRIGADE SIGNAL COMPANY

2-38. The brigade signal company installs, operates, maintains, and secures the brigade's organic network transport, automated information systems, and networks to support CP operations at-the-halt and C2 on-the-move. The signal company employs its platoons and teams throughout the brigade AO. The signal company has signal and communications security (COMSEC), systems maintenance augmentation, spares management, and maintenance accountability from the BSB field maintenance company organic communications-electronics maintenance element. See FM 6-02 for more information on the brigade signal company.

HEADQUARTERS AND NETWORK SUPPORT PLATOONS

2-39. The headquarters and network support platoon consists of the company headquarters section, a network operations section, a small CP support team, a retransmission team, and a communications-electronics maintenance support section. See figure 2-4 for the signal company organizational structure. The company headquarters section provides C2, logistics, and administrative support for the unit. The network operations section installs, operates, maintains, and defends the BCT C2 network.

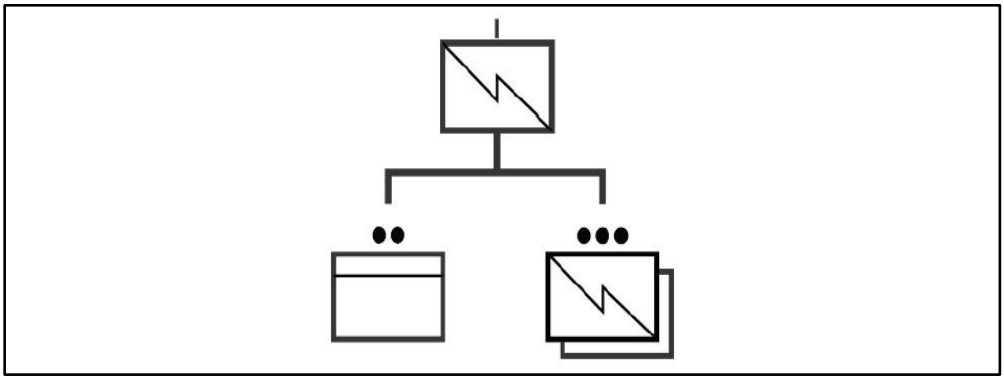


Figure 2-4. Brigade signal company organizational structure

2-40. The network operations section establishes the network operations and security cell, closely operates with network extension platoons, collocates with network extension platoons, and provides BCT network management and computer defense. These Soldiers and their server stacks are critical in linking the signal company equipment with the Defense Switched Network.

2-41. Network extension platoons are resourced to provide connectivity to their assigned CPs, and they consist of a joint network node team, a data support team, and a retransmission team. The joint network node

section provides network equipment that enables CPs to use line-of-sight or beyond-line-of-sight systems. Joint network node equipment provides the connectivity between satellite and terrestrial systems. The joint network node system connects BCT CPs, brigade support areas, higher headquarters, Army forces, joint task forces, and sanctuary locations. Each system maintains the interface capability to terminate network circuits, provide data and battlefield video teleconference services, and interface with special circuits (such as the Defense Switched Network). The joint network node system provides network planning and monitoring for the BCT area network. The network extension section has traditional retransmission teams and gateway systems for enhanced position location and reporting system units.

2-42. One network extension support platoon is usually located at the BCT main CP, and another is located at the BEB or BSB main CP. The users supported by the BCT signal company use Army C2 software and hardware capabilities to collaborate, make decisions, and lead BCT operations. (Refer to FM 6-02 for additional information.)

2-43. Computer defense personnel ensure the availability, integrity, authentication, and confidentiality of friendly information and information systems. Typically, the most significant risk for network intrusion and integrity is from users within the network. The system is protected from user corruption through comprehensive password and access management.

SMALL COMMAND POST SUPPORT TEAMS

2-44. The small CP support team provides communications and data support to a CP directed by the BCT commander. The team uses a small CP support vehicle equipped with a 2.4-meter (8-foot), automatic-acquire, Ku-band satellite communications terminal and data communications baseband equipment. The equipment is employed to provide secret data and voice-over-internet protocol connectivity over the Time-Division, Multiple-Access satellite communications architecture.

RETRANSMISSION TEAMS

2-45. The retransmission team provides range extension and network relay support for the Enhanced Position Location and Reporting System (for those BCTs so equipped) and Single-Channel Ground and Airborne Radio System very high frequency–frequency modulation networks. The retransmission team is mission-critical to BCT C2 and may necessitate the commitment of forces for protection in the absence of an airborne communications relay package.

COMMUNICATIONS-ELECTRONICS MAINTENANCE SUPPORT TEAMS

2-46. The communications-electronics maintenance support team utilizes a signal nodal maintenance plan that requires the operator-maintainer to reside at the system (joint network node) and perform field level maintenance. The communications-electronics maintenance team facilitates troubleshooting and performs field level maintenance on other communications-electronics equipment in the company. It also manages the company communications-electronics prescribed load list stock. The communications-electronics maintenance team evacuates unit level unrepairable network support company equipment to the BSB. Contracted personnel augment the team, as required.

SYNCHRONIZING BRIGADE COMMUNICATIONS

2-47. BCTs have organic warfighter information network-tactical (WIN-T) on-the-move and WIN-T at-the-halt communications assets for continued upper-tier connectivity while maneuvering throughout the division close and deep areas. BCTs may require additional communications support (from theater-resourced signal units) for small- to medium-size CPs established while conducting missions in close and deep areas. Specific unit capacities and resources are discussed below; however, signal Soldiers must understand how they are integrated into theater signal structures and how to request additional support or assistance.

2-48. The division G-6, through the planning process, identifies priority units and C2 nodes that will receive the finite amount of equipment and signal unit support. Main-effort BCTs may require additional joint network nodes resourced from other division or corps units.

2-49. Signal company leaders build and maintain their stakeholder integration by interacting and sharing best practices with fellow signal companies in the sustainment brigade, combat aviation brigade, maneuver enhancement brigade, sister BCTs, and expeditionary signal battalions.

2-50. BCTs receive communications support packages based on a joint manning document or individual augmentation request for Army and other Service forces using the request-for-forces process. The process includes validation by the corps, through the land component commander, to the joint task force. The geographic combatant command validates the request for forces and forwards the request for forces to the Joint Chiefs of Staff for any BCT-unique communications requirement.

2-51. Engineer leaders and staff engineers integrate and support signal company capabilities to establish BCT C2 systems and cyberspace, electronic warfare, and intelligence capabilities. This synchronization is the key to obtaining and maintaining freedom of action in cyberspace and the electromagnetic spectrum and the ability to deny the same to our adversaries.

2-52. Tactical internet systems are the deployed portion of the Department of Defense Information Network and include upper-tier and lower-tier Internet support.

- **Upper tier.** The upper-tier tactical Internet provides high-throughput networking at-the-halt to corps CPs and at-the-halt or on-the-move for brigades equipped. The upper-tier is an interoperability point for higher echelons, aviation integration, and joint, inter-organizational, and multinational partners. WIN-T provides the upper-tier tactical Internet. The WIN-T combat network radio gateway offers a bridge to connect combat network radio voice networks in the lower-tier to the upper-tier. This publication deals primarily with the operation of the upper-tier tactical Internet. Refer to ATP 6-02.60 for tactical network techniques for corps and below.
- **Lower tier.** The lower-tier tactical Internet supports tactical formations down to the team leader. The lower-tier consists primarily of single-channel radio networks at platoons and companies. The primary lower-tier waveforms are Soldier radio waveforms and the Single-Channel Ground and Airborne Radio System. Mobile applications enable visualization, operator interface with ancillary devices (such as Global Positioning System), targeting data, voice communications, and sensor capability. Refer to ATP 6-02.53 for more information about the lower-tier tactical Internet.

ESTABLISH TACTICAL NETWORKS

2-53. The BCT S-6 leads the brigade network operations and security centers in performing network planning, monitoring, administration, and reporting. Network planners, operators, maintainers, and technicians in the network operations and security centers—

- **Plan for networks and devices**. They develop and maintain high-level and in-depth layouts and plans for Department of Defense Information Network operations, including detailed configuration files for most devices.
- **Adjust plans as needed.** They relay changes and updates where required.
- **Monitor networks.** They collect and report the status of the network. The interpretation of the status prompts an anomaly response. The network operations and security centers or a managed element, such as a theater communications network, may initiate this response.
- **Manage user profiles.** They control user profiles to ensure that all users share a common network configuration. This reduces the number of network environment-related problems.
- **Perform network management activities.** They monitor the performance of network assets, including media. They update software versions and virus definitions and troubleshoot to mitigate network and device problems. The goal is continuous, effective network performance.

2-54. Along with the S-6 and S-3 teams, the signal company commander develops network plans from strategic concept to tactical implementation. This includes resources, device and network configurations and operational policies to build and maintain networks and services to support BCT operations. As operations require changes to the main and tactical brigade CPs across miles of a brigade area of responsibility, critical signal resources such as satellite transportable terminal, theater communications network, higher-capacity line-of-sight, Secure Mobile Anti-jam Reliable Tactical Terminal, and retransmission teams move to support operations.

2-55. SOPs generally dictate unit priorities of work. However, the commander may change the priorities of work based on the mission variables. There may not be enough Soldiers available to perform all of the tasks associated with setting up a CP and site security; in that case, priorities can change to accomplish the most important task first. Clear priorities of work ensure that personnel complete the key tasks necessary to establish the network and CP capabilities first. Signal leaders continuously supervise the set-up of communications systems to ensure that crews follow the priorities of work.

2-56. Signal company and BEB leaders should establish clear priorities of work for all operators and all systems. Defining clear priorities increases a team's efficiency in accomplishing assigned tasks, reducing Soldier idle time, and maintaining focus on mission requirements and link establishment. Planning considerations include—

- Internet protocol management.
- Password management.
- Firewall management.
- Ports, protocols, and services management.
- Network quality of service and speed of service.
- Prioritization of information.
- Preventive measures for jamming, disruptions, or cyberattacks.
- Network monitoring and status reporting.
- Maintenance and logistics support to retransmission teams.
- Digital and analog battle drills.

2-57. Multilayer cybersecurity protection maintains the integrity of both the network and the information passing through it. WIN-T secures the network consistent with the classification of information passed over the network. The cybersecurity architecture allows G-6 and S-6 network leaders to make informed risk decisions and effectively defend network resources. Refer to ATP 6-02.71 for more information about the cybersecurity framework.

FORWARD SUPPORT COMPANY

2-58. The FSC provides sustainment support to maneuver, reconnaissance, engineer, and fires battalions. FSCs are assigned to the BSB and are critical to the way in which the BSB supports each battalion. The BSB resources the FSC to set the logistics conditions necessary to ensure battalion success. The FSC commander executes the sustainment plan according to the supported battalion commander's guidance. The BSB provides technical oversight to each FSC. The BEB commander must ensure that staff and subordinate units understand FSC command and support relationships. If an EAB engineer battalion augments the BCT, it should be accompanied by the appropriate sustainment element that is task-organized to the battalion and augments the sustainment capabilities of the BCT sustainment plan.

2-59. BEB FSCs have a headquarters section, a distribution platoon, and a maintenance platoon. With logistics, the critical links are those between the BCT S-4, the BEB commander, executive officer and S-4, the BEB FSC commander, and the BSB commander and support operations officer. Because the FSC is in direct support of the supported battalion, the commander of the supported battalion has the authority to direct the FSC priorities of support and position on the battlefield. This allows the commander to better control the scheme of maneuver. By maintaining this logistics element and accounting for all key members' skills and experience, the supported battalion commander can also better enable freedom of action, prolonged endurance, and operational reach.

Distribution Platoon

2-60. The distribution platoon consists of a platoon headquarters and four squads that can be task-organized to distribute Class II, III, IV, V, and VII supplies. The distribution platoon leader and platoon sergeant execute all or a portion of the 14 materiel management functions required to ensure supply stocks are available and ready for distribution. These personnel also execute distribution integration and transportation operations functions, as required, to ensure that supplies are assigned a transportation mode, route, and movement time.

Maintenance Platoon

2-61. The Field maintenance platoon may be divided, with some elements colocated with the supported battalion and some elements located in the brigade support area, as determined by the FSC commander in collaboration with the BSB and BEB battalion commanders. The maintenance platoons vary based upon the equipment and major weapon systems of the supported battalion. Generally, the maintenance platoon consists of a platoon headquarters, maintenance control section, field maintenance section, service and recovery section, and field maintenance team.

Note. EAB FSC structures are similar to BCT structures but do not have a field feeding section.

Chapter 3
Command and Control

Commanders and planners must understand the inherent C2 challenges that they face when integrating engineer capabilities into support operations. Providing precise and timely engineer support across the BCT AO creates unique C2 challenges. This chapter focuses on the application of organic and augmenting engineer units, addresses engineer planning, and provides considerations for engineers as integrated members of the combined arms team. The construct and format for essential tasks for mobility, countermobility, survivability, and the engineer staff running estimate are also highlighted to assist engineer planners in integrating engineers. This chapter also provides an overview of integrating processes and continuing activities and their contribution to the overall operations process.

SECTION I—COMMAND AND CONTROL OVERVIEW

3-1. Effective C2 is an essential element in successful engineer operations. Engineer battalions in the BCT often require engineer augmentation and may receive nonengineer augmentation. This complex set of circumstances presents challenges that require engineer leaders and planners to coordinate across domains for nonengineer assets while accounting for engineer and other units from echelons above the BCT. Engineer unit commanders and planners must work together to ensure the effective control of task-organized elements to facilitate their complete integration into combined arms activities. Command and support relationships are the basis for building task organization. They also provide the basis for ensuring unity of command and unity of effort in operations.

3-2. The command is typically more decentralized during offensive operations than during defensive operations, as critical engineer resources in the BCT are task-organized to maximize the efficiency of a limited resource. The engineer commander's C2 system enhances the ability to conduct operations, exercise C2, and visualize the AO. The C2 system supports decision making and provides a way for commanders to communicate, collaborate, manage, and employ subordinate organizations while simultaneously tracking horizontally. Because of the potential complexity of activities conducted under the commander's span of control, the commander's chosen C2 system takes on added importance.

3-3. Mission type orders are used when commanders issue subordinate commanders a clearly defined goal, the resources to accomplish the goal, and a time frame to achieve the goal. Subordinate commanders are then given the freedom to plan and execute their mission within the higher commander's intent. ADP 6-0 outlines how commanders, supported by their staffs, combine the art and science of C2 to understand situations, make decisions, direct actions, and lead forces toward mission accomplishment. For an explanation of tactics and procedures, see FM 6-0. For a description of the techniques associated with C2, see ATP 6-0.5 and other supporting techniques publications.

3-4. *Mission command* is the Army's approach to command and control that empowers subordinate decision making and decentralized execution appropriate to the situation (ADP 6-0).

3-5. The mission command principles are—

- Competence.
- Mutual trust.
- Shared understanding.
- Commander's intent.
- Mission orders.

- Disciplined initiative.
- Risk acceptance.

3-6. *Command and control* is the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission (JP 1). The warfighting function is now part of C2. Figure 3-1 illustrates the combat power model, which links warfighting functions with leadership, C2, and information. The *command and control warfighting function* is the related tasks and a system that enable commanders to synchronize and converge all elements of combat power (ADP 3-0). The company, battalion, and brigade commanders execute missions through a C2 system consisting of the following four interrelated components that enable commanders to conduct operations:

- People.
- Processes.
- Networks.
- CPs.

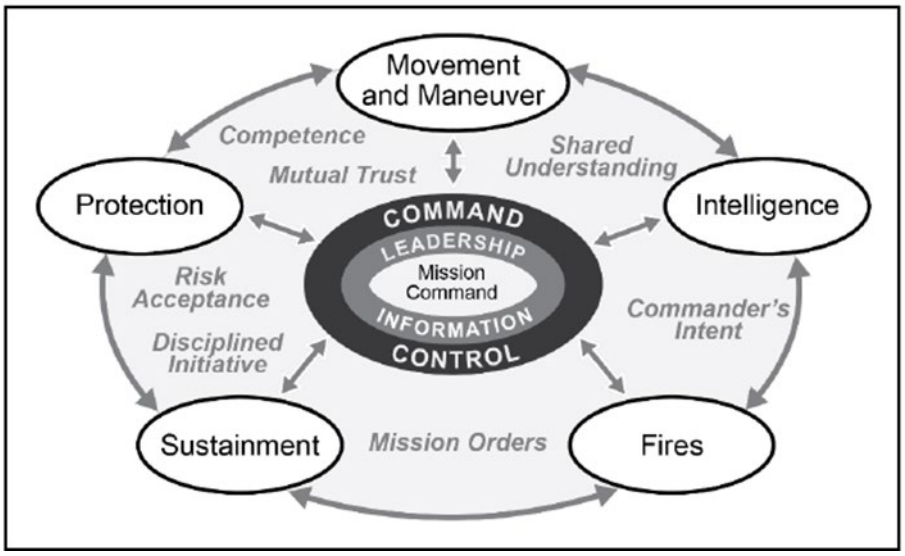


Figure 3-1. Combat power model

3-7. Leadership is one of the essential components of the C2 system. It provides purpose, direction, and motivation in combat. Leaders must be resourceful, tenacious, and decisive warriors. They must be innovative and flexible in the employment of their units. They must also have the mental agility to quickly grasp the situation and the initiative to take independent action based on the higher commander's intent.

3-8. The engineer C2 system must work quickly by rapidly processing information. The cycle of receiving information, completing instructions, and setting actions in motion must be well organized and efficient. Engineers supporting BCTs must have a flexible, synchronized, and integrated C2 system that allows the MDMP to remain ahead of the enemy's actions.

3-9. The C2 tasks are—

- Command forces.
- Control operations.
- Drive the operations process.
- Establish the C2 system.

COMMAND AND SUPPORT RELATIONSHIPS

3-10. Commanders establish command and support relationships when subordination of one unit to another is inappropriate; maximum flexibility is typically needed to rapidly move key engineer capabilities between

multiple units. FM 6-0 contains more specificity related to command, support, and training and readiness oversight details. Table 3-1 depicts the Army's command relationships.

Table 3-1. Command relationship matrix

If relationship is—	*Then inherent responsibilities—*							
	Have command relationship with—	***May be task-organized by—[1]***	***Unless modified, ADCON responsibility goes through—***	***Are assigned position or AO by—***	***Provide liaison to—***	***Establish/ maintain communications with—***	***Have priorities established by—***	***Can impose on gained unit further command or support relationship of—***
Organic	All organic forces organized with the HQ	Organic HQ	Army HQ specified in organizing document	Organic HQ	NA	NA	Organic HQ	Attached, OPCON, TACON, GS, GSR, R, DS
Assigned	Gaining unit	Gaining HQ	Gaining Army HQ	OPCON chain of command	As required by OPCON	As required by OPCON	ASCC or Service-assigned HQ	As required by OPCON HQ
Attached	Gaining unit	Gaining unit	Gaining Army HQ	Gaining unit	As required by gaining unit	Unit to which attached	Gaining unit	Attached, OPCON, TACON, GS, GSR, R, DS
OPCON[2]	Gaining unit	Parent unit and gaining unit; gaining unit may pass OPCON to lower HQ[1]	Parent unit	Gaining unit	As required by gaining unit	As required by gaining unit and parent unit	Gaining unit	OPCON, TACON, GS, GSR, R, DS
TACON	Gaining unit	Parent unit	Parent unit	Gaining unit	As required by gaining unit	As required by gaining unit and parent unit	Gaining unit	TACON, GS GSR, R, DS

Notes:
[1] In NATO, the gaining unit may not task-organize a multinational force. (See TACON.)
[2] Other relationships attributional to ADCON and OPCON are described in ADP 3-0.

Legend:

ADCON	administrative control	HQ	headquarters
AO	area of operations	NA	not applicable
ASCC	Army Service component command	NATO	North Atlantic Treaty Organization
DS	direct support	OPCON	operational control
GS	general support	R	reinforcing
GSR	general support–reinforcing	TACON	tactical control

3-11. 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 that most effectively meet the needs of the supported commander. Support relationships are graduated from a supportive relationship between two units (direct support typically in the offense) to a broad level of support extended to all units under the control of the higher headquarters (general support [GS] typically in the defense).

3-12. Table 3-2, page 3-4, depicts the Army's support relationships. Support relationships are not a command authority and are more specific than joint support relationships.

Table 3-2. Army support relationships

If relationship is—	*Then inherent responsibilities—*							
	Have command relationship with—	*May be task-organized by—*	*Receive sustainment from—*	*Are assigned by position or an area of operations by—*	*Provide liaison to—*	*Establish/ maintain communications with—*	*Have priorities established by—*	*Can impose on gained unit further support relationship of—*
Direct support[1]	Parent unit	Parent unit	Parent unit	Supported unit	Supported unit	Parent unit, supported unit	Supported unit	See note[1]
Reinforcing	Parent unit	Parent unit	Parent unit	Reinforced unit	Reinforced unit	Parent unit, reinforced unit	Reinforced unit, then parent unit	Not applicable
General support–reinforcing	Parent unit	Parent unit	Parent unit	Parent unit	Reinforced unit and as required by parent unit	Reinforced unit and as required by parent unit	Parent unit, then reinforced unit	Not applicable
General support	Parent unit	Parent unit	Parent unit	Parent unit	As required by parent unit	As required by parent unit	Parent unit	Not applicable

Note:
[1] Commanders of units in direct support may further assign support relationships between their subordinate units and supported unit elements after coordination with the supported commander.

3-13. In a direct-support relationship, the supporting unit answers directly to the supported commander's request for support. A direct-support relationship is typically employed when it is anticipated that a change to the engineer task organization may require frequent shift of an engineer unit from supporting one unit to another.

3-14. In a GS relationship, the supporting unit receives all missions and support from its parent unit. The supporting unit aids the unit as a whole—not any particular part or subdivision. A GS relationship is appropriate when central control and flexibility in employing limited engineer forces are required. Engineers in sustainment areas are typically employed using a GS relationship.

3-15. Several other relationships established by higher-echelon headquarters exist with units that are not in command or support relationships. These relationships are limited or specialized to a greater degree than the command and support relationships. These limited relationships are not employed when tailoring or task-organizing Army forces. The use of these specialized relationships helps clarify certain aspects of operational control or administrative control. Table 3-3 outlines other relations, such as training and readiness oversight.

Table 3-3. Other relationships

Relationship	*Operational Use—*	*Established by—*	*Authority and Limitations*
TRO	TRO is an authority exercised by a combatant commander over assigned RC forces not on active duty. Through TRO, commanders shape RC training and readiness. Upon mobilization of the RC forces, TRO is no longer applicable.	The commander identified in the Forces for Unified Commands memorandum. The commander normally delegates TRO to the ASCC.	TRO allows the commander to provide guidance on operational requirements and training priorities, review readiness reports, and review mobilization plans for RC forces. TRO is not a command relationship. ARNG forces remain under the command and control of their respective state adjutants general until mobilized for federal service. USAR forces remain under the command and control of the USARC until mobilized.
Direct liaison authorized	Allows planning and direct collaboration between two units assigned to different commands, often based on anticipated tailoring and task organization changes.	The parent unit headquarters. This is a coordination relationship, not an authority through which command may be exercised.	Limited to planning and coordination between units.
Aligned	Informal relationship between a theater Army and other Army units identified for use in a specific geographic combatant command.	Theater army and parent ASCC.	Normally establishes information channels between the gaining theater army and Army units that are likely to be committed to that area of responsibility.

Legend:

ARNG	Army National Guard
ASCC	Army Service component command
RC	Reserve Component
TRO	Training and Readiness Oversight
USAR	United States Army Reserve
USARC	United States Army Reserve Command

COMMAND AND CONTROL SYSTEMS

3-16. Engineers must be familiar with BCT C2 systems, which include people, processes, networks, and effective CPs. Collaborative and parallel planning, as well as battle tracking and reporting, are conducted on various communications networks. Procedures include reporting and recording actions and status reports so that leaders and units understand friendly situations, enemy actions, and changes to the environment. Commanders and staffs manage information flow through tools such as face-to-face reports, radios, staff products, and networked systems such as Joint Capabilities Release, CP of the Future, and CP Computing Environment. The sections below describe some of these systems and procedures.

3-17. Commanders and staffs prepare their headquarters for operations. While staffs perform essential functions that complement the effectiveness of operations, commanders drive the operations process through understanding, visualizing, describing, directing, leading, and assessing operations. As commanders direct their staffs through the planning and operations process, they provide guidance on their COP requirements, C2 systems, battle rhythm, and CP organization. This planning and guidance establish expectations and desired outcomes regarding how to fight and battle-track each organization, unit, and enabler.

BRIGADE ENABLER MANAGEMENT

3-18. The BEB commander must use a system to receive units and train their subordinate elements to integrate into a unit to which they effectively attach. When receiving units, the commander and staff integrate task-organized units using reception, stand-up, outward movement, and integration SOPs. The information in the SOPs can be adapted to guide subordinate units on integrating into units. Enablers are received and must collect at least the following information:

- S-1.
  - Personnel status information.
  - Reports.
- S-2.
  - Threat assessment.
  - Organic intelligence capabilities.
- S-3.
  - Capabilities, limitations, constraints, and requirements.
  - Reports.
  - Task organization.
  - Integration into planning.
- S-4.
  - Key logistical concerns/requirements.
  - Logistical integration, dispatches, support relationships.
  - Reports.
- S-6.
  - Communications security.
  - Communications card.
  - Key systems.
- Commander/command sergeant major.
  - Leader introductions.
  - Guidance.
  - Capabilities briefing.

3-19. BEB commanders should take a personal interest in developing internal BEB level capabilities briefings in conjunction with the BEB S-3 (for incoming augmenting units). Similarly, they should tailor shorter capability briefings for organic BEB subordinate units that are most often attached to gaining battalions. This will help ensure that those BEB subordinate units are correctly employed to achieve the BCT commander's desired effects. Likewise, the BEB commander should seek out capabilities briefings from augmenting units that are newly attached to the BEB. The briefings from augmenting units might require adjustments to the BEB battle rhythm if they are frequent enough. The BEB staff requires nonengineer task-organized units to assist in understanding their capabilities throughout the operations process. BEB officers and NCOs assist their counterparts in adjacent battalions in ensuring that BEB enablers are effectively integrated. Friction points can develop between BEB enablers and their supported battalions; often a conversation between S-3s, executive officers, and NCOs will resolve issues and improve BEB support to the BCT. Within the BEB, applicable on-the-ground command or support relationships with enablers should always be ensured and reinforced.

ENABLING UNIT

3-20. The enabling unit physically reports to the gaining unit CP. The leaders are prepared to provide their capability briefings, describing what their unit are, the number of Soldiers they contain, the weapons systems or platforms they have, and the capabilities that support gaining-unit operations.

3-21. Upon reception of the enabling unit, the gaining unit should—

- Clarify command and support relationships.
- Understand the commander's mission, intent, and time constraints.
- Analyze available intelligence (enemy, terrain, and weather) on existing obstacles and threats to friendly mobility.
- Provide recommendations to the maneuver unit for priority engineer requirements, including essential mobility, countermobility, survivability, and other engineering tasks that support the gaining unit and higher echelons.
- Recommend the best engineering COAs, balancing risks with mission requirements.
- Identify the best touchpoints for reporting or influencing action (joint capability release messages, daily meetings, commander's situation reports, updated estimates to higher headquarters.

3-22. The following list identifies information that the enabler unit should collect to support communications, sustainment, and the integration of combat missions:

- Clarification of command and support relationships.
- Unit tactical SOPs.
- Digital and analog maps and graphics.
- Digital information such as internet protocol and e-mail addresses, joint capability release role names, and frequencies.
- Operations/logistics/personnel information.
- Day and night recognition symbols for vehicles and personnel.
- Succession of command.
- Target list, including artillery, mortars, and obstacles/targets.
- Battle drills based on specific missions or events.
- Reaction drills, including enemy air, artillery, and ground attack.
- Sustainment support plan, including unit resupply, casualty evacuation, and maintenance operations.
- Signal and communications primary, alternate, contingency, and emergency plans, including special recognition signals and changes or additions to frequencies and call signs.
- Plan for occupying the tactical assembly area and tactical assembly area defense plan.
- Handling procedures for equipment and captured documents.
- Priorities of work.
- Order of march for movements.
- Reporting procedures for enemy, sensitive items, maintenance, logistics, status, and obstacles.
- Vehicle and equipment recovery support plan.
- Time and location of gaining unit OPORD, reconnaissance, rehearsals, rehearsal-of-concept drills, and backbriefings.

3-23. The enabler unit provides the following information to the gaining unit:

- Personnel report, including the unit battle roster.
- Combat status report, including the number, type, and operational status of vehicles/equipment and weapons.
- A quick capabilities briefing on what the unit brings to the fight.
- Sensitive-items report.
- Logistics status report, including Class I, III, IV, and V supplies, and any specialized needs (MICLIC tubes, antitank Volcano canisters, demolition initiators).

GAINING UNIT

3-24. The gaining unit CP and key staff members must integrate new units in order to support and integrate their unique capabilities into current and future combat operations. The commander and operations staff must quickly understand each unit's unique abilities to help shape the next fight. Their arrival may have been due

to a request or a task organization change to ensure that enablers are resourced to priority units. Components of the gaining unit perform the following tasks:

- **S-1**. Updates personnel status and battle rosters.
- **S-2**. Provides updated enemy situation, terrain, and weather information.
- **S-3**. Receives capabilities briefings, updates combat power charts, updates staff estimates, updates graphics (digital and analog), and balances the plan with changes to reality.
- **Battle captain/NCO**. Updates battle-tracking charts, maps, and frequency charts for incoming enabler units.
- **S-4**. Updates unit logistics statistics, supply requests, and staff estimates.
- **S-6**. Updates and disseminates unit signal operating instructions, and communications security procedures, and validates attached unit systems, and joint capability release role names.
- **Medical section**. Verifies Class VIII supplies on hand, updates the medical evacuation/casualty evacuation plan, validates attached unit medical capabilities (if required), updates BEB sustainment and protection annexes, and synchronizes additional medical assets with the BCT AHS plan.
- **Maintenance team**. Updates the global combat support system–Army, critical equipment or supply lists, and the maintenance collection point plan and verifies recovery assets.

3-25. The BCT and BEB depend on EAB enablers for offensive, defensive, and stability operations. These enablers may include engineer headquarters units, baseline engineer units, specialized engineer units, nonengineer enabling units, or engineer capabilities from sister Services and non-Department of Defense organizations. Engineer commanders and their staffs must be experts at attaching and detaching units, quickly integrating enabler units, and sustaining enabler units for missions requiring various command and support relationships. SOPs, communications systems, and best practices should be a routine part of reception, staging, onward movement, and integration.

SECTION II—ECHELON ABOVE BRIGADE ENGINEER ENABLERS

3-26. The BEB must work with the division engineer staff section or higher headquarters in order for all engineer enablers to place engineer capabilities where they are needed across the BCT battlespace. Offensive missions may require EAB bridging units, defensive operations require additional countermobility and survivability efforts, and stability missions require specialized engineers to assess critical infrastructure and essential services. Staffs must train on and practice with their systems to quickly attach and detach units as operations are adjusted based on changing missions and enemy actions.

ENGINEER HEADQUARTERS UNITS

3-27. The engineer headquarters unit is the basis for integrating engineer functions, elements, and capabilities from Army components. An engineer headquarters unit consists of a theater engineer command, an engineer brigade, and an engineer battalion. Each unit has a staff that allows the commander to provide C2 for assorted and various engineer organizations that are capable of providing C2 for other selected nonengineer units to support multifunctional missions (such as combined arms breaching and combined arms gap-crossing operations). The theater engineer command provides C2 for assigned or attached Army engineer brigades and other engineer units and missions for the combatant or joint task force commander. The engineer brigade is an Army functional brigade and provides C2 for up to five engineer battalions at division and corps levels. The EAB engineer battalion is typically found within the engineer brigade or maneuver enhancement brigade or in support of a BCT. USACE may task-organize a forward engineer support team for specified areas where other engineer organizational capabilities or capacities (such as water well drilling or structural engineering expertise) do not exist.

3-28. The EAB engineer battalion can plan, integrate, and direct the execution of combat and general engineering missions that are conducted by up to five assigned engineer companies and include a survey and design team. Engineer battalions are usually task-organized to an engineer brigade or maneuver enhancement brigade or are employed in support of a BCT. When supporting a BCT, the battalion may be focused on a single mission—for example, route clearance or construction. The battalion may also be organized to perform

breach force command during BCT combined arms breaching activities. During gap-crossing operations, the battalion may be designated as the crossing-site command.

3-29. When supporting a BCT, an EAB engineer battalion typically conducts engineer missions and controls up to five mission-tailored engineer companies. The engineer battalion headquarters can provide C2 for combat or general engineering missions when they have been task-organized to perform in these roles. The supporting engineer battalion is typically focused on a single mission, such as route clearance, security, or construction. The engineer battalion may also be task-organized to perform as a breach force command when the BEB conducts a combined arms breach for a separate task force. During a gap- or river-crossing operation, the engineer battalion may be designated as the crossing-site commander to allow the BEB to attack with the BCT. When conducting construction or explosive hazards clearance missions, the EAB battalion receives construction design, survey, or explosive-hazards teams to facilitate the mission, in addition to the existing battalion capacity. The battalion may be task-organized to perform all three of these functions at the same time or during the same activity.

BASELINE AND SPECIALIZED ENGINEER UNITS

3-30. Baseline engineer units include combat and general engineering units. (See table 3-4.) They are the primary building blocks for the organization of most engineer battalions. These units are used to augment organic engineer capabilities. They may be task-organized under an engineer battalion headquarters to serve under a variety of larger headquarters, providing the specifically tailored capabilities needed to support particular mission requirements. These capabilities include the sapper company, mobility augmentation company, clearance company, engineer support company, engineer construction company, and the multirole bridge company.

3-31. A BEB typically requires additional bridging equipment to support BCT level gap crossings for any gap beyond 13 meters (rapidly emplaced bridging system) or 18 meters (assault vehicle-launched bridge or the joint assault bridge). A multirole bridge company, an additional engineer combat company to align with the third maneuver battalion, and additional construction personnel to build flight landing strips or significant survivability structures are standard enabler packages that may be tasked to the lead BCT.

Table 3-4. Operating force engineers

Engineer Elements			*Component*		
			Active Army	*ARNG*	*USAR*
Organic engineers		Brigade engineer battalion	X	X	
		Geospatial engineer team	X	X	X
Force Pool	*Engineer headquarters*	Theater engineer command			X
		Engineer brigade headquarters	X	X	X
		Engineer battalion	X	X	X
	Baseline engineer units	Sapper company	X	X	X
		Mobility augmentation company	X	X	X
		Clearance company	X	X	X
		Engineer support company	X	X	X
		Engineer construction company	X	X	X
		Engineer vertical-construction company		X	X
		Multirole bridge company	X	X	X

Table 3-4. Operating force engineers (continued)

Force Pool (continued)	Engineer Elements		Component		
			Active Army	*ARNG*	*USAR*
	Specialized engineer units	Area clearance platoon		X	X
		Asphalt team		X	X
		Concrete section		X	X
		Construction management team	X	X	X
		Diving team	X		
		Engineer detachment (canine)	X		
		Engineer facility detachment		X	X
		Engineer utilities detachment		X	X
		Explosive-hazard coordination cell		X	X
		Firefighting	X	X	X
		Forward engineer support team–advanced*	X	X	X
		Forward engineer support team–main*		X	X
		Geospatial planning cell	X		
		Prime power*	X		X
		Quarrying team		X	
		Well drilling		X	
*Assigned to the U.S. Army Corps of Engineers					
Legend: ARNG Army National Guard USAR U.S. Army Reserve					

SAPPER COMPANY

3-32. The sapper company executes combat and general engineering tasks in support of BCTs and support brigades to enable force application, focused logistics, and protection. It often reinforces organic engineers in the BCTs. Sapper companies vary in design; however, all are organized with three sapper platoons. 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

3-33. The mobility augmentation company executes the following tasks with organic capabilities:

- Conduct assault gap-crossing operations.
- Conduct mounted and dismounted breaches.
- Emplace obstacles in support of BCTs and support brigades to enable force application, focused logistics, and protection.

3-34. The mobility augmentation company is equipped with a variety of assault-breaching and countermobility equipment. It is organized with two assault breach platoons and one obstacle platoon.

CLEARANCE COMPANY

3-35. The clearance company conducts detection and limited conventional and unconventional weapons neutralization along routes and within areas of support to enable force application, focused logistics, and protection. The clearance company provides C2 for up to five route, area, or combat engineer platoons.

ENGINEER SUPPORT COMPANY

3-36. The engineer support company provides construction support for initial (organic) base camp construction and repairs and maintains ground LOCs. The company is equipped with various earthmoving equipment and provides C2 for light and medium horizontal-construction missions directly supporting the BCT through the theater. The company provides general- and vertical-construction tasks to establish and maintain the infrastructure required to conduct and sustain activities across the range of military operations. The engineer support company airborne variant conducts horizontal-construction tasks associated with rapid runway repair, constructing TUAS airfields, helicopter landing zones, assault landing zones, as well as mobility, countermobility, and survivability directly supporting the BCT.

MULTIROLE BRIDGE COMPANY

3-37. Using organic bridging equipment, the multirole bridge company is required for hasty crossings of gaps greater than 18 meters (59 feet) but less than 160 meters (525 feet). One or more multirole bridge companies are required to support deliberate wet or dry gap-crossing operations. The multirole bridge company is organized with a company headquarters, two bridge platoons, and a support platoon. The company has an organic maintenance capability. The company can be task-organized into several sections and spread across the BCT AO.

ENGINEER CONSTRUCTION COMPANY

3-38. Engineer construction companies focus on construction and can construct, rehabilitate, repair, maintain, and modify landing strips, airfields, CPs, MSRs, supply installations, building structures, bridges, and other related infrastructure projects. There are two variants of the company: one with horizontal-construction prominence and one with vertical-construction prominence. Horizontally prominent engineer construction companies have two platoons of horizontal-construction engineers and one platoon for vertical-construction. Vertically prominent engineer construction companies have two platoons of vertical-construction equipment and one platoon of horizontal-construction equipment. These units may also perform repairs on and limited reconstruction of, railroads or water or sewage facilities. The primary capability of these construction units is enhanced by the augmentation of specialized personnel and equipment to provide quarrying and rock crushing. Major horizontal-construction projects include highways, storage facilities, and airfields. Additional augmentation may include dive support or survey teams, depending on the type and scope of the construction mission.

MINE DOG DETACHMENT

3-39. The mine dog detachment supports the BCT by providing a unique explosive-hazards detection capability. See ATP 3-39.34 for additional information on military working dogs.

EXPLOSIVE-HAZARDS COORDINATION CELLS

3-40. The explosive-hazards coordination cell manages the database of explosive-hazards and maintains a land mine database. The cell provides technical information on the mitigation of explosives risks. Explosive-hazards cell capabilities include—

- Establishing, maintaining, and sharing explosive-hazards information within the joint operations area while assigned to the engineer brigade.
- Conducting a pattern analysis.
- Providing technical advice on the mitigation of explosive-hazards.
- Investigating areas laden with explosive-hazards.
- Ensuring the accuracy of explosive-hazards information distribution via the Knowledge Management System.
- Coordinating technical and tactical explosive-hazards training for BCTs.
- Providing updated tactics, techniques, and procedures for route and area clearance.

ENGINEER PRIME POWER

3-41. Prime power units provide electrical power and advice and technical assistance on all aspects of electrical power and distribution systems. Prime power units have limited electrical engineering capability (design and analysis); provide electrical surveys; and operate, maintain, and perform minor repairs to other electrical power production equipment, including HN fixed plants.

Explosive-Ordnance Clearance Agents

The EOCA is not an engineer unit, but, rather, an engineer capability. EOCA-trained personnel are combat engineers trained to perform limited identification and destruction of explosive hazards, as outlined in the theater EOCA identification guide and supplemental list of the EOCA ordnance (part of the theater ordnance order of battle) provided to subordinates by the theater chain of command. EOD-trained Soldiers should be employed when the explosive hazard is out of scope for EOCA-trained personnel. EOCA-qualified Soldiers can assist EOD personnel in disposing of other explosive hazards. The EOCA capability resides in the BEB, the IBCT battalion task force, clearance company, mobility augmentation company, sapper company, area clearance platoon, and explosive-hazard coordination cell. EOCA training includes—

- Explosive-hazard reconnaissance.
- Explosive-hazard identification.
- Explosive-hazard area marking.
- Protective-works construction.
- Explosive-hazard disposal.

OTHER SPECIALIZED ENGINEER UNITS

3-42. Other specialized engineer units support construction, logistics, and reconnaissance capabilities at the operational and strategic levels and often augment those capabilities down to the tactical level. Many capabilities are of lower density than those of the baseline engineer units. These smaller, more specialized units are designed to support technical aspects within larger, engineer-related missions or to augment headquarters elements with unique technical engineering skills. Details for other specialized engineer units are described in ATP 3-34.40, FM 3-34, TM 3-34.83, and TM 3-34.84.

3-43. Specialized units and capabilities include—

- Concrete sections.
- Construction management teams.
- Engineer facility detachment.
- Engineer utilities detachment.
- Forward engineer support team–advanced.
- Forward engineer support team–main.
- Quarry platoons.
- Well-drilling teams.
- Engineer dive detachments.
- Firefighting teams
- Urban search and rescue.

SECTION III—NONENGINEER BRIGADE COMBAT TEAM ENABLERS

3-44. The BCT may require tailoring or task-organization for each specific mission that it performs. When assigned or attached in support of a theater-specific operation, OPORD, operation plan (OPLAN), or concept

plan, the BCT staff conducts a mission analysis to determine the capabilities, recommend task-organization, and command and support the relationships that are necessary to accomplish the mission. The BCT may receive a mix of units (military police, CBRN, CA, EOD, military information support operations, and ADA) from detachments to battalions. In many cases, the BEB assumes C2 of these enablers.

MILITARY POLICE COMPANIES

3-45. Each BCT is organized with an organic military police planning cell that includes a provost marshal and an operations NCO. During offensive, defensive, or stability tasks, the BCT should plan for the task-organization of additional baseline military police elements, including a military police company and, in special cases, a battalion for necessary C2 of military police operations (police operations, detention operations, and security and mobility support) to support mission requirements. Other specialized military police units and equipment may support tailored military police operations for which advanced policing or detention skill sets are required. See FM 3-39 for additional information on military police operations.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COMPANIES

3-46. The following four variants of CBRN companies may be employed to support the BCT or other designated force:

- The area support company provides CBRN reconnaissance, surveillance, and decontamination support in corps and theater support and consolidation areas.
- The hazard response company provides reconnaissance, surveillance, and decontamination in support of brigades.
- The biological company provides biological surveillance and monitoring of key areas and critical nodes.
- The chemical, biological, radiological, nuclear, and explosives company consists of specialized teams, including EOD teams.

Note. See FM 3-11 for additional information on the employment of CBRN organizations.

CIVIL AFFAIRS COMPANIES

3-47. The CA company provides a dedicated capability to plan, enable, shape, integrate, manage, and execute CA operations. CA operations engage and influence indigenous populations and institutions; incorporate unified action partners; develop civil considerations; and provide information about operational variables for the planning, facilitation, and management of provincial or large city government, civil-military operations, or stability activities. The Army rules of allocation provide for a CA company to be assigned to the BCT. The CA company consists of a headquarters, a civil-military operations center, and five CA teams. The company provides C2, staff planning, company operations, and administrative supervision and maintains an organic equipment capability to deploy the BCT. The company commander works closely with the BCT CA operations officer on the BCT staff. See ATP 3-57.60 for additional information.

EXPLOSIVE-ORDNANCE DISPOSAL COMPANIES.

3-48. EOD units are trained and equipped to render-safe explosive ordnance. EOD units are not trained or equipped to be employed for a combined arms breach. See ATP 4-32 for additional information on EOD support to the BCT.

MILITARY INFORMATION SUPPORT OPERATIONS

3-49. According to an Office of the Secretary of Defense level program, the tactical PSYOP company provides the BCT commander with the capability to execute an influence-focused plan and higher-command plans and intent. Planning is coordinated and developed by a PSYOP planner on the BCT staff. The TPC

augments the PSYOP planner, who is organic to the BCT, and assists in developing plans to best support the BCT commander's intent. The tactical PSYOP company is organized into three or four tactical PSYOP detachments, each consisting of three or four teams. A team uses a mix of Army standard equipment, branch-unique vehicle and man-pack loudspeaker systems and electronic news-gathering kits. The PSYOP detachment is tasked through C2 channels based on the task organization. See ATP 3-53.2 for additional information.

AIR DEFENSE UNITS

3-50. Air Defense units are added to BCTs to support lethal and protective responses to enemy air threats. Units may include detachments of short-range air defense systems and radar systems. See ATP 3-01.8 for techniques for combined arms for air defense.

Chapter 4
Engineer Support to Operations

The engineer force provides mission-tailored capabilities to the BCT in all operations. The BEB task organization contains adequate support for initial entry and offense. As the OE develops, EAB units provide specialized support to conduct the simultaneous engineer operations necessary in complex offense, defense, and stability operations across the engineer discipline. This chapter provides an overview of engineer missions that support the BCT during shape and prevent operations, LSCO (offensive and defensive activities), and the consolidation of gains and discusses engineer considerations for the associated tactical requirements. See FM 3-90-1 for detailed information on offensive and defensive operations.

SECTION I—ENGINEER SUPPORT DURING SHAPE AND PREVENT OPERATIONS

4-1. Conflict prevention primarily consists of diplomatic actions taken in advance of a crisis to prevent or limit violence, deter parties, and reach an agreement short of conflict. Military operations are tailored to meet political demands and may require deploying forces to contain a dispute or prevent it from escalating into hostilities. During operations to shape and operations to prevent, engineer effort typically requires more general-engineering-related activities. As units arrive in theater and conduct reception, staging, onward movement, and integration, engineer missions include improving routes for ground forces and constructing temporary-based lodgments to prepare for future combat missions.

SUPPORT TO COMMAND AND CONTROL

4-2. The BCT commander relies on the BEB to provide C2 for specialty enablers provided to the BCT. BEB commanders and staffs must effectively and efficiently integrate organic and subordinate enabling functions and units with BCT commanders and staff counterparts. BEBs may be tasked to perform missions beyond their functional role and organic capability to provide engineer coordination supporting combined arms maneuver, countermobility, survivability, requisite military intelligence, signals, and CBRN reconnaissance. These tasks include support area security and terrain management, BCT CP and base cluster defense, critical leader engagement with HN and allied partners, establishment of detainee collection points, and integration of various functional enablers.

4-3. Engineers integrate into the BCT planning cycles to translate broad, conceptual intent from higher headquarters into actionable operations orders. Geospatial information and terrain analysis provide the foundation on which an understanding of the physical environment is based. MICO and signal companies provide the networks and systems to collect information and intelligence on the enemy and the environment to create a COP for unit commanders.

4-4. Division and higher headquarters identify engineer units and capabilities as they arrive in-theater, and combat power is continuously increased. Engineers in the BCT may be used for missions outside of the BCT AO if they comprise the only unit with that particular skill set. As more engineers and engineer headquarters units arrive, a few enablers may be available to support BEB and BCT mission sets. These include assessing infrastructure, building lodgment, supporting sustainment, and improving mobility along MSRs and alternate supply routes. BEB staff must regularly update staff estimates as the theater forces expand to include tracking engineer expertise from other Services, contractors, and even HN engineer units. Figure 4-1, page 4-2, depicts various engineer missions that support BCTs across warfighting functions.

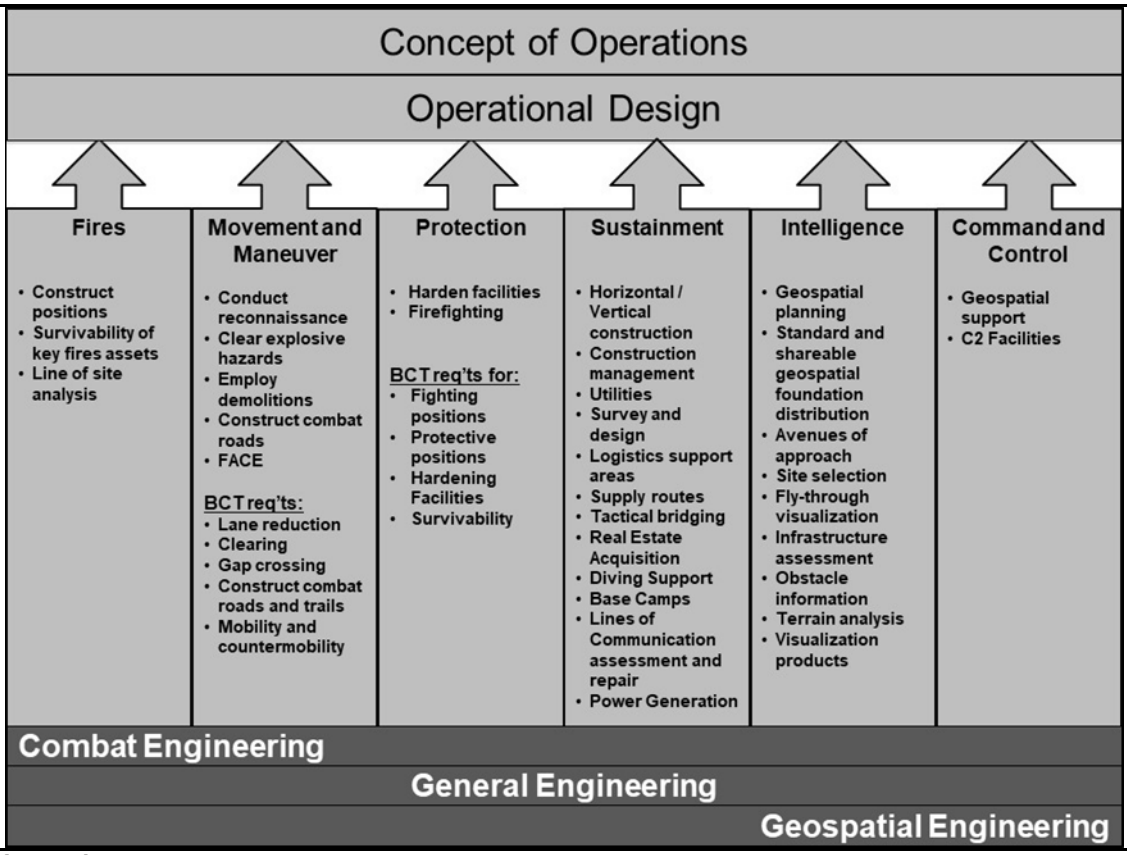


Figure 4-1. Engineer missions across warfighting functions

MISSIONS TO SET THE THEATER

4-5. Setting the theater for engineers includes establishing, maintaining, and defending bases or base clusters ranging from an air base or seaport to an intermediate staging base. Managing the basing process and individual bases spans across the basing life cycle. The management of basing ranges from the acquisition (and later disposition) of real estate, real property, materials, construction labor, base setup, decommissioning, and transferring the base back to a HN or other authority. Most of this planning and management is logistical. A vital part of the logistical puzzle is the management of Class IV (barrier and construction material) and Class V (explosives) supplies. It is essential to manage these classes of supplies separate from the others since they help to meet very distinct and different purposes: base defense, infrastructure security, general force protection measures and, occasionally, breaching.

4-6. Infrastructure survey teams use infrastructure assessments to prioritize the infrastructure categories and parts that require reexamination during the infrastructure survey. If required, the BEB requests field force engineering augmentation to provide infrastructure assessments or specific requirements, such as electrical-power assessments on HN military bases. Some considerations in evaluating operational infrastructure requirements include:

- Does existing or planned infrastructure meet operational needs over the campaign phases in terms of quantity, quality, location, and force protection?
- Will infrastructure meet coalition, unified action partner, and HN needs over time?
- Should infrastructure be repaired, upgraded, maintained, or newly constructed?

- What are the infrastructure defense and protection needs over time, by type, and scalability?
- Is any part of the infrastructure on the critical asset list, defended asset list, or protection prioritization list?

4-7. To limit the amount of construction required for lodgment, the United States aims to maximize the use of existing HN infrastructure. This includes air bases, ports, roads, military buildings, and even water and electrical distribution stations. Engineers work with BCT and sustainment planners to build the requirements list needed to sustain the BCT and prepare the unit for combat operations.

BASE CAMP PLANNING

4-8. Operating from base camps is a fundamental tactic of ground-based forces. Whether in a tactical assembly area, an existing HN military barracks facility, or a base camp built by contracted support (such as the logistics civil augmentation program), engineers must plan engineer missions to ensure that a base function or purpose is met. Engineer commanders and staffs assist supported commanders by furnishing engineer advice and recommendations to the commander and other staff officers; preparing the engineering portions of plans, estimates, and orders that pertain to base camps; participating on project approval and acquisition review boards and base camp working groups, as necessary; and coordinating and supervising specific engineer activities for which the engineer staff is responsible. The engineer staff assists the commander by performing various functions to synchronize engineer operations in the operational area. See ATP 3-34.40 and ATP 3-37.10 for more information.

4-9. Combat engineers typically support initial entry or access into enemy-held territory through a beachhead, airhead, or bridgehead. The initial secured and defended area is then expanded into a substantial defended area referred to as a lodgment. General engineers may support the initial entry or access through logistics over the shore and airfield or port construction, maintenance, or repair. General engineers replace combat engineers so that the combat engineers can move forward with maneuver forces. General engineers then provide support to expand the lodgment in capacity and capability as it progresses to a support area; and eventually, base camp master planning begins. Considerations are given to upgrading existing base camp facilities to become more semipermanent. Planning for base camps begins before deployment and evolves as the situation becomes clearer, with defined end states and the presence of codified forces.

4-10. Base camps for the BCT may be established in nations adjacent to the operational area to support deployments before or after initial entry into an area. For example, an intermediate staging base may also serve as a base camp. These base camps may include new or prefabricated construction and make maximum use of existing structures (with or without repair or modification), eliminating the need for constructing new billets.

4-11. *Base camp development planning* is a time-sensitive and mission-driven cyclical planning process that determines and documents the physical layout of adequately located, sized, and interrelated land areas, facilities, utilities, and other factors to achieve the maximum mission effectiveness, maintainability, and expansion capability in theater (EP 1105-3-1). The process must also address the eventual cleanup and closure of the base camp after the U.S. military mission is complete. Base camp development planning products include the planning report, maps, plan drawings, and geophysical information.

4-12. Successful base camps are characterized by four principles that are incorporated throughout the life cycle (ATP 3-37.10 and JP 3-34). Commanders and staffs use the following base camp principles as a guide for analytical thinking:

- Scalability.
- Sustainability.
- Standardization.
- Survivability.

4-13. Base camp functional areas are related to base camp tasks and activities, and they are grouped to facilitate planning and execution.

4-14. During mission planning, the following base camp functional areas help commanders and staffs organize the broad range of base camp requirements and the supporting information and tasks required for execution:

- Operations.
- Logistics.
- Services.
- Protection.
- Facilities and infrastructure.

4-15. The base camp development planning process is depicted in figure 4-2. Planners rarely perform these steps in an exact sequence; consequently, numbers are not assigned to these steps. Since planning is iterative and intuitive, planners may, at times, enter the process when it is well underway. Major construction standards are as follows:

- **Semipermanent.** Semipermanent construction standards allow for finishes, materials, and systems selected for moderate energy efficiency, maintenance, and life cycle cost, with a life expectancy of more than 2 years but less than 10 years.
- **Permanent.** Permanent construction is designed and constructed with finishes, materials, and systems selected for high energy efficiency and low maintenance and life cycle cost. Permanent construction has a life expectancy of more than 10 years. The theater commander must specifically approve permanent construction.

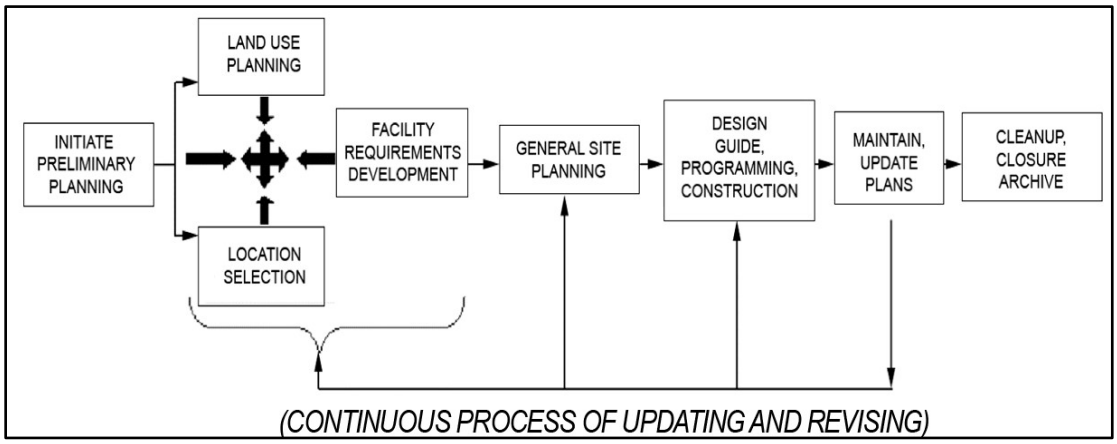


Figure 4-2. Base camp development planning process

ENGINEER RECONNAISSANCE SUPPORTING MOBILITY

4-16. Engineer reconnaissance teams are ad hoc formations derived from organic engineer teams, squads, or platoons. It may be necessary to conduct route, road, and bridge reconnaissance to identify mobility capacity and obstacles that must be cleared to support the BCT. Engineer reconnaissance teams are tasked to determine the grade and alignment, horizontal and vertical curve characteristics, and nature and location of obstructions. Obstacles are an impediment to movement or maneuver supporting the proposed traffic requirement for vehicles using a route.

4-17. Engineers may be tasked by BCT or higher headquarters to determine soil properties and drainage patterns, in addition to the usage ability of quarry pits, roads and railroads, and obstacles. To prepare for missions that improve roads for trafficability, engineers must consider road construction processes such as clearing, grubbing, grading, ditching for stormwater, and maintaining the road in the future to build a reliable work estimate. EAB engineers, HN personnel, or logistics civil augmentation program contractors who arrive in theater after the BCT has already arrived may conduct this work.

4-18. Engineer reconnaissance teams may work independently or as a combined arms force during shape and prevent operations. In addition to supporting intelligence collection that supports the BCT priority

intelligence requirements, engineers task-organize and integrate with the reconnaissance element to perform reconnaissance. Forms used for reconnaissance reporting are—

- DD Form 3007 *(Hasty Protective Row Minefield Record)*.
- DD Form 3008 *(Explosive Hazards Clearance Report)*.
- DD Form 3009 *(Route Classification).*
- DD Form 3010 *(Road Reconnaissance Report).*
- DD Form 3011 *(Bridge Reconnaissance Report)*.
- DD Form 3012 *(Tunnel Reconnaissance Report)*.
- DD Form 3013 *(Ford Reconnaissance Report)*.
- DD Form 3014 *(Ferry Reconnaissance Report)*.
- DD Form 3015 *(Engineer Reconnaissance Report)*.
- DD Form 3016 *(River Reconnaissance Report)*.
- DD Form 3017 *(Explosive Hazards Survey Report)*.
- DD Form 3020 *(Breaching Reconnaissance Record)*.

4-19. Aerial port of debarkation and seaport of debarkation have unique reconnaissance requirements. Considerations are given to the composition of the reconnaissance team for establishing the ability of military vehicles to safely use the facilities. While the U.S. Transportation Command is typically responsible for assessing and managing strategic ports of debarkation, engineer reconnaissance can be employed to ensure HN/U.S. Transportation Command data accuracy. USACE reachback engineer data integration is also available to remotely assess existing infrastructure or provide a technical classification for rudimentary data. See ATP 3-34.81 for more information on engineer reconnaissance.

Support to Movement and Maneuver During Shape and Prevent Operations

4-20. Engineers support planners and sustainers in determining roads required to enable operational mobility, enabling force projection and logistics, or building partner capacity and developing infrastructure. The planner determines locations that must be connected, the degree of permanence or use, the characteristics of estimated traffic type, and the traffic volume based on operational requirements. LOCs may determine the locations of some military facilities, or the locations of military facilities may determine the locations of some LOCs.

4-21. Based on operational requirements and reconnaissance data, engineer and transportation staff officers propose an initial route for roads and railroads. The proposed route is analyzed based on obstacles, route restrictions, grades, and the best horizontal and vertical alignment. The original route survey consists of straight-line segments or tangents connected through an iterative design process with horizontal and vertical curves to achieve the shortest, smoothest, most efficient route that requires the least maintenance, repair, or upgrade.

4-22. Combat roads and trails are combat-engineering missions because they are typically performed in close support of ground maneuver forces; however, combat and general engineers build them. Combat roads and trails are usually characterized by expedient construction methods and are intended to handle low traffic volumes for a short duration to meet immediate requirements. Combat roads have a temporary surface of material (such as crushed rock) to increase trafficability. Combat trails are intended to temporarily provide mobility while more permanent LOCs are constructed. Since combat engineers do not have the time, equipment (graders, water distributors, compactors), and necessary general engineers training, they cannot construct a road to meet the geometric design of all military roads. See ATP 3-90.4 for additional information on combat roads and trails.

SECTION II—LARGE-SCALE COMBAT OPERATIONS

4-23. Engineer support during large-scale combat occurs throughout the depth of the AO. Engineers provide simultaneous and synchronized support to deep, close, and support area operations. Engineers plan obstacles to shape the enemy's ability to move and maneuver. Knowledge of the terrain, and its visualization, can be used to identify locations where friendly forces can affect the ability of enemy reinforcements to move or

maneuver. Engineer reconnaissance identifies areas where friendly forces require engineer effort in support of mobility. Attacking forces task-organize engineer units to provide mobility support to the main and supporting attacks and the reserves. Engineers provide countermobility support to secure vulnerable flanks or prepare defenses.

OFFENSIVE MISSIONS

4-24. Offensive missions aim at defeating, destroying, or neutralizing the enemy. A commander may execute an offensive activity to deprive the enemy of resources, seize decisive terrain, develop intelligence, hold an enemy in position, or facilitate other friendly operations. In the offense, the assured mobility framework (predict, detect, prevent, avoid, neutralize, and protect) is used as a means of delineating the employment of friendly forces, simultaneously affecting enemy mobility and momentum; engineers in support of the offense focus on enabling movement and maneuver. See ATP 3-90.4 for more information on the assured mobility framework.

4-25. The engineer running estimate provides the engineer staff framework to synchronize and integrate engineer support into offensive missions. Conducting parallel and collaborative 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 crucial time for combined arms planning and combined arms rehearsals. Engineer staffs coordinate engineer reconnaissance to support the collection of information about obstacles and other technical information. They also coordinate the movement and positioning of 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 is more effective in ensuring their appropriate utilization. General-engineering assets, with their heavy and wheeled equipment, require added time for movement. Though the focus of supporting the offense 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.

CHARACTERISTICS

4-26. Surprise, concentration, audacity, and tempo characterize successful offensive operations. Maneuver commanders sustain the initiative by aggressively committing their forces 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 and destroying critical elements of the enemy force.

Surprise

4-27. 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

4-28. Engineers begin concentration planning by integrating geospatial products and predicting threat obstacles. This effort is further enhanced with engineer reconnaissance employment, providing the necessary obstacle information and other technical information essential for detailed planning. This allows the maneuver force and the engineers that support it to concentrate reduction assets and overcome obstacles or other impediments at the point of penetration as part of the maneuver unit breaching plan.

Audacity

4-29. Audacity initiates the actions needed to develop a situation; patience allows a situation to develop until the force can strike at the most crucial time and place. Experienced commanders balance audacity and

imagination against risk and uncertainty to strike in a manner, place, and time unexpected by enemy forces. Engineer mobility capabilities organic within the BCT enhance the commander's ability to exploit opportunities.

Tempo

4-30. Operational speed and flexibility are crucial to the attack. Rapid mobility operations by engineers maintain the maneuver force tempo. The ability to quickly reduce, proof, and mark lanes through an obstacle in support of the maneuver unit is the hallmark of the engineer. The imperative of maintaining mobility and momentum is highlighted as forces focus on achieving the fundamental tasks of avoid, neutralize, and protect.

TYPES OF OFFENSIVE OPERATIONS

4-31. The four primary offensive operations are movement to contact, attack, exploitation, and pursuit. A brief explanation of these operations is provided below; they are thoroughly explained in FM 3-90-1.

Movement to Contact

4-32. The priority for combat engineering support is typically mobility, although it may rapidly shift to countermobility in anticipation of an enemy attack. The task organization of engineers for a movement to contact must balance task-organizing mobility capabilities with the lead element to optimize response time and tempo without increasing the level of risk to the mobility of the main body or limiting the ability of 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 ATP 3-90.5, FM 3-90-1, and FM 3-96 for more information.

Security Force

4-33. Engineers may augment the security element to reconnoiter obstacles and help gather obstacle information to refine breaching planning for follow-on forces. See ATP 3-34.81 for information on conducting engineer reconnaissance.

Advance Guard

4-34. 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 obstacle information and overwatching enemy information from the security force to determine the potential point of breach. The advance guard usually constitutes the main effort until the main body is committed. Situational obstacles support efforts to fix or block enemy forces and must not affect follow-on friendly maneuver. See ATP 3-90.8 for more information on situational obstacles.

Main Body

4-35. The main body contains the bulk of 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

4-36. Flank and rear guard elements remain at a distance from the main body to prevent the enemy from surprising the main body with direct fire. Situational obstacles are used to help secure the flank. Obstacle control measures and clearly defined triggers are critical in effectively employing situational obstacles.

Attack

4-37. Task organization of engineers depends on mission variables 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 information collection effort helps generate obstacle information, which provides the necessary detailed picture of the enemy situation. The breaching organization is established based on detailed reverse breach planning (see ATP 3-90.4) if breaching is anticipated. Engineer priority of effort focuses on 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 employ obstacles and support survivability during the defense, while mobility forces focus on clearing obstacles or improving lanes to support friendly movement. (See ATP 3-90.5, FM 3-90-1, and FM 3-96 for more information.)

Exploitation

4-38. Exploitation is typically not conducted below the BCT level. The BCT (or higher-level unit) rapidly attacks over a broad front to prevent the enemy from establishing a defense, organizing an effective rearguard, 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. Engineers support 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 3-90-1, FM 3-90-2, and FM 3-96 for more information.)

Pursuit

4-39. A pursuit is normally not conducted at the BCT level unless the BCT is augmented with additional aviation assets or ground maneuver units. The goal of pursuit is to fix the enemy between the direct-pressure and encircling forces and then destroy it. The direct-pressure and encircling forces require that engineers be forward in movement formations to quickly reduce lanes in obstacles that cannot be bypassed, thus ensuring unimpeded mobility. Engineers also conduct countermobility and survivability tasks in support of the encircling force. Commanders do not normally organize specifically for a pursuit ahead of time, although they may plan for a pursuit as a branch or sequel to an offensive mission. See ATP 3-90.5, FM 3-90, and FM 3-96 for more information.

SUSTAINMENT CONSIDERATIONS FOR THE OFFENSE

4-40. When preparing for the offensive, engineer planners must consider several situations. For example, when a maneuver battalion changes from search-and-attack mode to an approach march or a hasty attack, significant shifts in engineer sustainment plans are generally not required. However, other operation adjustments, such as transitioning to the defense, may cause a considerable change in sustainment focus or emphasis. Therefore, 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/IV/V supplies) well forward within supported unit combat trains, anticipating a transition to the defense.
- Use air resupply when possible.
- Use previously planned and combat-configured loads of standard obstacle packages 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.
- 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 to support AO expansion, logistics traffic increases, and casualty evacuation. Activities include engineer reconnaissance, route clearance, and forward aviation combat engineering.
- Plan and prepare for replacements based on known and projected engineer losses.

FORMS OF MANEUVER

4-41. The maneuver commander selects the form of maneuver based on the analysis of mission variables. An activity dominated by offensive operations may contain several forms of offensive maneuver. The five forms of maneuver are—

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

ENVELOPMENT

4-42. 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 maneuver commanders with the flank they need; therefore, enemy obstacles and terrain must be studied.

4-43. The maneuver force that makes up the enveloping force typically organizes for breaching. Once committed, the enveloping force must have the capability to breach unforeseen obstacles with minimal delay and maneuver. The following circumstances are critical to this ability:

- **Obstacle information gathered before the enveloping force mission**. The engineer staff must ensure that engineers are integrated into the brigade information collection plan and the cavalry squadron and battalion scouts.
- **Engineers task-organized to the enveloping force**. Engineers provide organic obstacle reduction capabilities and further task-organize forces to accomplish the mission.

4-44. Engineer task organization must provide flexibility and redundancy. The main effort cannot be delayed while low-density equipment is brought forward or units are replaced. Engineer planners can utilize the reverse planning process for determining engineer task organization requirements in support of combined arms breaching.

Main Effort

4-45. Engineer support to the main effort is broken into two areas—providing mobility for the enveloping force and providing support to protect enveloping force flanks on situational obstacles. Obstacles are typically planned at the brigade level.

Note. Scatterable mine systems are vital components in supporting an envelopment.

4-46. 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 which should be determined early in the planning phase for augmentation.

4-47. Planners must ensure that there is an adequate force designated to breach obstacles reseeded by enemy scatterable systems. Due to the limited availability of organic engineers, a request for forces is usually required from EAB engineer units with breaching capabilities.

Actions on the Objective

4-48. The mission of the enveloping force may be to attack and defeat or destroy a defending enemy force or reserve force, seize terrain, or interdict enemy withdrawal routes. The priority of engineer effort is still mobility. The task organization must provide attacking battalions with the capability to breach protective obstacles. However, if the mission is to secure key terrain, then the enveloping force may require mobility and countermobility capabilities, denying the enemy use of LOC. The organic engineer units can provide only limited survivability support. In these cases, the engineer staff, through wargaming, ensures that the enveloping force has the assets necessary to maintain its mobility during the attack, protect its flanks, create survivability positions, and establish effective blocking positions.

Fixing Force

4-49. Providing the necessary assets to the fixing force is the greatest challenge of the engineer staff. While the main effort of engineer support and concentration of the engineer force resides 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 movement of the enveloping force. This causes the enemy to fight in two directions.

4-50. The engineer role in the fixing force is generally limited because of support priorities to the enveloping force. The engineer staff carefully analyzes the requirements of the fixing force. This may require focusing on the maneuver plan two levels down, through close coordination with engineer and maneuver force commanders. The engineer staff often recommends that the maneuver commander accept a level of risk and allocate the minimum force necessary to accomplish mobility requirements. However, the engineer staff can reduce the risk level by initially focusing on obstacle information collection to confirm or deny assumptions about the enemy situation facing the fixing force. Adequate engineer augmentation minimizes the need to accept higher levels of risk.

TURNING MOVEMENT

4-51. The commander directing a turning movement task organizes resources into a turning force, a main body, and a reserve force. Each of these forces executes security and reconnaissance. The turning force or the main body can conduct the decisive action of the echelon, given the appropriate mission variables.

Main Effort

4-52. 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.

4-53. 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

4-54. To provide engineer support to actions on the objective, the engineer staff must understand the maneuver scheme. Engineer staff involvement with the S-2 in the IPB process is fundamental to this understanding. Determining the task organization of engineer units to the turning force centers on the IPB process and subsequent information collection. The success of the turning movement implies the potential requirement to transition to the defense to support the maneuver force fight against counterattacking enemy forces.

4-55. If the BCT is the turning force, the supporting attack may be more like the follow-and-assume or follow-and-support force within the BCT axis of attack. As such, the possibility of shifting engineer assets is greater than it is in the form of a 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 a focus on of countermobility and then back to mobility is critical.

FRONTAL ATTACK

4-56. Engineers are involved in maintaining 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, a main body, and a reserve force. The mission variables dictate the specific task organization. A frontal attack should always include significant combat engineer augmentation. The supporting attack is likely to have many of the same engineer requirements as the main attack (reducing obstacles).

Main Effort

4-57. Engineer requirements are associated with each element of this force but are likely to be massed to ensure success of the decisive action. This is generally done in support of the main effort several areas of engineer support to the main effort require that dedicated engineer forces—

- 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

4-58. 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 rapidly transition to support the maneuver element defense activity. 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 should be applied for any anticipated combined arms breaching. See figure 4-3, page 4-12, for an example of reverse breach planning.

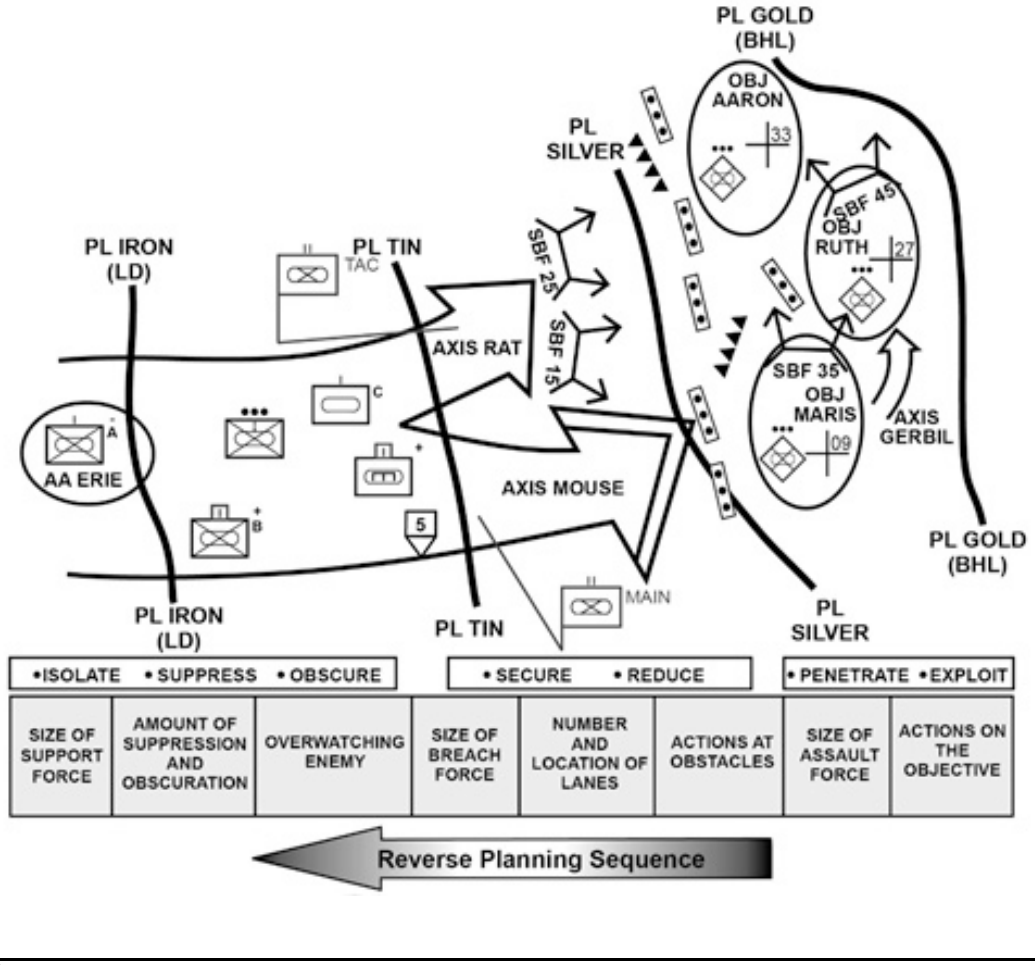
PENETRATION

4-59. A successful penetration requires the concentration of all combat multipliers, including night, darkness, and covered and concealed terrain. There are three stages to penetration:

- Breaching enemy main defensive positions.
- Widening the gap created to secure the flanks by enveloping one or both of the newly exposed flanks.
- Seizing and subsequently exploiting the objective.

Main Effort

4-60. Engineers support penetration by providing the main effort with overwhelming mobility to rupture enemy obstacles. This remains the engineer priority of support until penetration is achieved. The engineer staff must mass obstacle reduction assets in the main effort. Penetration requires the rapid projection of combat power to maintain the momentum and quickly divide the enemy force. To do so requires creating more lanes along a narrower front than generally associated with breaching. Therefore, mass and redundancy drive engineer task organization to the main effort. Mass is commonly achieved by weighing the main effort with task-organized EAB engineer augmentation based on the generally high number of essential mobility and survivability tasks associated with the main effort.



Legend:

AA	assembly area
BHL	battle hand-over line
LD	line of departure
OBJ	objective
PL	phase line
SBF	support by fire
TAC	tactical command post

Figure 4-3. Reverse breach planning process supporting a frontal attack

4-61. The maneuver unit may use supporting forces or follow-and-support forces to widen the point of penetration and improve the breach lanes. The engineer staff must understand the commander's intent in order to ensure that forces have enough engineer support. When a follow-and-support force is employed, it assumes responsibility for widening the point of penetration and improving the lanes. This may require a smaller, more centralized engineer organization.

Countermobility

4-62. Depending on the enemy situation, countermobility may quickly become the priority in order to help defeat counterattacks against lodgment. Follow-and-support forces are typically used to secure lodgment and defeat counterattacks. Engineers must—

- Anticipate the size of the counterattack force.
- Analyze likely avenues of approach.
- Allocate the countermobility assets necessary to disrupt or fix counterattack forces.
- Plan situational obstacles for flanks and uncovered terrain.

4-63. Engineer planners design obstacle belts that permit the use of tactical and situational obstacles. Consideration is given to future operations. The use of obstacle restriction and obstacle-free areas allows the commander to limit or eliminate the use of obstacles that may impede future operations. Obstacle belts are designated and turned over to subordinate battalions for planning obstacle types and composition to meet the commander's intent. Obstacle belt emplacement authority is generally retained at the brigade. Forces securing lodgments require flexible and responsive obstacle capabilities, such as the ability to emplace scatterable munitions. See ATP 3-90.8 for more information on countermobility.

Exploitation

4-64. Once the objective is secured, the engineer priority shifts to assisting the force in exploiting its success by ensuring the mobility of subordinate units. To facilitate the exploitation, the engineer staff must provide that the scheme of engineer operations allow for the rapid development of lanes at the point of penetration. The lanes must support the uninterrupted forward passage of the reserves to subsequent objectives and the flow of sustainment. Once the force has passed through the lanes, responsibility for improving and maintaining lanes is transferred to follow-on forces.

INFILTRATION

4-65. Successful infiltrations require thorough reconnaissance. Engineer aspects of reconnaissance include—

- Using observation and fields of fire, avenues of approach, key and decisive terrain, obstacles, and cover and concealment from an enemy perspective to help develop the reconnaissance plan.
- Identifying the enemy disposition.
- Identifying infiltration lanes.
- Locating assault positions for the attacking force.
- Identifying enemy weaknesses.
- Observing enemy activity.

Intelligence Preparation of the Battlefield

4-66. Engineer reconnaissance helps the commander determine the infiltration method, the task organization, and the size of the infiltrating units. Obstacle information is collected to fulfill priority intelligence requirements when developing the enemy situation template. Reconnaissance is also vital in determining actual routes and whether single or multiple infiltration lanes are available. Successful engineer support to infiltration is predicated by careful, detailed terrain analysis by the engineer staff and physical collection by the engineer reconnaissance team.

4-67. Existing gaps in enemy defenses, locations of enemy security elements, natural and man-made obstacles, and predicted enemy obstacles are all considered. Engineers infiltrating with the cavalry squadron and battalion scouts verify, report, mark, and (if ordered) reduce obstacles along the infiltration lanes.

4-68. The engineer staff develops information requirements for inclusion in the S-2 collection plan. In addition to the information requirements, information explicitly identified in the objective area (specifically, obstacle information) is developed in support of the infiltration itself. Engineer reconnaissance teams support technical reconnaissance requirements affecting mobility. Examples of information requirements include the—

- Location, type, density, and employment method of obstacles in and around the objective.
- Recommended location for the point of penetration and any bypasses.
- 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 requires protection.

Mobility

4-69. Mobility is the main focus of engineer units during an infiltration, with the 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 mobility tasks 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.
- Accurate and timely intelligence updates provided by engineers working with scouts during reconnaissance.
- Detailed combined arms rehearsals.

Planning Considerations for Actions on the Objective

4-70. To provide adequate support to maneuver battalions and the cavalry squadron during actions on the objective, detailed engineer planning at the brigade centers on wargaming contingencies and sequels as well as transitions. Engineers may be task-organized to one or more maneuver battalions or to the cavalry squadron in a command relationship during the infiltration and subsequent actions on the objective. This ensures the maneuver commander's flexibility to further task-organize engineers and establish absolute control that follows the actions of the objective during breaching. Subsequent, on-order missions (defense) may dictate a change in the task organization of engineer units. Those units may need to transition from a command relationship to a support relationship with maneuver battalions or the cavalry squadron. This is done to speed up the response of engineer units and ensure responsive sustainment support.

ENABLING OPERATIONS

4-71. Enabling operations are specialized operations that units plan and conduct to achieve or sustain a tactical advantage. Units execute these operations as part of decisive action. Alone, enabling tasks cannot ensure success; however, neglecting them can result in mission failure. The fluid nature of the OE likely increases the frequency with which engineers must execute tasks supporting enabling operations as part of a combined arms team. Engineer tasks supporting enabling operations include—

- Breaching, clearing, and gap crossing (see ATP 3-90.4).
- Explosive hazards (see ATP 3-34.20).
- Reconnaissance (see ATP 3-34.81).
- Passage of lines (see FM 3-90-2).

DEFENSIVE OPERATIONS

4-72. Defensive operations are a prelude to the offense. Defensive plans should not be designed simply to resist enemy attacks. Rather, they should aim at reverting to the offense and decisively defeating the enemy. The defense seeks to defeat an enemy attack, buy time, economize forces, or develop conditions favorable for the offense. The engineer focus is on attacking the enemy's ability to influence operating areas (countermobility through combined arms obstacle integration as part of engagement area development) and supporting mobility for friendly repositioning or counterattacking forces.

4-73. Many planning considerations for the offense also apply to the defense. The engineer running estimate provides the framework for synchronizing and integrating engineer support to the defense. See ATP 3-37.34 and ATP 3-90.8 for more information on countermobility, engagement area development, and survivability planning.

CHARACTERISTICS

4-74. The defending force is the first to arrive on the battlefield and, with the help of engineers, use the terrain to its advantage. Based on the higher commander's intent, maneuver commanders, the fire support officer, and the engineer support site tactical obstacles to enhance the effects of direct and indirect fire on the enemy. Engineers provide technical expertise and advice to the commander on the obstacle plan and intent

(tactical, decoy). Fortifications allow fire 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.

4-75. Engineers provide 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 needed in order to fulfill the intensive requirements for engineer support in the defense.

4-76. Preparation, security, disruption, mass and concentration, flexibility, and operations in depth characterize a successful defense. The engineer commander and engineer staff plan and execute engineer missions that enhance the ability of the maneuver unit to combine fire, 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.

4-77. Defenses also employ deception, seeking to encourage the enemy to deploy forces early, deplete critical resources, and contribute to the overall confusion of the enemy they face. The engineer contribution to deception provides decoy fighting positions, phony minefields, and other deceptive items.

Preparation

4-78. Preparation of the defense includes planning and refining the plan, positioning forces, constructing obstacles and fighting positions, preparing other survivability requirements, synchronizing fire, positioning logistics, and conducting inspections and rehearsals. To prepare for the defense, the commander must be familiar with enemy capabilities and limitations. 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's main threat). The terrain enhances the capabilities of these weapons.

4-79. Engineers play an essential role in engagement area development. 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 C2 nodes. See ATP 3-90.8, FM 3-90-1, and FM 3-96 for further discussion of engagement area development.

4-80. Engineer success in the preparation phase depends on the ability of the engineer staff to conduct integrated planning with the combined arms staff. The engineer staff must identify engineer requirements in support of decisive action and shaping tasks, 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 ATP 3-90.8, obstacle control, intent, and resourcing are driven from the top down (initiated by the higher headquarters). In contrast, the process of integrating the actual obstacle location with fires is driven from the bottom up (undertaken by the overwatching unit alongside the emplacing unit).

4-81. Engineer focus in the preparation phase is not limited to close combat in the main battle area. Each element of the defensive framework must be considered during engineer mission analysis and accounted for in the scheme of engineer operations.

Security

4-82. The security of the force is principally provided through deception and physical means. In the defense, the friendly unit deceives the enemy by concealing its strengths and weaknesses. A security force positioned between the enemy and the main body normally secures the main body. The purpose of this measure is to provide early warning and disrupt or delay the enemy attack. Engineers supporting the cavalry squadron or the security forces operating under the control of the cavalry squadron focus on providing situational obstacles and sensors with the intent of disrupting or delaying the enemy attack and providing early warning.

Disruption

4-83. The method that a commander chooses to achieve disruption varies with the situation, but the ultimate goal is to spoil the coordination of the attacker. Engineer commanders and engineer staff work closely with BCT and maneuver battalion staff to ensure that combat engineering (countermobility/survivability/mobility) functions are integrated into disruption activities, leveraging geospatial engineering capabilities 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.

Mass and Concentration

4-84. Engineers support the massing and concentration of effects by employing obstacles, constructing fortifications, and providing mobility to counterattack or reserve forces. The principal role of engineers in massing effects is to ensure that tactical obstacles are integrated with defender fire 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 (engineer 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.

Flexibility

4-85. 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 a 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.

Operations in Depth

4-86. Operations in depth refer to the simultaneous application of combat power throughout an AO. Commanders plan their operations in depth. They create conditions by disrupting long-range enemy fires, sustainment, and C2. These disruptions weaken enemy forces and prevent any early enemy successes. Operations in depth prevent enemy forces from maintaining their tempo. In the defense, commanders establish a security area and the main battle area with its associated forward edge.

DEFENSIVE TASK TYPES

4-87. There are significant differences among the three basic types of defensive tasks—mobile, area, and retrograde—and the tasks must be dealt with differently during planning and execution. See FM 3-90-1 for more detailed information.

Mobile Defense

4-88. Engineer support to a mobile defense focuses on using obstacles to interrupt enemy maneuver and providing mobility to the striking force and reserves. Most countermobility and survivability assets support the fixing force, while most mobility assets support the striking force. Obstacle zone planning 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 in order to ensure 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.

4-89. 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, alternate, and subsequent battle positions. Protective-obstacle effort may occur at any point within the mobile defense. However, the minimal forward protective-obstacle effort may be required 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 the ability of the counterattack force to maneuver.

Area Defense

4-90. An area defense capitalizes on the strength inherent in closely integrating defending units. The conduct of an area defense facilitates the consolidation and reconstitution of forces to transition to a focus on another element of decisive action, such as stability. During area defense, engineer involvement in terrain analysis is vital. Engineers help identify key and decisive terrain that supports the commander's operation concept, focusing on where the commander wants to kill the enemy. During obstacle planning, obstacle control measures are designed to provide maximum flexibility to subordinate units while concentrating the tactical obstacle effort on key and decisive terrain retention. The engineer staff must advise the maneuver commander of the resource requirements of each subordinate unit based on its assigned tasks for countermobility/survivability/mobility and must coordinate through the appropriate channels to ensure that the units are resourced accordingly.

4-91. The survivability effort in area defense must—

- Enhance the ability of the force to accurately concentrate fire 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 with regard to the exact location of the main defense.

4-92. If the construction and implementation of EAs are successful, then the enemy is forced to conduct assaults on the defensive positions to suppress or defeat the maneuver force's concentrated fires into the EAs. Survivability positions and protective obstacles must provide the protection necessary for maneuver forces to continue successfully engaging the enemy from primary or alternate positions. Effective defensive positions and mobile reserves are critical components for successful area defense.

4-93. The engineer staff enables effective defensive positions and mobile reserves through proper planning and preparation. The engineer staff must also understand the tactical-obstacle effort of subordinate units and coordinate their efforts to ensure that they are mutually supporting. The engineer staff 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

4-94. Mobility and countermobility are normally the focus of engineer support to the retrograde. 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 the retrograde is twofold. The steps are as follows:

- **Step 1.** The mobility of the force must be maintained, regardless of the type of retrograde being conducted. Engineer tasks supporting mobility focus on maintaining the ability of the force in contact to disengage while preserving freedom of movement and maneuver for the main body.
- **Step 2.** The force must be protected because it is particularly vulnerable to enemy actions during the retrograde. Consequently, the retrograde is normally conducted under limited-visibility conditions. Engineers support units that are left in contact and extend the commander's time by reducing enemy mobility through emplacing obstacles and modifying terrain.

4-95. It is a difficult balance between obstacle emplacement to delay enemy movement and obstacle reduction to conduct a counterattack. Engineer involvement in combined arms planning for a retrograde is essential. The level of detail developed by the engineer staff and the BCT staff 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 modified combined obstacle overlay highlights the terrain effects on the attacking enemy. Once determined, the 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 plans.

4-96. The engineer staff coordinates with the S-2 on engineer-specific information requirements. The information requirements aim to facilitate and maximize engineers efforts supporting units conducting the counterreconnaissance fight and retrograde. Considerations include predicting enemy reconnaissance efforts on the situation template and main-body attack routes into the AO. These considerations aid in planning and executing obstacle belts and groups that support the retrograde operation.

4-97. The route identification that the force uses is vital to retrogrades. Mobility must be maintained along these routes. While conducting terrain analysis during the IPB process, the engineer staff 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 must meet operational requirements. With these routes identified, route reconnaissance can be conducted to verify trafficability and suitability for the force. The information gained through 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, reported, and marked with unit standardized marking methods. Every Soldier in the unit must clearly understand the unit lane-marking system. Guides are sometimes left at obstacle lane locations to ensure safe passage. Because of the critical nature of the mission, commanders must provide guides if the mission variables so allow. At a minimum, units update the COP to reflect lanes and their status.

4-98. A major component in countermobility planning and execution during a retrograde is the synchronization of the warfighting functions. Countermobility missions can only be executed with a clear understanding of the commander's intent and operation concept. Situational obstacles are a key combat multiplier for the commander. Situational obstacles are normally centrally controlled.

4-99. Due to the critical requirements for mobility and countermobility, the maneuver unit may have limited survivability assets. The survivability that is provided is typically focused on supporting the protection of key assets and 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. Still, most survivability depends on the effective use of terrain and other measures (camouflage, concealment, and deception.)

4-100. Execution of lane closures is vital to the retrograde. Lane closure is normally centrally planned and executed by the BCT to ensure that mission execution conforms to the commander's intent and the scheme of maneuver. Obstacles identified for closing lanes frequently become brigade reserve obstacles. Lane closure depends on—

- Friendly and enemy activities.
- Contact levels.
- The size of the force left in contact.
- Available engineer forces.
- The time available.

4-101. 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 overwatching the obstacle). Synchronization is critical in preventing 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 closures must be rehearsed. See ATP 3-90.8 for more information on land closure criteria.

4-102. If aviation augmentation is available to support the rapid repositioning of units and to attack enemy forces, engineers may need to conduct forward aviation combat engineering and obstacle emplacement. Detailed planning between aviation units and the engineer staff is critical in synchronizing this effort.

4-103. Deception targets the enemy's ability to be decisive and to prevent the concentration of combat power against friendly force weakness. The engineer staff 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 or tank silhouette that is partially dug-in may cause the enemy to think that the friendly force is defending a retrograde instead of conducting one. In addition to shaping the battlefield, countermobility can also deceive the enemy with regard to what mission the unit is conducting. For example, the forward use of engineer equipment gives the appearance of preparing for a hasty defense while covering the withdrawal of a force. Employing decoys is part of camouflage, concealment, and decoy operations. See ATP 3-37.34 for more information on camouflage, concealment, and decoys.

4-104. Even though the unit is conducting a retrograde, some engineer assets and supplies may be moving forward. Other equipment may require specialized support. The engineer staff resolves 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 requires assistance due to the slow speed or lack of haul assets. To meet this requirement, transportation assets may need to be obtained 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.

SUSTAINMENT CONSIDERATIONS DURING THE DEFENSE

4-105. In contrast to the offense, the defense breaks 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 must be 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 of unit sustainment supplies (rations, water, and fuel) may also be required. Push and pull methods of resupply may be used; the method used is generally dictated by the time available before enemy contact is expected. In planning for the defense, it is important to—

- Maintain a brigade level or, if possible, a division or joint task force level focus on Class IV and Class V obstacle material handling in the brigade AO. Maneuver battalions have limited capability to move or transport these materials, so this must be well coordinated.
- Maintain low visibility for Class IV and V supply points. Enemy intelligence collection assets key on these sites during reconnaissance.
- 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 combat-configured loads of obstacle material to push logistics to forward supply sites. These packages facilitate obstacle planning, delivery, and execution for the brigade.
- Plan additional protection for engineer units, equipment, and sustainment during the defense. These assets may be high-value targets for the enemy.
- Plan for additional equipment maintainers to maintain engineer equipment and rapidly evacuate it as required. Fuel consumption and the expenditure of engineer-specific Class IX supplies are high for engineer equipment.

ENGINEER SUPPORT TO SECURITY

4-106. Engineers must understand the fundamentals of security operations. See FM 3-90-2 for further details on these fundamentals, which are—

- Area security.
- Cover.
- Guard.
- Screen.

4-107. Planning for engineer support to activities involves each of the engineer disciplines, although the focus remains on combat engineering (mobility, countermobility, and survivability [M/CM/S]). The amount and type of combat- and general-engineering support required vary according to the mission and mission variables. Geospatial-engineering information and services may vary based on maneuver forces requirements, but the requirement to include geospatial-engineering for all military operations remains a constant. The amount and type of engineer augmentation are critical since each of the BCT organic engineering capabilities is limited and, in some cases, completely lacking necessary engineer equipment or focused expertise. A general list of engineer tasks supporting the maneuver unit's security plan includes—

- Develop EAs.
- Develop the situational obstacle plan integrated with BCT decision points.
- Develop and execute the survivability plan.
- Plan and emplace obstacles.
- Integrate fires with obstacles and the situational obstacle plan.
- Occupy specific observation posts.
- Monitor bridges, ford sites, point obstacles, and reserve demolition targets.
- Provide mobility support.
- Provide tactical bridging.
- Identify key enemy engineer equipment, including 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).
- Screen.
  - Engineer reconnaissance.
  - Hardening in support of survivability.
  - Improvement of combat roads and trails.
- Guard.
  - Offensive—priority of support M/CM/S.
  - Defense—priority of support M/CM/S.
- Cover.
- Understand the security.
  - 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 clearance and route maintenance.
  - Conduct route security.
  - Conduct route reconnaissance.
  - Construct checkpoints.
  - Maintain a visible presence through demonstrations.

ENGINEER SUPPORT TO SELECT WARFIGHTING FUNCTIONS

4-108. Engineers provide focused and specific support to various units within and augmenting the BCT. Much of the following discussion addresses the hardening aspects of survivability (see ATP 3-37.34) and the requirement for engineer support to adequately protect vital personnel and equipment. Another significant element may be engineer reconnaissance (see ATP 3-34.81). Organic engineers are often focused on tactical missions to support maneuver units, while augmenting engineers take on missions that organic engineers have little capacity to perform.

FIRES

4-109. Engineer missions in support of field artillery units are primarily related to survivability or the location of georeferenceable points for artillery aiming points. Artillery units often require engineer support

to construct survivability positions for individual howitzers, fire direction centers, and radars. These survivability positions are built to protect Soldiers and equipment from the effects of direct and indirect fire.

4-110. Weapon-locating 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 fire. These radars are high-value targets for enemy forces and have no armor or self-protection capability.

4-111. Planning is critical when obscuration is required because mechanical obscuration is only available to artillery units or manually emplaced by individuals.

4-112. Engineer support to ADA is focused on hardening and other survivability tasks. ADA assets may include radars used to detect incoming ballistic missiles, ranging from intermediate- to short-range ballistic missiles; cruise missiles; UAS; rockets, artillery and mortars; submunitions; tactical air-to-surface missiles; and fixed- and rotary-wing aircraft. 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 capabilities in the BCT AO, which may require survivability effort from the BCT engineers.

4-113. In heavily wooded or jungle terrain, ADA units may need for engineers to clear fields of fire to facilitate missile launches or direct fire. Augmentation of engineer equipment and capabilities may be required to complete these tasks. When static, these weapon systems may require survivability positions that protect Soldiers and the systems and allow full use of vehicle air defense components.

MOVEMENT AND MANEUVER—AVIATION

4-114. Engineer support to aviation units and assets focuses on forward aviation combat-engineering tasks. Organic BCT engineers often complete these tasks but most likely require augmenting engineers for many general-engineering tasks, such as constructing full-support helipads.

4-115. Organic engineers within the BCT can quickly reinforce temporary aviation revetments to protect aircraft from the effects of enemy fire. The emplacement of gabions, berms, or concrete barriers supporting aircraft parking areas provides survivability and protection for aircraft. See ATP 3-37.34 for details on constructing aircraft revetments.

4-116. Combat engineering supports aviation units in the construction of forward arming and refueling points. Organic engineers can provide some support, but augmenting engineers offer capabilities that are not available in the organic engineer companies. Forward arming and refueling points may require survivability support, most often by berming. This berming may apply to the aircraft and ammunition or fuel being stored nearby. Locations chosen for establishing a forward arming and refueling points may require preparation (clearing and grubbing). The armored combat earthmover and deployable, universal combat earthmover can be used to perform many of these tasks, but bulldozers are better suited for areas with heavy vegetation. It may also be necessary for engineers to construct small trenches for the placement of fuel hoses to prevent damage. Contamination control measures may be addressed as operational tempo decreases.

4-117. Organic combat engineers can provide clearing and leveling for launch and recovery sites for the TUAS 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. TUAS at the BCT level and below require smaller, less-advanced launch and recovery sites. Organic engineers assist detachments in clearing and preparing launch and recovery areas, including the clearing of vegetation and the leveling of sites. Larger UAS, present at the operational level, may require extensive engineer augmentation support, such as an airstrip (some UAS under Air Force control require a paved runway). When supporting these units in the BCT AO, general-engineering unit augmentation must construct and maintain runways. If paving is necessary, engineer planners must ensure coordination for concrete detachment augmentation or bituminous material procurement.

PROTECTION

4-118. The *protection warfighting function* is the related tasks and systems that preserve the force so the commander can apply maximum combat power to accomplish the mission (ADP 3-0). The protection concept in today's OE includes protecting personnel (combatants and noncombatants) and physical assets. In addition to safeguarding bases and base camps, securing routes, and protecting forces within sustainment areas, protection considerations are applied to support battle positions, combat outposts, forward operating bases, and HN and other infrastructure. The battlefields of today require that commanders know survivability tactics and techniques that can provide protection. See ADP 3-37 for additional information on the protection warfighting function.

Chemical, Biological, Radiological, and Nuclear

4-119. 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 constructing 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 build combat roads and trails to improve access to the site. Engineer units coordinate with CBRN units to construct the decontamination site and ensure that site standards are met. For large-scale decontamination, EAB general-engineering units may be required to meet the capacity of the construction.

COMMAND AND CONTROL—SIGNAL ASSETS

4-120. Engineering support to signal units consists 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. When signal node power consumption overwhelms its organic capacity, support is requested from prime power units.

SUSTAINMENT

4-121. Engineer planners must constantly be aware of the requirements of supporting sustainment, and the engineer assets providing this support typically come from EAB engineer organizations. The following paragraphs are intended to remind engineer planners of sustainment considerations when conducting the engineer running estimate and developing orders. See ATP 3-34.40 for information on general-engineering construction support that may be undertaken to support sustainment.

Airfields

4-122. 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 activities from the brigade support area; general-engineering units are required to accomplish these tasks.

Heliports

4-123. One or more landing zones or heliports may be required to support operations. When operating in austere environments, rotary-wing aircraft are used for transport, medical evacuation, and resupply. The brigade support medical company of the BSB requires a landing zone close to its Role 2 MTF to facilitate medical evacuation by air ambulance. Engineers primarily use geotextile materials or dust-inhibiting fluids to reduce the effects of erosion and dust.

Supply Routes

4-124. The use of dedicated supply routes is critical for the sustainment of the BCT. Engineer units may be required to repair and maintain MSRs and alternate supply routes to ensure mobility for sustainment elements. These requirements are typically large-scale tasks and require general-engineering units to meet the demand. Depending on supply routes, it may be necessary to have multiple engineer units supporting supply route maintenance and repair. Engineer planners should consider augmentation by an additional

engineer battalion (or even a brigade) when supporting significant MSR requirements. Bridging support may be required to continue uninterrupted sustainment along MSRs.

Ammunition Transfer Holding Points

4-125. Ammunition transfer holding points within the BCT require force protection berms or trenches to protect resources. Large trenches may be constructed where ammunition can be stored and protected. These trenches and berms also mitigate the effects of a blast if they receive a direct hit from an enemy.

Fuel Sites

4-126. Engineers provide horizontal- and vertical-construction support for distribution systems. Protective works are constructed around bulk fuel sites.

Sustainment Survivability

4-127. The headquarters of most units supporting sustainment have limited protection and require survivability support. Initially, organic engineer units may provide limited berms and emplace gabion type barriers for protection; however, maneuver support tasks likely take precedence. General-engineering organizations augmenting the BCT are best suited to support the BSB and BCT sustainment area. Sustainment area units may require vertical- and horizontal-construction support, especially as the sustainment area becomes more permanent.

Health Service Support

4-128. Medical units have limited protection and require survivability support. Engineer assets may be required in order to provide berms, emplace obstacles, and harden facilities for patient protection.

Note. If units utilize a structure not previously used for an MTF, the shelter should be inspected for structural integrity and safety by supporting engineer elements.

Power Generation

4-129. The augmentation of power generation support may be necessary, primarily if the BCT is tasked with constructing or maintaining a base camp or forward operating base. Prime power teams provide this power generation support to bases and base camps. General engineering is required to assist in the creation of power distribution systems. See ATP 3-34.45 for more information on power generation and distribution systems.

Pioneering

4-130. Combat- and general-engineering units can construct various expedient lifting devices and other enablers using their pioneering skills. Such enablers include gin poles, shears, timber trestle bridges, three-rope bridges, ramps, and other devices that assist with lifting and loading heavy objects. These devices are especially useful in maintenance areas where forklifts and cranes may be under intensive use or other bridging is not available or appropriate. See TM 3-34.86 for details on constructing these and other supporting items.

SECTION III—ENGINEER SUPPORT TO CONSOLIDATE GAINS

4-131. *Consolidate gains* are the activities to make enduring any temporary operational success and set the conditions for a stable environment, allowing for a transition of control to legitimate authorities (ADP 3-0). Commanders continuously consider activities necessary to consolidate gains and achieve the desired end state. The consolidation of gains is integral to winning an armed conflict and achieving enduring success. It is essential to retaining the initiative over determined enemies because it ultimately removes both the capability and will for further resistance. It is the final exploitation of tactical success. When supporting Army forces and integrating or reinforcing the efforts of all unified action partners, engineer forces provide the joint

force commander with significant capability to support the consolidation of gains. The engineering tasks associated with the consolidation of gains are the same; only the conditions under which they are executed are different.

4-132. Consolidation of gains is not synonymous with stability, counterinsurgency, or nation building. It describes activities designed to make the achievement of the military objective enduring. Engineer support to offensive and defensive operations may continue, as well as the broad array of stability tasks continued over time in specific OEs. Maneuver forces will adjust their AO to mass effects and to ensure that C2 covers critical areas in the area of responsibility. Engineers must deliberately plan and prepare for a shift in vital engineer resources to support the consolidation of gains that capitalizes on operational success. Expect engineers and their supporting enablers, such as military police and EOD, medical, and CA personnel to conduct stability or security tasks.

4-133. The consolidation area is an important feature of LSCO at the tactical level. An enemy cannot be allowed time to reconstitute new forms of resistance to protract the conflict and undo the initial unit battlefield gains. As forces struggle with security, ground between the brigade advancing in the close area and brigade and division rear boundary areas expand beyond unit capacity. For contiguous or noncontiguous areas, units can establish a consolidation area to prioritize units and resources. While a consolidation area must initially focus on the defeat of enemy forces, the ultimate objective ensures that the enemy no longer has the means or the will to continue the conflict. As security in these areas improves, stability tasks can be increased.

4-134. It is difficult to distinguish LSCO tasks and missions from the consolidation of gains mission sets at the tactical level. It represents a transition within portions of the AO that requires security, the defeat of enemy remnants, and bypassed forces through decisive action. When a BCT is assigned a consolidation area, missions can range from exploitation and pursuit of bypassed enemy forces to stability operations that support the population. Engineers and maneuver planners must anticipate what additional capabilities the BCT or battalions require in order to facilitate area security, the security of key terrain, and control of the local population.

4-135. Engineer C2 shifts to place headquarters nodes at key mission sites. Follow-on forces may provide critical units and resources that are not required for LSCO but are essential for supporting the consolidation of gains and stability of the region.

4-136. Engineer tasks that support the consolidation of gains are similar to tasks in shape-and-prevent operations. These include—

- Assess civil infrastructure.
- Conduct area clearance to remove explosive hazards.
- Reconnoiter additional LOCs, roads, and bridges to support freedom of maneuver.
- Improve force protection measures for critical infrastructure.
- Improve combat roads and trails and replace tactical bridging with longer-term LOC bridging.
- Increase the number of contracts for Class IV, construction equipment, or construction labor.
- Construct base camps and improve infrastructure as forces and logistics are relocated within the AO.

TRANSITIONS

4-137. Commanders deliberately plan for transitions to allow the setting of the conditions necessary for a successful transition. Planning addresses the need to control the tempo of operations, maintain contact with enemy and friendly forces, and keep enemy forces off balance. It establishes the procedures and priorities by which a unit prepares for its next mission. It establishes the required organization of forces and control measures necessary for success according to the mission variables.

4-138. Prior planning decreases the time needed to adjust the tempo of operations when a unit transitions from LSCO to the consolidation of gains. This planning allows subordinate units to conduct parallel planning and prepare for subsequent operations. Preparations include resupplying unit basic loads and repositioning or reallocating support capabilities and other resources.

4-139. Planning also reduces the amount of time and confusion that occurs when a unit is unsuccessful in its defensive efforts and must transition to retrograde operations. Commanders designate units to conduct denial operations and to evacuate casualties and equipment. Commanders use retrograde operations to preserve their forces as combat-capable formations until they can establish those conditions necessary for a successful defense. Plans should account for both failure and success, and they should account for a transition. There may be a negotiated end to hostilities from which the force transitions to stability. Engineer capabilities and forces may need to greatly expand to adjust to new basing requirements, enhancing the protection of new sites and critical infrastructure and improving mobility in war-damaged areas of operations.

ENGINEER SUPPORT TO STABILITY

4-140. In stability operations, most engineer effort is focused on theater infrastructure repair and restoration to reconstruct or establish essential services that support the population. Given the nature of stability, the risks associated with environmental hazards may have greater importance and impact than they do in offense or defense. Stability tends to be of longer duration than offense, defense, or DSCA operations. Specific legal limits on BCT and engineer activities may exist based on security agreements, treaties, and agreements between the Department of State, the U.S. Agency for Infrastructure Development, and the Department of Defense.

4-141. Missions performed by organic and augmenting engineers are linked directly to the BCT mission and responsibility. Route clearance and other close support tasks are applied equally to the phase or type of operation to maintain mobility for the BCT and elements supporting the BCT. The route clearance mission will also likely require general-engineering and specialized engineer capabilities. The BCT engineer staff 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 engineer staff 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.

4-142. In analyzing engineer requirements in stability operations and determining BCT essential tasks for M/CM/S, the engineer staff considers the following factors:

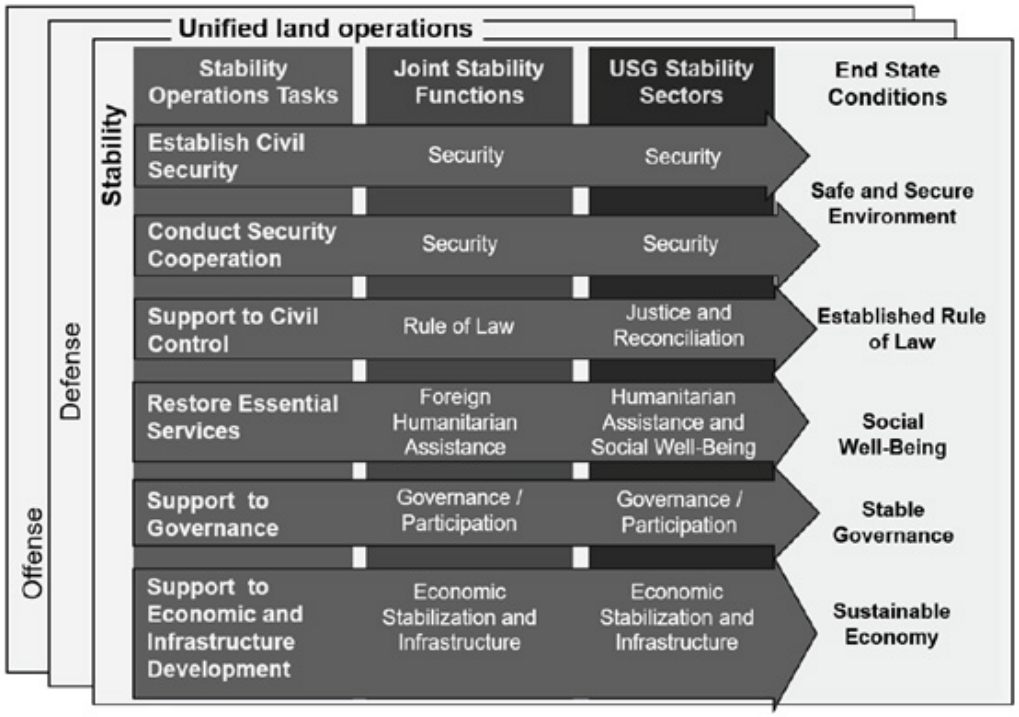
- Terrain in the AO.
- Types of obstacles in the AO.
- Engineer assets and available capabilities.
- Mission duration.
- Water supply, quality, and location.
- Waste management facilities.
- Local power facilities.
- Firefighting capability.
- Cultural habits that impact engineer missions, such as how people travel; how they transport materials; and whether they fertilize their crops with ammonium nitrate, which is a consideration for its potential dual-purpose use as an explosive material.
- Base camp support requirements.
- Operational area clearance.
- Basic country infrastructure (roads, bridges, railways, airfields, ports) and contracted engineering support.

ARMY STABILITY OPERATIONS

4-143. Army forces continue consolidating gains by conducting Army stability operations tasks: establish civil security, support civil control, restore essential services, support governance, support economic and infrastructure development, and facilitate security cooperation. The tasks associated with Army stability operations evolve as security improves. Army forces retain the lead for facilitating security cooperation, primarily by assisting security forces. Eventually, the lead for the other five tasks is transferred to another

military or civilian organization, although Army forces may retain a supporting role. Figure 4-4, outlines the six tasks integrated into unified land operations to achieve desired end state conditions.

4-144. Each Army stability task and stability sector contains several related subordinate tasks. In any operation, the Army stability operations tasks and the subordinate tasks included within each area are integrated with offensive and defensive tasks. Each situation is unique. Assessment and analysis support planning and execution to determine the ends, ways, and means appropriate to the conditions of an OE. For more detailed information, see ADP 3-07.



Legend:
USG United States Government

Figure 4-4. Army stability operations tasks

ESTABLISH CIVIL SECURITY

4-145. Establishing civil security involves providing for the safety of the HN and its population, including ensuring protection from internal and external threats. This is essential to providing a safe and secure environment. Without a reasonable level of civil security, other stability operations tasks are not effective. Civil security is dependent upon the following conditions:

- Cessation of large-scale violence.
- Public order.
- Physical protection.
- Territorial security.

SUPPORT CIVIL CONTROL

4-146. Support of civil control is centered on justice reform, the rule of law, and public order, underpinned by efforts to rebuild the HN judiciary, police, and corrections systems. It encompasses the key institutions necessary for a functioning justice system, including those involving police, investigative services, prosecutorial arms, and public defense. Civil-control tasks and oversight, accountability, and transparency of

the justice sector deter corruption that threatens security, justice, and governance institutions. Impartiality of judges in applying the law to incarcerate convicted individuals is essential to building public trust in due process and a just system. Civil-control tasks focus on building temporary or interim capabilities to pave the way for HNs or international organizations to implement permanent capabilities. Civil control is dependent upon the following conditions:

- Just legal frameworks.
- Public order.
- Accountability to the law.
- Access to justice.
- Legitimate state monopoly over the means of violence.
- Culture of lawfulness.

RESTORE ESSENTIAL SERVICES

4-147. Efforts to restore essential services ultimately contribute to achieving stable governance, a sustainable economy, and the social well-being of the populace. In failing or failed states or in the aftermath of armed conflict and significant disasters, military forces support efforts to establish or restore the most basic civil services: the essential food, water, shelter, and medical support necessary to sustain the population until local civil services are restored. The immediate humanitarian needs and security of the local populace are always a foremost priority. Provision of essential services is dependent upon the following conditions:

- Access to, and delivery of, basic needs and services.
- Access to, and delivery of, education.
- Return and resettlement of dislocated civilians, including refugees and internally displaced persons.

4-148. The engineer contribution to the restoration of essential services includes conducting those combat- and general-engineering tasks that are carried out during other phases of operations but, more specifically, conducting assessments of the condition and capacity to essential services. The mnemonic SWEAT-MSO (sewer, water, electricity, academics, trash, medical, safety, and other) is then used to assess the restoration of essential services. See ATP 3-34.81 for a detailed discussion on SWEAT-MSO. Alternately, USACE reachback engineer data integration provides instruction on how an assessment is conducted.

SUPPORT GOVERNANCE

4-149. Governance refers to the processes, systems, institutions, and actors that enable a state to function; effective, legitimate governance ensures that these are transparent and accountable and that they involve public participation. Military efforts to support governance help build progress toward achieving effective legitimate governance. Military support to governance focuses on restoring public administration and resuming public services while fostering long-term efforts to establish a functional, effective political governance system. The support provided by military forces helps to shape the environment for extended unified action by other partners. Military efforts eventually enable the HN to develop an open political process, a free press, a functioning civil society, and legitimate legal and constitutional frameworks. Good governance is dependent upon the following conditions:

- Provision of essential services.
- Stewardship of state resources.
- Political moderation and accountability.
- Civic participation and empowerment.

SUPPORT ECONOMIC AND INFRASTRUCTURE DEVELOPMENT

4-150. Military tasks executed to support the HN economic sector are critical for sustainable economic development. The economy is among the first elements of society to exhibit stress and, ultimately, fracture as conflict, disaster, and internal strife overwhelm the government. Signs of financial stress include rapid increases in inflation and unemployment, uncontrolled escalation of public debt, and a general decline in the

ability of the state to support the well-being of the people. Economic problems inextricably relate to governance and security concerns. As one institution begins to fail, others often follow.

4-151. Infrastructure development complements and reinforces efforts to stabilize an HN economy. It focuses on physical assets and supporting services that enable the economic viability of the state. These include construction services, engineering, and physical infrastructure within the following sectors:

- Transportation (roads, bridges, railways, airports, seaports, and waterways).
- Telecommunications.
- Energy (natural resources, the electrical power, and energy production) and distribution.
- Municipal and other public services.

4-152. An accurate, detailed assessment is key to formulating long-term plans for economic and infrastructure development. Engineers are capable of conducting reconnaissance of the HN economy and state physical infrastructure and can effectively provide input for planning efforts. During infrastructure reconnaissance, technical information on the status of large-scale public systems, services, and facilities necessary for economic activity is gathered. This reconnaissance facilitates restoring essential services as well as spurring economic and infrastructure development. Infrastructure reconnaissance is accomplished in two stages: infrastructure assessment—associated with the restoration of essential services—and infrastructure survey—supporting economic and infrastructure development. Infrastructure reconnaissance supports the operations process by providing vital information on the quality or problems of the local infrastructure. It provides information about how those infrastructure issues impact military operations and the population. See ADP 5-0 for more detailed assessments, and see ATP 3-34.81 for more information on infrastructure assessment.

Security Cooperation

4-153. Establishing or reestablishing competent HN security forces is fundamental to providing lasting safety and security for the HN and its population. These forces primarily counter external threats. However, they also assist in other critical missions, including providing disaster relief and humanitarian assistance and combating other internal military threats. Developing HN security forces is integral to successful stability operations and includes organizing training and equipping, rebuilding, and advising various HN security forces.

4-154. Security cooperation activities are designed to promote stability, develop alliances, and gain and maintain access through security relationships that build partner capacities and capabilities. Security cooperation primarily focuses on interoperability programs with core partners and the fledgling security forces of a failed or failing HN. Military forces use security cooperation efforts to achieve mid- to long-term objectives with partners. Although military forces may require short-term activities, they take extreme care not to put long-term objectives, nationally and regionally, at risk. See FM 3-22 for more detailed information on security cooperation.

ENGINEER STABILITY MISSIONS BY WARFIGHTING FUNCTION

4-155. Engineer tasks in support of stability and DSCA are very similar in that the preponderance of the tasks are performed to restore some semblance of normalcy for a population. Following are considerations for integrating engineer activities into supporting stability or DSCA.

Movement and Maneuver

4-156. Engineers support BCT movement and maneuver just as they support offense and defense; however, there is likely to be more emphasis on minimizing the effects of breaching or clearing infrastructure and preventing 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 and contractors, and HN engineers. This includes the tasks performed by elements other than engineers (military police, CBRN, EOD units). Depending on the required effort, the BCT may elect to establish an integration cell (assured mobility section) to coordinate the associated activities.

4-157. Engineers must be creative in implementing obstacles (fences, roadblocks, checkpoints) for controlling civilians or separating belligerent forces while working within the limitations of the rules of engagement or use-of-force directives.

4-158. The movement and maneuver missions for engineers during DSCA include combat- and general-engineering efforts to clear and repair roads and (in some cases) repair bridges. The organic engineering equipment is well suited for the removal of rubble and debris associated with disasters.

INTELLIGENCE

4-159. In stability operations, the engineer planner must extend beyond geographical and threat force capability considerations and understand more about ethnic and religious factions, assessments of infrastructure and key structures, and capabilities of existing facilities providing essential services.

4-160. Stability operations place more demand on understanding and integrating the civil considerations with operational variables (political, military, economic, social infrastructure, and information), combined with cultural, historical, economic, ethnic, and humanitarian factors to build a common knowledge base for an AO. For instance, cultural information might be necessary for predicting the potential reactions of a civilian area to an operation. Determining the disposition of the civilian population and how that population 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 Field Force Engineering, nongovernmental organizations in the area before U.S. forces).

FIRES

4-161. Fire support planning for stability is the same as that conducted for offensive and defensive activities, though there could be limitations and restrictions on using certain indirect-fire assets. Engineers provide specialized geospatial products to highlight critical areas, structures, and infrastructure (including underground utilities, such as oil pipelines). There is an increased potential for collateral damage and subsequent effects on follow-on repair and reconstruction efforts.

SUSTAINMENT

4-162. 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 task or decisive action. Engineers may be a critical enabler in providing 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 and supporting the sustainment of maneuver forces in their missions. Infrastructure reconnaissance plays a crucial role in assessing the requirements associated with providing essential services. See ATP 3-34.81 for more information on infrastructure assessments and infrastructure surveys. As the AO matures, the general-engineering effort may be transferred to theater or external support contracts (logistics civilian augmentation program, Air Force Contract Augmentation Program, Navy Global Contingency Construction Contract). Engineer planners must understand the availability and procedures for employing HN support, establishing Department of Defense contracting, and making local purchases. There may initially be a need to deploy an advance party (heavy with logistics and engineering support) if the AO does not have the infrastructure necessary to support the operation. In other circumstances, it may be necessary for the commander and a small group of specialized key personnel (CA, public affairs, and brigade judge advocate) to lead the advance party.

PROTECTION

4-163. In stability operations, engineers play a major role in protecting positions, headquarters, support facilities, base camps, and highly vulnerable assets. In addition to protecting the United States and its unified action partners, 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 gabion barriers). General engineers or civilian contractors can provide the most effective protection level. In stability operations, the BCT may face explosive hazards. Engineers typically play a major role in coordinating efforts to reduce effects on military forces and nonmilitary forces and civilians.

4-164. In DSCA, the immediate effort is focused on protecting civilians from the elements or the residual hazards of 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.

4-165. Regardless of BCT requirements in stability operations and DSCA, there are most likely not enough engineer assets (including civilian-contracted engineer support) available. This situation requires that BCT units construct their 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.

COMMAND AND CONTROL

4-166. Ensuring effective interagency coordination and unity of effort may require the establishment of working groups, boards, and coordination centers and the use of liaison officers (LNOs) at various levels. See FM 3-07 for more information on interagency coordination. Engineer planners must consider the span of control in arraying engineer units. No single command option works best for all stability and DSCA missions. Additionally, Army forces will serves as a supporting organization rather than the lead agency.

4-167. During the planning of nonlethal effects, engineers share their knowledge of public works systems and reconstruction efforts to effectively and efficiently focus efforts. In DSCA, engineers support the commander's public affairs program by providing updates on engineering projects supporting relief and recovery.

ENGINEER SUPPORT TO FOREIGN SECURITY FORCES

4-168. Trainers (or advisors) within the BCT consistently provide and instill leadership at all levels of the foreign security force organization. Depending on the circumstances, the BCT or subordinate unit may execute a security force assistance training mission(s) other unilaterally or as part of a multinational force. In any case, leadership is essential in the inherently dynamic and complex environment associated with security force assistance. Security force assistance activities require the personal interaction of trainers (or advisors), foreign security force trainees, and other military and civilian organizations/agencies. A high premium is placed on effective leadership from junior to senior officers and NCOs. Leaders must fully comprehend the OE and be prepared, fully involved, and supportive in order for foreign security force training to succeed. An effective foreign security force requires leadership from both the provider and the recipient throughout training to help build the foreign security force capacity to train forces.

4-169. The SFAB engineer battalion develops the engineering capability and capacity of foreign security forces to preserve and protect combat power through training on emplacement, breaching, and reduction of obstacles and on route clearance techniques. The battalion trains the foreign security forces on construction tasks and construction operations, as necessary. The engineer battalion also has a small MICO and a signal company that provide limited technical support to the brigade in addition to their advising roles. The engineer battalion requires significant augmentation of enablers to provide greater engineer capabilities to foreign security forces.

4-170. Battalion-level-and-below advisors assist foreign counterparts in analyzing the foreign security force mission and commander's intent from higher headquarters. Advisors assist foreign security force commanders, and subordinate leaders restate the mission, conduct an initial risk assessment, identify a tentative decisive point, and define their intent. Advisors assist their foreign counterparts in analyzing the operational and mission variables. From these variables, advisors help their foreign counterparts to develop a COA that meets the higher headquarters concept of operations and commander's intent. Advisors assist with operations and information flow to the foreign security force higher commander. Refer to ATP 3-21.10, ATP 3-21.20, and ATP 3-96.1 for additional information.

ENGINEER SUPPORT TO DEFENSE SUPPORT TO CIVIL AUTHORITIES

4-171. The overall purpose of DSCA is to meet the immediate needs of U.S. citizens in times of emergency until civil authorities can accomplish the required tasks without assistance. DSCA is similar to support of stability operations but differs because it is conducted within the United States and its territories and is executed under U.S. law. For example, under state control when operating within the United States, National Guard forces (Title 32) have law enforcement authorities that are not granted to Regular Army forces (Title 10). Military units in Title 10 status are under federal control and are usually operational control of the U.S. Northern Command or the U.S. Indo-Pacific Command. Upon arrival, units are normally under the tactical control of the joint task force or joint forces command. Once deployed, they receive mission assignments from the joint task force commander or joint forces command.

4-172. Although not the norm, the BCT could be deployed into an area supporting civilian agencies in order to provide essential services, assets, or specialized resources to help civil authorities deal with situations beyond their capabilities. In civil support, the adversary is often disease, hunger, or consequences of a disaster. Companies and battalions, including engineer units from the BCT, can expect to participate in DSCA with or without other units from time to time.

4-173. General-engineer support for the restoration of essential services is the primary focus in DSCA; however, all three engineer functions may be simultaneously applied to some degree. These functions are normally executed by USACE under Emergency Support Function, in support of the Federal Emergency Management Agency under the Federal Response Framework. USACE capabilities are employed for DSCA through traditional Army command structure, U.S. code, public law, or DODD.

4-174. The BEB 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. The organic geospatial-engineering team within the BCT can support relief by providing geospatial products and the analysis of potential life support areas. Support to CBRN response is a major operation; and of the DSCA missions, it has the most extensive support requirements for military personnel. Other U.S. government agencies have the important responsibility of responding to domestic terrorist incidents. However, Army forces have a key supporting role and can quickly respond when federally directed by the U.S. Northern Command.

4-175. As with stability support, most BCT engineer requirements in DSCA are likely met with augmented general-engineering and specialized engineer capabilities. The BCT engineer staff must be prepared to direct and coordinate the simultaneous application of engineer capabilities to support the BCT mission. When the required engineer augmentation or capability is unavailable to the BCT, the engineer staff 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 a disaster or a terrorist attack, its organic and augmenting engineer forces may perform or support some critical relief and recovery functions, such as—

- Urban search and rescue.
- Emergency flood control.
- Hazard identification.
- Food distribution.
- Water production, purification, and distribution.
- Provision of temporary shelter.
- Transportation.
- Firefighting.
- Medical support.
- Communications.
- Contamination control.
- Sanitation/waste management.

4-176. 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.
- Coordinating geospatial products and support.
- 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 operations and DSCA.

4-177. In DSCA, there may be a need for specialized engineer requirements such as those associated with 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 be able to determine when their employment would be appropriate.

4-178. The engineer staff and the engineer commander may have a requirement to integrate 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 the design, construction management, and command requirements needed to accomplish these missions, which will likely include—

- Base camp construction and power generation.
- Emergency restoration of critical infrastructure.
- Infrastructure reconnaissance, technical assistance, and damage assessment.
- Emergency demolition.
- Debris removal.
- Route opening.
- Construction and repair of roads and trails.
- Repair of runways and airfields.
- Installation of assets that prevent foreign-object damage to rotary-wing aircraft.
- Temporary-bridge construction.
- Area damage control supporting the mobility of unified action partners.
- Regional access through the construction and upgrade of ports; airfields; and reception, staging, onward movement, and integration type facilities.

CIVIL-MILITARY COORDINATION

4-179. 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 (if established) to plan, synchronize, and execute approved projects that achieve the commander's desired effects. Subordinate unit commanders submit civil-military construction and engineer project nominations in the form of a statement of work. 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 engineer staff, battalion or brigade financial management staff officer, provost marshal officer, legal officer, and CA operations typically participate in this process.

4-180. The engineer staff 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 engineer staff also coordinates for geospatial products that can facilitate construction activities and serves as the interface for, or initiates reachback to, the USACE and other agencies to coordinate for planning products, technical support, and professional expertise. The engineer staff coordinates and collaborates with adjacent or higher-unit engineer staff sections to ensure unity of effort.

4-181. Infrastructure reconnaissance is a multidisciplinary task conducted by a base team augmented, as necessary, with additional expertise. The engineer staff is tasked with coordinating infrastructure

reconnaissance but should rely on other proponents for specialty capabilities, depending on the category or required expertise. The base infrastructure reconnaissance team includes expertise from engineer, CA operations, preventive medicine, military police, and other disciplines. Augmentation from additional disciplines is provided when possible. (See ATP 3-34.81 for more information on infrastructure reconnaissance.)

4-182. In the OE, engineers at most echelons operate or interact with other unified action partners participating in the military operation. Given the multitude of organizations and capabilities involved, engineer staff (at the appropriate levels) must coordinate with these organizations to ensure that resources are focused on meeting objectives. Establishing and maintaining effective liaison with all participating agencies is essential to achieving the unity of effort. The civil-military operations center can be a focal point for this effort at the BCT level.

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Chapter 5
Task Force Engineers and Engineer Planning

Engineers continue to support the maneuver commander through advice, planning, and the synchronization of engineer efforts across the battlespace. This chapter discusses the role that the task force engineer undertakes as the senior engineer for the battalion task force and integration techniques for engineers to employ when in a supporting or supported role.

SECTION I—BRIGADE COMBAT TEAM ENGINEERS AND TASK FORCE ENGINEER ROLES AND RESPONSIBILITIES

5-1. The BEB must accomplish several tactical, logistical, and administrative tasks to support any BCT mission. To accomplish these tasks, the duties and responsibilities of key personnel in the brigade and battalion must be defined and understood.

5-2. The BEB commander executes mission command through mission orders over subordinate companies, elements, and staff sections. Subordinate units might be further task-organized to maneuver task forces, the BCT cavalry squadron, or a separate company or troop. The BEB commander ensures that all subordinate elements have adequate administrative and logistical support (through direct provision or, if directed, through the coordination of support with other units). The BEB commander also executes training and readiness authority/oversight over subordinate elements, including all nonengineer organic enabler units. Considering the functional diversity of the BEB, its inherent BCT level support role, and reliance on EAB enablers, these basic tasks are much more complicated.

THE BRIGADE ENGINEER

5-3. The brigade engineer's primary duty is to plan, coordinate, and facilitate the execution of engineer missions to support the commander's scheme of maneuver. In this role, they must—

- Synchronize diverse BEB missions to all engineer requirements and support those missions.
- Make time-sensitive engineer decisions on requests for recommendations for immediate tactical support from subordinate units.
- Coordinate with external units and agencies (sister BCT and EAB units and U.S. government and HN entities).
- Know, understand, coordinate, and execute proper training and readiness authority/oversight of various subordinate units and ensure that home station and other training opportunities are sufficient for readiness.
- Establish a "team of teams" among the BEB and BCT staff, functional subordinate BEB units, and sister BCT units that includes flexible terms of reference accounting for unique leader traits.
- Formulate ideas for engineer support to meet the brigade commander's intent.
- Visualize the future state of engineer operations in the brigade.
- Recommend engineer priorities of effort and support and acceptable risks to the brigade commander.
- Determine and accurately evaluate the critical aspects of the engineer situation.
- Decide what engineer missions must be accomplished to support current and future brigade fights.
- Prioritize and recommend the allocation of engineer personnel, equipment, logistics, and units.
- Concurrently develop a scheme of engineer operations with the brigade maneuver COAs.

- Integrate the necessary orders and instructions into division plans and orders.
- Issue timely instructions and orders through the brigade base order to subordinate engineer units to facilitate subordinate planning, preparation, and integration.
- Alter the engineer plan, as required, with feedback from maneuver battalions and engineer units.
- Interface with the divisional engineer or engineer brigades on plans, the status of brigade engineer missions, and identification of any brigade requirements for division or EAB engineer assets to support the brigade. Inform the brigade commander of the capabilities, limitations, and employment considerations of supporting engineers.

5-4. Because BCT combat operations require additional engineer capability, a BCT will likely be reinforced with varieties of unique engineer units and, possibly, an engineer battalion. However, this engineer reinforcement is temporary, and the assigned engineer detachments, platoons, companies, and battalion reinforce the BEB engineer effort. The BEB should always retain brigade engineer status for continuity and familiarity with the brigade commander and staff. This facilitates continuity and stability for engineer support for the maneuver commander.

5-5. The ABE is an engineer staff planner assigned to the brigade and the BEB key enabler integrator. The ABE is part of the BCT modified table of organization and equipment; however, the ABE may also be designated by the BEB commander. As the BCT engineer, the BEB commander is responsible for engineer training and leadership development. The BEB commander may evaluate, counsel, and even rate the ABE (depending on guidance from the BCT commander). The following supporting tasks assist the BEB commander and staff with planning integration:

- Integrate engineer battlefield functions into future brigade plans and develop the necessary input to brigade orders, annexes, and engineer unit orders, as required.
- Make time-sensitive engineer decisions on requests for recommendations for immediate tactical support from the subordinate units. This may occur in the brigade TOC or tactical CP.
- Integrate geospatial engineering support into future brigade plans and coordinate with the geospatial engineer team to develop necessary input into brigade orders and annexes.
- Assist the BCT S-2 and MICO in integrating BCT organic geospatial engineering capabilities into the overall intelligence effort. Oversee and support the geospatial cell and product flow.
- Formulate ideas for IPB and engineer support to meet the brigade commander's intent.
- Monitor the execution of engineer orders and instructions by keeping track of the current fight.

5-6. In coordination with the BEB, the ABE team integrates specified and implied engineer tasks into the brigade plan. The brigade engineer is ultimately responsible for ensuring that supporting engineer units are wholly integrated into brigade mission planning, preparation, and execution. This task is one of the most challenging and will only be successful with the full support of the supporting company commander.

5-7. The engineer battalion staff reinforces the BCT staff and ABE cell. Maneuver commanders should think of the ABE as the engineer tactical-actions center and the engineer battalion staff as the engineer TOC. The engineer battalion can, and should, reinforce the ABE for planning, execution, and battle-tracking purposes. This will also enable the recommended simultaneous BCT and engineer battalion OPORD publication, facilitated by the recommended colocation.

TASK FORCE ENGINEER ROLES AND FUNCTIONS

5-8. The task force engineer has an essential role in integrating engineer assets into the combined arms battalion formation. The task force engineer provides vital feedback and recommendations to the task force commander to shape the unit scheme of maneuver. The orders process is essentially ensuring a shared understanding between the task force and the attached engineer units. Additionally, the task force engineer closely monitors engineer activities, equipment availability, and engineer Class IV/V supply status. The task force engineer is that bridge between the task force and engineer assets. One of the most critical responsibilities of the task force engineer is to ensure that supporting engineers know where they need to be and when—and what they need to support the task force. The task force engineer must understand the task force commander's intent for engineers and the scheme of maneuver and the BEB commander's guidance,

including the BCT obstacle plan, engineer priorities, and allocation of engineer forces. Brigade and task force engineers must remain in continuous contact throughout the planning and execution of all operations.

5-9. The task force engineer integrates specified and implied engineer tasks into battalion plans. The task force engineer is ultimately responsible for ensuring that supporting engineer units are entirely integrated into battalion mission planning, preparation, and execution. This task is one of the most challenging and will only be successful with the full support of the supporting platoon and company commander. An engineer platoon leader or company commander who is task-organized to a combined arms maneuver battalion may assume the role of the task force engineer.

COMMAND AND STAFF RESPONSIBILITIES

5-10. The BEB, ABE, attached EAB enablers, and task-force engineers must balance their command (platoon, company, or BEB) and their staff (maneuver battalion or brigade) responsibilities. Overemphasis on either responsibility may be necessary for the short term but must be avoided in the long term. Maneuver commanders should help their engineers achieve this balance by providing upfront guidance and a specific timing and execution timeline. The engineers can plan to help achieve this balance. Table 5-1 breaks down various levels of engineer roles and responsibilities between staff and unit commanders.

Table 5-1. Engineer roles and responsibilities by echelon

	Armor/Stryker Formation Senior Engineer Leader	***Staff Cell***	***Light Formation Senior Engineer***	***Staff Cell***
Division	When assigned, the engineer brigade commander is the division engineer.	The division engineer officer in charge is the staff engineer, disseminating orders through the division assistant chief of staff, operations (G-3).	Attached echelon above battalion, engineer battalion commander.	The division engineer is the staff engineer.
Brigade combat team	The brigade engineer battalion commander is the brigade engineer.	The assistant brigade engineer is the brigade staff engineer.	The brigade engineer battalion commander is the brigade engineer.	The assistant brigade engineer is a brigade staff officer.
Battalion task force	The engineer company commander or a platoon leader.	The engineer company commander or platoon leader is the staff engineer.	The engineer company commander or a platoon leader.	The assigned enlisted engineer is the engineer reconnaissance noncommissioned officer.
Company	The senior engineer task-organized advises maneuver company.	Not applicable.	The senior engineer task-organized advises maneuver company.	Not applicable.

5-11. Nearly simultaneous OPORD planning for the BCT and engineer battalion should follow the 1/3, 2/3 rule and provide time for subordinate units to conduct troop-leading procedures. This balance requires parallel planning, integrated with BCT planners, to nearly simultaneously publish the BEB OPORD and the BCT OPORD.

5-12. Collocating headquarters may support both planning cycles. Collocation of BEB and BCT TOCs speeds up the planning process; however, it also creates a large footprint and the emission of electromagnetic signatures. Engineer companies should be collocated near the task force TOC to support advising opportunities as well as planning cycles. Maneuver commanders and staffs can plan for, and help enable, this colocation through terrain management.

INTEGRATION TECHNIQUES FOR THE TASK FORCE ENGINEER

5-13. Task force engineers should be team players and should build the team. They should get to know not just engineers who are in the BEB but also those task force engineers at battalions. Visit with geospatial engineers to understand how they receive map requests, manage geospatial data, manage and support updates to the BCT COP, and receive and answer terrain-related questions from all staff sections to support the entire staff mission analysis and COA development processes. Know and work with the planners on the battalion and brigade staff, the S-4 NCO who can submit contracts and fund requests for Class IV supplies or DD Forms 1391 (*FY__ Military Construction Project Data)* for contingency locations, Class V supplies, and training needs from the land and ammunition NCO in-theater or at home station. Know and work with local experts for specialty equipment, counter-improvised explosive device and counter-radio-controlled improvised explosive device/electronic warfare training teams, and department of public works teams to manage infrastructure or essential services.

5-14. Task force engineers must understand maneuver doctrine, engineer doctrine, and unit SOPs. They should know how the Army fights and what issues may arise during offensive, defensive, stability, or DSCA missions. Task force engineers must attend battle staff courses to build doctrinally correct graphics on maps (analog) and the digital C2 system. They should use doctrinal definitions such as screen, guard, or cover and know the meanings of each.

5-15. Task force engineers should integrate into the maneuver planning cycle. They need to be a member of every operational planning team. Task force engineers must ask questions and provide options for planners to consider. They have to update the engineer running estimate when conditions change and start work on engineer annexes such as the task force survivability matrix; obstacle plan; and engineer matrix; with units tied to missions. Task force engineers will provide the scheme of engineer operations and engineer annex to any OPORD or FRAGORD and be prepared to work in the tactical CP or TOC, day or night. Participation includes any targeting cycle (usually not at battalion, but at the BCT, level) to suggest effects to shape the battlefield or targets to identify.

5-16. Task force engineers must understand friendly engineer capabilities (which may include joint engineers and allied coalition enablers). They have to understand friendly equipment capabilities, both those on-hand and those available. Task force engineers should maximize BEB efforts and enable every attachment. They should use contractors, Service engineers, or HN where possible. Task force engineers must maximize the use of engineer experience from the Reserve Component. Questions to be considered include: What EAB enablers are in the joint operational area? Are there specialized teams for power generation or contracting? Who can help design a future base camp as the battlespace expands?

5-17. All BEB leaders must understand the vast mission that the BEB provides support for to the BCT. They provide C2 to various and diverse enablers and solve problems such as those involving the support of area security, key leader engagements, and detainee processing. The ABE and task force engineer are the permanent representatives assigned to the BCT or battalion. These individuals must understand where to go and who to ask for questions, data, or understanding. Engineers must move out of their comfort zone (experiences or occupations) to solve complex, undefined problems. The ABE assists the brigade engineer and the BCT in developing and providing recommendations to the brigade commander. The key is having the right command and support relationship, task force engineer or liaison structure that allows the task force and BCT to plan for, receive, employ, and return EAB assets to higher-priority locations.

5-18. Since the Engineer Regiment is diverse, task force engineers must understand where to seek information or reachback options that support diverse or unique engineer missions. Since resources are finite, engineers must know where to look and what to ask. Engineer Soldiers assigned to combat engineer organizations must sometimes conduct general-engineer assessments to know what and who to ask. This is referred to reachback. It required breaking out the unit organization manual to identify whether the utility detachments or the forward engineer support team–advance are the right capabilities for a specific mission requirement.

5-19. Task force engineers and engineer leaders anticipate and provide options to the commander. Engineers are in critical locations and positions to work with maneuver, fires, sustainment, and protection forces. Observing what is occurring now and the effects and determining future needs help staff engineers identify when transitions occur. To move from offensive to defensive missions requires preparation time and

resources. Class IV supplies, such as overhead cover, wire-fabric bastions, Spiders, and Volcano tubes, do not show up at the right location and time unless a leader identifies the future shift to a defensive environment. As security and offensive operations wind down, more stability tasks are required, such as assessing essential services, removing explosive hazards, and improving road networks. Task force engineers should support the maneuver commander by thinking ahead and evaluating needs using updated running estimates, attending assessment working groups, and being present during shift changes to understand current enemy and friendly actions.

TASK FORCE ENGINEER INTEGRATION CONSIDERATIONS

5-20. The displacing unit may take on the role of the senior engineer for the gaining unit. EAB units may arrive to a maneuver task force and assume the senior task force engineer's planning and integration roles. The unit command team coordinates with the gaining unit commander, S-3, and staff engineer to identify C2 procedures. In this situation, the role of the supporting unit changes from simple enabler integration to integral member of the gaining-unit staff. Specific engineer coordination considerations, by element, include—

- **Task force commander.**
  - Leader reconnaissance.
  - Commander intent and scheme of engineer operations.
  - Mobility, countermobility, and survivability priorities.
  - Class III, IV, and V supply responsibilities.
  - Intent and location of scatterable munitions.
- **Maneuver company commander.**
  - Leader reconnaissance.
  - Verification of direct-/indirect-fire coverage of obstacles.
  - Obstacle security, infantry squad, or platoon forward at night (counterreconnaissance).
  - Final obstacle placement.
  - Senior equipment representative with infantry commander in chief dozer.
  - Target turnover.
  - Security of Class IV and V barrier material supply points.
  - Infantry security of engineers emplacing obstacles.
  - Labor augmentation for obstacle emplacement.
  - Passage-point guides.
  - Obstacle siting.
  - Passage lane closing.
- **Task force S-2.**
  - IPB of threat intentions and capabilities.
  - Daily/repeated intelligence updates.
- **Task force S-3.**
  - Location to hide heavy engineer equipment during battle.
  - Verification of reporting requirements.
  - Verification of division/brigade authorization to emplace minefields, cut roads, and detonate demolitions and scatterable mines.
  - Engineering mission during the conduct of defense.
- **Task force supply officer (S-4).**
  - Class III supply needs and distribution plan, if not provided by the parent unit.
  - Haul/distribution of engineer heavy equipment, if required.
  - Additional haul assets for engineer heavy equipment, if required.

- Helicopter assets to sling load Class IV/V supplies forward container delivery system.
- Maintenance priority to engineer heavy equipment.
- Location and manning of Class IV/V supply points.

- **Fire-support officer/ADA**
  - Verification of airborne data and analysis system; area denial artillery munition/remote, and antiarmor mine system employment location/trigger.
  - Fire support officer/fire-support element observe obstacles, if possible.
  - ADA coverage of all personnel emplacing obstacles, heavy equipment, and supply points.
  - Integration of obstacles and indirect fires, according to ATP 3-90.8.

5-21. The struggle that is common to all enabling units is gaining and maintaining legitimacy. Engineer (enabler) planning is where legitimacy starts.

- **Task-organize engineer (enabler) forces to requirements.** The BEB task organization and supported units should change throughout the operation because the operational variables change. A mix of different units is often necessary to achieve the desired capability.
- **Assign priority to the main effort.** Massing combat power does not necessarily mean dumping all assets into one organization, nor does it mean thinly spreading across all formations. The BEB staff, in-conjunction with the BCT staff, must conduct a detailed analysis to ensure that the right enablers are present at the decisive point.
- **Integrate engineers (enablers) with maneuver and fire (and sustainment).** The scheme of movement and maneuver may dictate the battlefield, with the scheme of fires as the first supporting effort, but the integration of engineers and other enablers and the sustainment warfighting function constitute the difference between broad-concept success and first-contact success.
- **Do not hold engineers (enablers) in reserve (gain and maintain contact).** Most BEB capabilities support the protection warfighting function. Keep the enablers employed with the flexibility to dynamically task-organize, at the right place and the right time.
- **Build a logistically sustainable force.** The BEB staff must wargame the concept of sustainment for engineers and proposed task organization for enablers and provide recommendations to the BCT staff and supported units.
- **Maintain effective C2.** The BEB must remember that command and support relationships are not implied. Command and support relationships are not commonly understood at lower echelons.
- **Use all local resources.** In particular to engineers, the ABE and BEB staff must look to local governmental and nongovernmental agencies to acquire engineer resources, equipment, or support. This may be more relevant during stability operations. For other enablers (CBRN, CA, and military police in particular), early and frequent coordination efforts with the local government facilitate opening LOC and further complement the BCT themes and messaging campaign.

SECTION II—ENGINEER PLANNING

5-22. The engineer planning process is the primary means for developing engineer estimates. The engineer estimate enables the early integration of engineer capabilities into combined arms operations. The engineer estimate is an extension of the MDMP. Commanders use their staffs and integrate input from subordinate commanders into the planning processes. Engineer leaders must understand and be integral participants in the planning processes impacting engineer operations at their echelons of employment. Supporting engineer unit commanders and leaders conduct parallel planning processes, which provide both effective outcomes for the engineer units employed and appropriate input to the higher-level commander's process. Geospatial support elements and engineer staff planners integrate directly within the planning staff at each echelon to participate in the planning process.

THE FRAMEWORK OF THE OPERATIONS PROCESS

5-23. Military planning begins with an analysis and understanding of a specific OE, filtered through the particular mission. This, in turn, determines which information elements of the operational variables are carried over and filtered by the mission variables for analysis. A thorough understanding of an OE and the assigned mission enables the commander and staff to envision the desired end state and broad approach to achieve that end state using the elements of operational art. Through operational art and joint operations principles, commanders understand, visualize, and describe the integration and synchronization of combat power elements to achieve objectives, attain desired end state conditions (in broad terms), determine an operational approach, and describe their commander's intent and guidance. Commanders selectively use these tools in any operation. However, the broadest application of the tools applies to long-term operations. The operational approach is determined, in part, by the combat power available to the commander. The commander considers the combat power available to determine what the potential for translation into effects or actions. It is a measure of the total capacity that the commander has at his disposal. A knowledge of whether the combat power available is adequate to accomplish assigned missions is critical. This is the conceptual stage of planning.

5-24. The Army framework for organizing and activating C2 is the operations process. The *operations process* is the major command and control activities performed during operations: planning, preparing, executing, and continuously assessing the operation (ADP 5-0). Commanders use the operations process to drive the conceptual and detailed planning necessary to understand their OE; visualize and describe the desired end state of the operation and the operational approach; make and articulate decisions; and direct, lead, and assess operations as shown in figure 5-1.

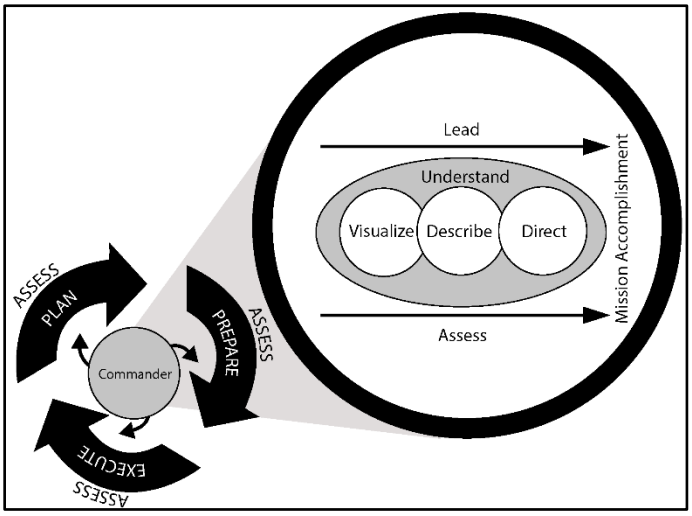


Figure 5-1. The operations process

5-25. The commander and staff then go into detailed planning to develop one or more COAs. Each COA assigns broad, general tasks and priorities of support to each warfighting function. These broad, general tasks represent the major activities that constitute the building blocks for a COA. Warfighting functions refer to the broad capabilities that must be accounted for in all operations. By developing how each function contributes to attaining the desired end state (developing a scheme of support for each warfighting function—a scheme of maneuver, scheme of fires, scheme of sustainment), the commander lays out a broad approach to move from the current state to the desired end state. The COAs should synchronize the warfighting functions to generate combat power.

5-26. The allocation of resources is usually done through one of the operational frameworks. The operational frameworks provide a tool that helps commanders frame where to apply combat power (warfighting functions) to achieve specific effects. Commanders and staffs use the main and supporting efforts to indicate the shifting of priorities of support by each warfighting function when the complexity of operations requires sequential application of combat power using phases or when circumstances require a change in the concept

of operations. While developing and evaluating the COAs, commanders and staffs use the principles of joint operations and the tenets of unified land operations as tools to assess whether or not COAs account for essential characteristics of effective operations or desired aspects of current operations. Both principles and tenets should help commanders and staffs visualize how to structure a COA and operations concept.

5-27. Commanders and staffs use the Army planning methodologies (Army design methodology, MDMP, and troop-leading procedures) to analyze multiple COAs to determine the most suitable one. Once the commander approves a COA, the remainder of the MDMP determines the specific tasks assigned to subordinate units to accomplish the mission in the AO and ultimately achieve the identified end state. These specific tactical tasks come from decisive action tasks; the tactical tasks of offense, defense, stability or DSCA; enabling tasks; and subordinate tasks. The result of this process should be an OPORD. The OPORD established the relationship between mission, commander's intent, and concept of operations. The operation order guides the commander's arrangement of warfighting functions to mass the effects of combat power at the chosen place and time to overwhelm an enemy or dominate the situation.

5-28. Mission command requires that commanders issue mission orders. *Mission orders* are directives that emphasize to subordinates the results to be attained, not how they are to achieve them (ADP 6-0). Mission orders facilitate mission command by providing subordinates with clear commander's intent, latitude in determining how to accomplish missions, and flexibility to exercise disciplined initiative within the parameters of the commander's intent.

ENGINEER MISSION SUPPORT CONSIDERATIONS ACROSS WARFIGHTING FUNCTIONS

5-29. Informed by their OE analysis, operational and tactical-level engineer planners define an AO, estimate forces required, and evaluate the operation requirements. They use the commander's intent to develop and refine COAs that contribute to setting the AO conditions that support the desired end state. They maintain a broad focus and seek to exploit the extended planning horizon. As units are identified for participation in the operation, they collaborate as fully as possible to gain depth for their view of the OE and add to their planning and problem-solving capabilities. This collaboration also extends the planning, preparation, and execution horizon of the subordinate engineer.

5-30. The MDMP serves as the primary means of Army operational planning. Operational-echelon engineer planners, along with their staff counterparts, participate in the process of translating the commander's visualization into a specific COA for preparation and execution. The theater army echelon engineers collaborate closely with their counterparts in the geographic combatant command joint engineer staff throughout the MDMP to develop a shared understanding of the mission. Theater level engineers use the Joint Operations Planning Process, vice the Army MDMP. As the plan develops, engineer planners remain synchronized with their theater army staff counterparts through warfighting functions, as shown in table 5-2.

Table 5-2. Engineer planning integrated across warfighting functions

Warfighting Function	*Engineer Planning*
Movement and Maneuver Move. Employ forces. Maneuver. Employ direct fires. Occupy an area. Conduct mobility and countermobility operations. Conduct reconnaissance and surveillance. Employ battlefield obscuration.	Analyze infrastructure to support operational deployment and movement. Evaluate mobility and countermobility activities required to preserve operational freedom of maneuver, including clearance, crossing, aviation (including the construction of tactical unmanned aircraft system airfields and forward area refueling point locations), and terrain reinforcement considerations. Develop engineer force and capabilities estimates. Consider infrastructure improvements, reconstruction, and other nonlethal applications for stability and defense support of civil authorities tasks.

Table 5-2. Engineer planning integrated across warfighting functions (continued)

Warfighting Function	*Engineer Planning*
Intelligence Provide intelligence support to force generation. Support situational understanding. Conduct information collection. Provide intelligence support to targeting and information operations.	Coordinate for geospatial information and products to enhance visualization of the operational environment, achieve situational understanding, and enable decision making. Estimate threat engineer capabilities, intent, and obstacles to support the battlefield and mission analysis intelligence preparation. Collect and coordinate for obstacle information. Disseminate recognition and warning information for specific explosive hazards and hazardous material. Coordinate for engineer assessments and surveys for technical information requirements.
Fires Decide surface targets. Detect and locate surface targets. Provide fire support. Assess effectiveness. Integrate fires.	Participate in the targeting process. Coordinate for command guidance on the employment of scatterable mines and other munitions.
Sustainment Provide for logistics. Provide for financial management. Provide for personnel services. Provide for health service support.	Determine base camp development and support estimates. Estimate real estate and other facilities engineering support. Identify lines of communications and other vital routes and determine support requirements for establishing and maintaining the distribution system. Estimate area damage control and other construction support to improve capability and capacity. Determine specialized engineer requirements, such as power, water distribution, facility construction, and firefighting. Prepare construction and barrier material estimates. Prepare munitions estimates. Determine authorities, funding types, and levels of support.
Command and Control Execute the operations process. Conduct knowledge management and information management. Synchronize information-related capabilities. Conduct cyberelectromagnetic activities. Conduct military deception operations. Conduct civil affairs operations. Control airspace. Install, operate, and maintain the network. Protect information.	Coordinate for geospatial products to enhance visualization of the operational environment, achieve situational understanding, and enable decision making. Establish and participate on boards, working groups, and cells. Recommend command and support relationships. Recommend control measures, priorities, standards, and reports. Establish and maintain liaisons.

Table 5-2. Engineer planning integrated across warfighting functions (continued)

Warfighting Function	*Engineer Planning*
Protection	Evaluate base camp and other survivability requirements.
Coordinate air and missile defense.	Evaluate the survivability of key assets.
Apply antiterrorism measures.	Consider facilities hardening.
Conduct chemical, biological, radiological, and nuclear operations.	Consider the use of networked munitions as part of base defense.
Coordinate explosive ordnance disposal support.	Plan for area damage control.
Provide force health protection.	Investigate environmental impacts.
Conduct personnel recovery.	Conduct explosive-hazard threat assessment and support.
Conduct risk management.	Determine detention facility design and construction requirements.
Conduct police operations.	
Conduct survivability operations.	
Conduct detention operations.	
Control populace and resources.	
Implement physical security procedures.	

INTEGRATING PROCESSES

5-31. Commanders and staffs integrate the warfighting functions and synchronize the force to adapt to changing circumstances throughout the operations process. They use several integrating processes to do this. An integrating process consists of a series of steps that incorporate multiple disciplines to achieve a specific end. For example, through planning and the MDMP, the commander and staff are integrated in a series of steps to produce a plan or order. Key integrating processes that occur throughout the operations process include—

- MDMP.
- IPB.
- Information collection and knowledge management.
- Targeting.

MILITARY DECISIONMAKING PROCESS

5-32. During planning, the MDMP integrates the commander and staff in a series of steps to produce a plan or order (see ADP 5-0). MDMP is an iterative planning methodology used to understand the situation and mission, develop a COA, and produce an OPLAN or OPORD. Engineers and other planning team members recommend specific tasks, actions, and methods to integrate operations into the plan.

5-33. MDMP begins and ends with the brigade commander and is as straightforward or as detailed as time permits. The brigade commander plays the central role in the process, with the staff providing advice and information related to its respective areas. The process results in the preparation of synchronized, detailed orders and, ultimately, execution of the operation. Table 5-3 depicts MDMP inputs and outputs. Table 5-4, page 5-12, shows MDMP considerations.

5-34. The MDMP consists of the following seven steps:

- **Step 1.** Receipt of mission.
- **Step 2.** Mission analysis.
- **Step 3.** COA development.
- **Step 4.** COA analysis (wargaming).
- **Step 5.** COA comparison.
- **Step 6.** COA approval.
- **Step 7.** Orders production, dissemination, and transition.

Table 5-3. Inputs and outputs for the seven steps of MDMP

Key inputs	Steps	Key outputs
• Higher headquarters' plan or order or a new mission anticipated by the commander	Step 1: **Receipt of Mission**	• Commander's initial guidance • Initial allocation of time
	Warning order	
• Commander's initial guidance • Higher headquarters' plan or order • Higher headquarters' knowledge and intelligence products • Knowledge products from other organizations • Army design methodology products	Step 2: **Mission Analysis**	• Problem statement • Mission statement • Initial commander's intent • Initial planning guidance • Initial CCIRs and EEFIs • Updated IPB and running estimates • Assumptions • Evaluation criteria for COAs
	Warning order	
• Mission statement • Initial commander's intent, planning guidance, CCIRs, and EEFIs • Updated IPB and running estimates • Assumptions • Evaluation criteria for COAs	Step 3: **Course of Action (COA) Development**	• COA statements and sketches - Tentative task organization - Broad concept of operations • Revised planning guidance • Updated assumptions
• Updated running estimates • Revised planning guidance • COA statements and sketches • Updated assumptions	Step 4: **COA Analysis (War Game)**	• Refined COAs • Potential decision points • War-game results • Initial assessment measures • Updated assumptions
• Updated running estimates • Refined COAs • Evaluation criteria • War-game results • Updated assumptions	Step 5: **COA Comparison**	• Evaluated COAs • Recommended COAs • Updated running estimates • Updated assumptions
• Updated running estimates • Evaluated COAs • Recommended COAs • Updated assumptions	Step 6: **COA Approval**	• Commander approved COA and any modifications • Refined commander's intent, CCIRs, and EEFIs • Updated assumptions
	Warning order	
• Commander approved COA and any modifications • Refined commander's intent, CCIRs, and EEFIs • Updated assumptions	Step 7: **Orders Production, Dissemination, and Transition**	• Approved operation plan or order • Subordinates understand the plan or order

Legend:

CCIR	commander's critical information requirement
COA	course of action
EEFI	essential element of friendly information
IPB	intelligence preparation of the battlefield

Table 5-4. Engineer considerations in MDMP

Military Decisionmaking Process Steps	*Engineer Considerations*
Receipt of mission	• Receive higher headquarters plans, orders, and construction directives. • Understand the commander's intent and time constraints. • Request geospatial information about the area of operations. • Establish engineer-related boards, as appropriate.
Mission analysis	• Analyze the available information on existing obstacles or limitations. Evaluate terrain, climate, and threat capabilities to determine the potential impact on maneuver/countermobility/survivability tasks. • Develop the essential tasks for maneuver/countermobility/survivability tasks. • Identify the available information on routes and critical facilities. Evaluate the LOC, aerial port of debarkation, and seaport of debarkation requirements. • Determine the availability of construction and other engineering materials. • Review the availability of engineering capabilities, including Army, joint, multinational, HN, and contracted support. • Determine the bed-down requirements of the supported force. Review theater construction standards and base camp master-planning documentation. Review unified facilities criteria, as required. • Review the existing geospatial data on potential sites, conduct site reconnaissance (if possible) and environmental baseline surveys (if appropriated), and determine the threat (including environmental considerations and explosive hazards). • Obtain the necessary geologic, hydrologic, and climatic data. • Determine the level of interagency cooperation required. • Determine the funding sources, as required. • Determine the terrain and mobility restraints, obstacle intelligence, threat engineering capabilities, and critical infrastructure. Recommend the commander's critical information requirements. • Integrate the reconnaissance effort.
COA development	• Identify the priority engineer requirements, including essential tasks for maneuver/countermobility/survivability tasks developed during mission analysis. • Integrate engineer support into COA development. • Recommend an appropriate level of protection effort for each COA based on the expected threat. • Produce construction designs that meet the commander's intent. (Use the Theater Construction Management System when the project is of sufficient size and scope.) • Determine alternate construction locations, methods, means, materials, and timelines to provide the commander with options. • Determine real property and real estate requirements.
COA analysis	• Wargame and refine the engineer plan. • Use the critical path method to determine the length of different courses of action and the ability to crash the project.
COA comparison	• Determine the most feasible, acceptable, and suitable methods of completing the engineering effort.

Table 5-4. Engineer considerations in the MDMP (continued)

Military Decisionmaking Process Steps	*Engineer Considerations*
COA approval	• Determine and compare the risks of each engineering course of action. • Gain approval of the essential tasks for maneuver/countermobility/survivability tasks and construction management, safety, security, logistics, and environmental plans, as required.
Orders production, dissemination, and transition	• Produce construction directives, as required. • Provide input for the appropriate plans and orders. • Ensure that resources are correctly allocated. • Coordinate combined arms rehearsals, as appropriate. • Conduct construction prebriefings. • Conduct preinspections and construction meetings. • Synchronize the construction plan with local and adjacent units. • Implement protection construction standards, including requirements for security fencing, lighting, barriers, and guard posts. • Conduct quality assurance and mid-project inspections. • Participate in engineer-related boards. • Maintain as-built and red-line drawings. • Project turnover activities.
Rehearsal	• Coordinate and participate in combined arms rehearsals as appropriate.
Legend: COA course of action HN host nation LOC lines of communication	

RECEIPT OF MISSION AND COMMANDER'S GUIDANCE

5-35. Commanders can use a commander's initial guidance worksheet to guide the staff on planning and focusing on the mission analysis effort. This can also include identifying items that the commander already understands.

MISSION ANALYSIS: CONDUCT INTELLIGENCE PREPARATION OF THE BATTLEFIELD AND ENGINEER BATTLEFIELD ASSESSMENT

5-36. Engineers use operational variables to analyze the OE before and during mission execution, adding to the shared common understanding by identifying potential challenges and opportunities within the operation. The resulting understanding (an engineer view) of the OE limits OE considerations, resulting in engineer functional missions. The resulting engineer view of the OE is subsequently organized by lines of engineer support and linked to the standard overall understanding through the warfighting functions. Operational and mission variables are outlined in FM 3-34; however, this publication focuses on IPB and engineer running estimates.

ENGINEER SUPPORT TO INTELLIGENCE PREPARATION OF THE BATTLEFIELD

5-37. *Intelligence preparation of the battlefield* is the systematic process of analyzing the mission variables of enemy, terrain, weather, and civil considerations in an area of interest to determine their effect on operations (ATP 2-01.3). IPB is an integrating process and is critical to the success of planning. To be effective, IPB must—

- Accurately define the commander's area of interest to focus collection and analysis on the relevant aspects of the mission variables of enemy, terrain, weather, and civil considerations. Relevance is defined as having a significant effect on friendly and threat operations.
- Describe how each of the four mission variables will affect friendly operations and how terrain, weather, and civil considerations will affect the enemy.
- Provide the IPB products necessary to aid each step of the MDMP according to the commander's planning timelines and guidance.
- Determine how friendly forces, enemy forces, and indigenous populations affect each other to create outcomes that continually affect friendly operations.

5-38. IPB is not the sole responsibility of the intelligence staff. This complex analysis involves the commander and the entire staff working together to determine the effects.

5-39. IPB is the most effective and best aids the commander's decision making when the intelligence staff integrates other staff expertise and supporting elements into its analysis. The engineer must understand the S-2 threat capabilities statement and situation template to analyze enemy engineer capabilities. Engineer reconnaissance may be required to support IPB, and the engineer staff must be proactive in recognizing these requirements and tasking the appropriate engineer elements. Geospatial engineers provide the necessary tools and expertise to describe, analyze, and visualize the terrain so that commanders, staffs, and subordinate echelons can make better-informed decisions.

5-40. IPB consists of four steps. Each step is performed or assessed and refined to ensure that IPB products remain complete and relevant. The four IPB steps are—

- **Step 1. Define the OE.** Defining the OE results in identifying significant characteristics of the OE as they relate to enemy, terrain, weather, and civil considerations that can affect friendly and enemy operations. This step also results in the identification of gaps in current intelligence holdings.
- **Step 2. Describe environmental effects on operations.** The staff describes how the characteristics affect friendly operations. The intelligence staff also describes how terrain, weather, civil considerations, and friendly forces affect enemy forces. Finally, the entire staff determines the impact and effects of friendly and enemy force actions on the population.
- **Step 3. Evaluate the threat.** The purpose of evaluating the threat is to understand how the threat can affect friendly operations. Threat evaluation is a detailed study of enemy forces, their composition and organization, tactical doctrine, operation patterns, weapons and equipment, and supporting systems. This step identifies threat capabilities based upon threat missions and objectives.
- **Step 4. Determine threat COAs.** The staff identifies and develops possible threat COAs that can affect accomplishing the friendly mission. The staff uses threat COAs and other facts and assumptions about the OE, drives friendly COA analysis, and influences friendly COA development.

5-41. The desired end state for IPB is that, upon completion of step 4, the supported commander and staff have a thorough understanding of how engineer capabilities influence the pending mission. The completed engineer input to IPB will—

- Set the stage for the development of annex G and appendixes to annex C of the base order.
- Contribute to the development of the intelligence cell annex B–Intelligence, Collection Priorities, and Intelligence Estimates.
- Provide valid, high-value target recommendations.
- Influence COA development and mission execution.

ENGINEER RUNNING ESTIMATE

5-42. Before receipt of a mission, the engineer running estimate consists of a comprehensive analysis of the OE and engineer capabilities assessment. Upon receipt of a mission, the running estimate parallels the MDMP and becomes focused on relevant information to assist the commander's decision making. Required information in the engineer running estimate supports the commander's visualization and decision making. The engineer staff concurrently prepares and refines the running estimate with the supported maneuver force planning process and continuously maintains it throughout planning, preparation, execution, and assessment.

5-43. Commanders are rarely briefed on the contents of every staff section running estimate. The engineer staff only briefs the portion of the estimate that applies to the situation at hand and the issue or decision currently being addressed. During operations, running estimates are usually presented orally, especially during preparation and execution. Written or digital estimates should be prepared to support the knowledge management plan, continuity, and sharing of engineer information up, down, and laterally.

5-44. From the engineer perspective, mission analysis equates to recognizing the tactical problem and sharing the engineer view of the OE, identifying engineer requirements, and determining which engineer capabilities must be used to solve the problem. Once the problem is identified, the objectives during COA development and implementation must balance requirements with capabilities and integrate engineer capabilities into the concept of operations.

5-45. The running estimate parallels the MDMP. Mission analysis, facts, assumptions, and variables furnish the running estimate structure. Table 5-5 provides a correlation of mission analysis and the engineer running estimate. The engineer running estimate is initiated by—

- Analyzing the higher-headquarters order.
- Conducting IPB.
- Identifying specified, implied, and essential engineer tasks.
- Identifying operational risks and mitigation methods.

Table 5-5. Correlation of mission analysis and the engineer running estimate

Mission Analysis	*Engineer Running Estimate*
• Analyze the higher-headquarters order. • Conduct intelligence preparation of the battlefield. • Determine specified, implied, and essential tasks. • Review available assets. • Determine constraints. • Identify critical facts and assumptions. • Conduct a risk assessment. • Determine the commander's critical information requirements. • Develop an intelligence, surveillance, and reconnaissance 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 warning order. • Review facts and assumptions.	• Analyze the higher-headquarters orders, including the— ▪ Commander's intent. ▪ Mission. ▪ Concept of operation. ▪ Timeline. ▪ Area of operations. • Conduct intelligence preparation of the battlefield, including— • Terrain and weather analysis. • Enemy mission and mobility/countermobility/survivability capabilities. • Friendly mission and mobility/countermobility/survivability capabilities. • Determine— ▪ Specified mobility/countermobility/survivability tasks. ▪ Implied mobility/countermobility/survivability tasks. ▪ Essential mobility/countermobility/survivability tasks. ▪ General-engineering requirements. • Review— ▪ Limitations. ▪ Risk, as applied to engineer capabilities. ▪ Time analysis. ▪ Essential tasks for mobility/countermobility/survivability. ▪ Restated mission. • Conduct a risk assessment that addresses— ▪ Safety. ▪ Environment. • Determine terrain and mobility restraints, obstacle information, threat engineer capabilities, and critical infrastructure. • Recommend the commander's critical information requirement. • Integrate engineer reconnaissance efforts.

ANALYSIS OF THE HIGHER-HEADQUARTERS ORDER

5-46. The engineer staff thoroughly analyzes the higher-headquarters order by initially focusing on the engineer annex, which conveys the overall maneuver unit mission, commander's intent, and operation concept (two levels up). Analysis includes understanding the—

- Current situation (enemy and friendly).
- Engineer mission, intent, and scheme of engineer operations (two levels up).
- Assigned AO (normally prescribed by boundary lines).
- Estimated time available.
- Missions of adjacent units and their relation to the higher-headquarters plan.
- Engineer contributions (by task and purpose) to the mission, commander's intent, and operation concept (two levels up).
- Available assets (including specialty units outside of the BCT, such as divers, forward engineer support teams, and general-engineering units from other Services within the joint operational area).

ANALYZE REQUIRED ENGINEER MISSIONS

5-47. Engineers examine the mission type and consider all potential tasks or supporting engineer requirements to succeed with the respective terrain and enemy threats. Table 5-6 details sample considerations that engineer forces are asked to provide in offensive, defensive, stability, and DSCA operations.

5-48. Analyze the engineer mission by—

- Identifying specified and implied mobility, countermobility, survivability, and general-engineering tasks.
- Analyzing friendly mission and mobility, countermobility, and survivability capabilities.
- Determining constraints.
- Determining the risk level as applied to engineer capabilities.
- Conducting time analysis.
- Developing essential tasks for mobility, countermobility, and survivability tasks.

Table 5-6. Elements of decisive action

Offense	
Operation:	***Considerations:***
Movement to contact. Attack. Exploitation. Pursuit.	Planning begins with predicting the adversary's intent through a thorough understanding of the threat and threat engineer capabilities and how the terrain will affect operations. Engineer planning tends to focus on mobility support, including a robust reconnaissance effort. Engineer planning also includes planning to ensure a smooth, resourced transition from offensive to defensive or stability operations. Engineers conduct the reverse breach planning process and determine the number of breach lanes required. Engineers request bridging for gap crossings and plan for transitions from assault to tactical to line-of-communication bridging. Engineer units tend to have command relationships to maneuver commanders.

Table 5-6. Elements of decisive action (continued)

Defense	
Operation:	***Considerations:***
Mobile defense. Area defense. Retrograde.	Planning begins with using terrain products to visualize how best to shape the terrain, including describing the best positions to defend. Engineer planning tends to focus on countermobility and survivability support, including a significant construction effort. Construction planning includes security and survivability considerations for engagement area development and force protection. Engineer units tend to have support relationships to the maneuver commander except for those combat engineer forces that are task-organized to the reserve or the mobile strike force.
Stability	
Operation:	***Considerations:***
Establish civil security. Establish civil control. Restore essential services. Support governance. Support economic and infrastructure development. Ensure security cooperation.	Assessment of the operational environment includes a greater focus on political and cultural considerations. Engineer planning tends to focus on construction support, including engineer forces working among and in conjunction with civilians. Engineer units are likely to be distributed among echelons of command. Engineer units tend to have support relationships with the maneuver commander; however, there are cases in which responsiveness and proximity to higher engineer commands dictate a command and support relationship.
DSCA	
Operation:	***Considerations:***
Provide support for domestic disasters. Provide support for domestic chemical, biological, radiological, and nuclear incidents. Provide support for domestic civil law enforcement. Provide other designated support.	Engineer planners consider statutes and regulations that restrict Army interaction with other government agencies and civilians during defense support of civil authorities. Engineer planning tends to focus on construction support, including engineer forces working among and in support of civilian agencies. Engineer units are likely to be distributed among echelons of command. Engineer units tend to have support relationships with the maneuver commander; however, there are cases in which responsiveness and proximity to higher engineer commands dictate a command and support relationship.

IDENTIFY SPECIFIED AND IMPLIED TASKS

5-49. The engineer staff identifies specified and implied tasks for mobility, countermobility, and survivability tasks. Specified tasks are specifically assigned to a unit by higher headquarters. These tasks may be included in the base order, annexes, and overlays. For engineers, this could include—

- Obstacle zones.
- Obstacle belts with intents.
- Required numbers of breach lanes.
- Breach types designated by the higher commander

5-50. Implied tasks must be performed to accomplish a specific task or the mission, but they are not stated in the higher-headquarters order. For engineers, this could include—

- Obstacle handover coordination during a relief-in-place mission.
- EOD explosive-hazards neutralization assistance.

ANALYZE THE FRIENDLY MISSION AND CAPABILITIES

5-51. The engineer staff must understand the friendly mission, commander's intent, and operational concept and how engineer capabilities contribute to the mission. To estimate the friendly mission and mobility, countermobility, and survivability capabilities, the engineer staff must—

- Consider the friendly mission.
- Evaluate friendly engineer capabilities and their impact on accomplishing the mission.
- Estimate available engineer assets based on the task organization of—
  - Maneuver forces.
  - Engineer forces.
  - Higher engineer headquarters.
  - Adjacent engineer units.
  - Attachments and detachments.
  - HN or contractor capabilities.
- Consider the availability of critical resources.

5-52. The engineer staff considers assets that can provide engineer capability. These considerations include—

- Task-organized engineer units.
- Mine plows and rollers from nonengineer units.
- Units under the control of higher engineer headquarters (HN and contracted civilian support).
- Adjacent units.

5-53. This understanding facilitates requests for additional resources based on the shortfalls identified during mission analysis and COA development.

5-54. Once the available assets have been determined, the engineer staff works with the S-3 to determine the estimated time available. The engineer staff can apply standard planning factors or known unit work rates to determine the total engineer capability. For example, in the offense, the engineer staff identifies the supported element size and scheme of maneuver to determine the number of lanes required to pass the reduction area. This requirement is compared to the available capability; and if necessary, the staff can request augmentation. In the defense, the ABE determines the number of obstacles or linear effort (in kilometers) and protective positions that engineers could construct with available resources. In stability operations, the focus may be on the number of clearing teams that can be created. During COA development, the engineer staff uses unit-specific capability estimates.

5-55. The engineer staff or task force engineer combines the terrain and weather analysis; the enemy and friendly mission analysis; and mobility, countermobility, and survivability capabilities to form 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 AND RISK

5-56. Constraints are restrictions that are placed on a unit by higher headquarters. They dictate an action or inaction, restricting the freedom of action that a subordinate commander has for planning. Constraints can take the form of requirements; this could include designated reserve targets, obstacle belts (with intents), and lane requirements for engineers. Constraints can also prohibit actions; for example, they may require approval authority for the use of scatterable mines. Obstacle zones and belts are also examples of constraints because they limit the area in which tactical obstacles can be placed.

5-57. Tactical risk consideration begins during the planning stage, as commanders designate and weigh the decisive action. A commander should mitigate (and may specify) an acceptable level of risk to accomplish the mission. For instance, the priority obstacle effort in defense may be employed on the most likely enemy avenues of approach, while situational obstacles are planned on the most dangerous avenues of approach as an economy-of-force measure. The engineer staff must understand how a risk involving an engineer capability specifically impacts combined arms activities and must advise the commander accordingly. One such risk, such as the decision about whether or not to employ engineer reconnaissance teams to support the information collection process, may be mitigated by employing other reconnaissance assets. See ADP 6-0, ATP 5-19, FM 3-90-1, and FM 3-90-2 for additional information on tactical risk.

PERFORM TIME ANALYSIS

5-58. The engineer staff must ensure that engineer operations are included in the combined arms time analysis. The first step of a time analysis is to determine the actual time available. The engineer staff 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 helps the engineer staff accurately refine the time available and adjust the friendly engineer capability accordingly. An excellent tool to use in this process is a basic timeline sketch that includes the—

- Supported unit OPORD times and rehearsal times.
- Engineer unit OPORD times and rehearsal times.
- Movement times.
- Line-of-departure or prepare-to-defend times.
- Hours of darkness or limited visibility.
- Blade team hours for the survivability matrix and obstacle construction times for the countermobility annex.

DEVELOP ESSENTIAL TASKS FOR MOBILITY, COUNTERMOBILITY, AND SURVIVABILITY

5-59. An essential task for mobility, countermobility, and survivability tasks refers to a specified or implied mobility, countermobility, and survivability task that is critical to combined arms mission success. Essential tasks are identified from specified and implied tasks. Combined with the maneuver commander's guidance, these tasks enable the engineer staff and other staff representatives to recommend essential tasks for mobility, countermobility, and survivability tasks to the maneuver commander during the mission analysis briefing.

5-60. Following the mission analysis briefing, the commander approves the essential tasks that are considered relevant for mobility, countermobility, and survivability tasks.

DETAILED RUNNING ESTIMATES FOR BUILDING ENGINEER ANNEXES AND ORDERS

5-61. The work to build and maintain engineer running estimates is never a waste of time. All preparation work and products are the building blocks for OPORDs, FRAGORDs, and annexes. Assets available, time analysis, and tasks for survivability combine into building the survivability annex. Following are some of the standard engineer products that support preparation and execution for all plans:

- Support to Appendix 5, Geospatial Intelligence to annex B, Intelligence.
- Appendix 4. Gap Crossing Operations to annex C, Operations.
- Appendix 8. Survivability Operations to annex E, Protection.
- Appendix 1. Mobility/Countermobility to annex G, Engineer.
- Appendix 2. Survivability to annex G, Engineer.
- Appendix 3. General Engineering to annex G, Engineer.
- Appendix 4. Geospatial Engineering to annex G, Engineer.
- Appendix 5. Environmental Considerations to annex G, Engineer.

5-62. The result of the MDMP is a concept of operations. The running estimate is refined through a detailed consideration of engineer requirements in support of the concept of operations.

FUNDAMENTALS OF EXECUTION

5-63. Execution is putting a plan into action by applying combat power to accomplish the mission and adjusting operation based on changes in the situation. In execution, commanders, staffs, and subordinate commanders focus their efforts on translating decisions into actions. They direct action to apply combat power at decisive points and times to achieve objectives and accomplish missions. Inherent in execution is deciding whether to execute planned actions (such as phases, branches, and sequels) or modify the plan based on unforeseen opportunities or threats.

5-64. Commanders fight the enemy, not the plan. Rather than condemning the value of planning, this concept reminds commanders, staffs, and subordinate unit leaders of the proper relationship between planning and execution. A plan provides a reasonable execution forecast. However, it remains a starting point—not an exact script to follow. During execution, the situation may change rapidly. Operations that the commander envisioned in the plan may bear little resemblance to actual events during execution. Subordinate commanders need maximum latitude in order to take advantage of situations and meet the higher-commander's intent when the original order no longer applies. Effective execution requires leaders who are trained in independent decision making, aggressiveness, and risk taking in an environment of mission command.

SEIZE AND RETAIN THE INITIATIVE

5-65. Seizing the initiative ultimately results from forcing an enemy reaction. Engineers identify times and places to mass the effects of engineer capabilities and combat power to relative advantage. To compel a response, they threaten something that the enemy cares about, such as its center of gravity or decisive points leading to its center of gravity. By forcing the enemy to react, commanders initiate an action-to-reaction sequence that ultimately reduces enemy options to zero.

TAKE ACTION

5-66. Commanders and their subordinate leaders create conditions for seizing the initiative with action. Without action, seizing the initiative is impossible. Faced with an uncertain situation, there is a natural tendency to hesitate and gather more information to reduce uncertainty. Although waiting and gathering information might reduce uncertainty, such inaction will not eliminate it. Waiting may even increase uncertainty by providing the enemy with time to seize the initiative. Effective leaders can manage uncertainty by acting and developing the situation. When the immediate situation is unclear, commanders clarify the situation by action—not by waiting and gathering information.

CREATE AND EXPLOIT OPPORTUNITIES

5-67. Events that offer better ways to success present opportunities. Commanders recognize opportunities by continuously monitoring and evaluating the situation. Failure to understand the opportunities inherent in an enemy action can result in a surrender of the initiative. Commander's critical information requirements must include information requirements that support exploiting opportunities. Commanders encourage subordinates to act within the commander's intent as opportunities occur. A shared understanding of the commander's intent creates an atmosphere that is conducive to subordinate exercise of initiative.

ACCEPT RISK

5-68. Risk management is the process of identifying, assessing, and controlling risks arising from operational factors and making decisions that balance risk costs with mission benefits. Risk management helps organizations and individuals make informed decisions to reduce or offset risk. Using the risk management process increases the operational effectiveness of the force and the probability of mission accomplishment. This systematic approach allows for the identification and assessment of hazards and the management of associated risks. The risk management process outlines a disciplined approach to expressing a risk level in terms that are readily understood at all echelons. For example, the commander may adjust the level of body armor protection during dismounted movement, balancing an increased risk level to individual Soldiers with improved likelihood of mission accomplishment.

5-69. The principles of risk management (see ATP 5-19) are—

- Integrate risk management into all phases of missions and operations.
- Make risk decisions at the appropriate level.
- Accept no unnecessary risk.
- Apply risk management cyclically and continuously.

5-70. Risk management is a cyclical and continuous process of identifying and assessing hazards; developing, choosing, implementing, and supervising controls; and evaluating outcomes as conditions change. Except in time-constrained situations, planners deliberately complete the process—systematically applying all the steps and recording the results. In time-constrained conditions, the commander, staff, subordinate leaders, and Soldiers use judgment to apply risk management principles and steps. The five steps of risk management are—

- **Step 1.** Identify the hazards.
- **Step 2.** Assess the hazards.
- **Step 3.** Develop controls and make risk decisions.
- **Step 4.** Implement controls.
- **Step 5.** Supervise and evaluate.

5-71. Engineers use risk management to identify, assess, and control hazards to reduce their effect on operations and readiness. The five steps of risk management tend to require emphasis at different times during the MDMP. While planning doctrine places the beginning of formal risk management in mission analysis, the commander and staff can begin identifying hazards upon receipt of the warning order or OPORD. For example, when conducting unilateral and partnered operations and training, the commander must assess the potential risk for an insider attack early in the process.

ENGINEER PLANS, ORDERS, AND ANNEXES

5-72. The engineer staff prepares an order or plan by turning the selected COA into a clear, concise concept of operations with the required supporting information. The concept of operations for the approved COA becomes the concept of operations for the plan. The COA sketch becomes the basis for the operation overlay. Orders and plans provide information that subordinates need for execution. Mission orders avoid unnecessary constraints that inhibit subordinate initiative. The engineer staff assists subordinate unit staffs with planning and coordination.

5-73. The engineer staff planner provides input for the appropriate paragraphs in the base plan and the base annexes and appendixes of the base plan, as included in FM 6-0. In addition to developing input for the functionally specific paragraphs, engineer planners must review other sections. Engineers ensure the integration of geospatial support in the appropriate sections and annexes. Engineers review the task organization to ensure sufficient capability to meet identified requirements. The engineer planner recommends the appropriate command or support relationships. Additionally, planners provide input to the flow of the engineer force, as detailed in the time-phased force and deployment data. Engineers review operations sections, annexes, and overlays to ensure the inclusion of obstacle effect or other graphics and help convey the scheme of engineer operations. Engineers in the fires section work with the fire support officer and other staff members to integrate obstacles with fire. Employing scatterable mines and confirming that obstacles are covered by fire are of particular interest.

5-74. An engineer annex, generally found in annex G of the base plan or base order, is the principal means through which the engineer defines engineer operations to the maneuver commander's intent, essential tasks for M/CM/S, and coordinating instructions to subordinate commanders. It is not intended to function as the internal order for an engineer organization. The engineer commander articulates intent, the concept of operations, and coordinating instructions to subordinate, supporting, and supported commanders. The annex, which is meant to clarify the scheme of engineer operations to the OPLAN or OPORD, includes the—

- Overall description of the scheme of engineer operations, including approved essential tasks for M/CM/S.
- Priorities of work to shape the theater or AO.
- Operational project planning, preparation, and execution responsibilities.

- Engineer organization for combat.
- Essential tasks for M/CM/S for subordinate units.
- Allocations of Class IV and Class V supplies (obstacle material).

Note. Guidance on obstacle responsibilities that is provided to maneuver units should be listed in the body of the basic order, not in the engineer annex.

5-75. The engineer staff officer produces the engineer overlay to highlight obstacle information or breaching operations. A gap-crossing operation may require a separate annex as part of the base order.

5-76. The engineer staff officer performs as the staff integrator and advisor to the commander for environmental considerations. An environmental considerations appendix parallels guidance from the joint OPLAN, OPORD, or concept plan. See ATP 3-34.5 for an example of an environmental appendix. When specific command procedures dictate, other staff officers include some environmental considerations in logistics and medical annexes. Unit planning at the regiment or brigade level and below generally includes only those elements required by higher-headquarters orders or plans that are not already included in a unit SOP. If this appendix is not written, appropriate material is placed in the coordinating instructions of the basic order.

COMMAND POST FUNCTIONS

5-77. CPs are activities for exercising C2, supporting MDMP, and providing the commander with the tools necessary to make timely and relevant decisions. CP staff and equipment are arranged to facilitate coordination, smooth information exchange, and make rapid decisions. Well-designed CPs integrate command and staff efforts by matching CP manning, equipment, information systems, and procedures against its internal layout and utilities. Organizing the CP into functional and integrating cells promotes efficiency and coordination. CP configurations and layouts vary between units and echelons. Units establish detailed SOPs to standardize CP operations. Tactical SOPs should be followed and revised throughout training exercises to ensure that CP efficiencies are gained and transitioning personnel quickly learn processes, functions, and workflows. Figure 5-2 depicts how information typically flows from disparate sources of raw data to fulfill information requirements.

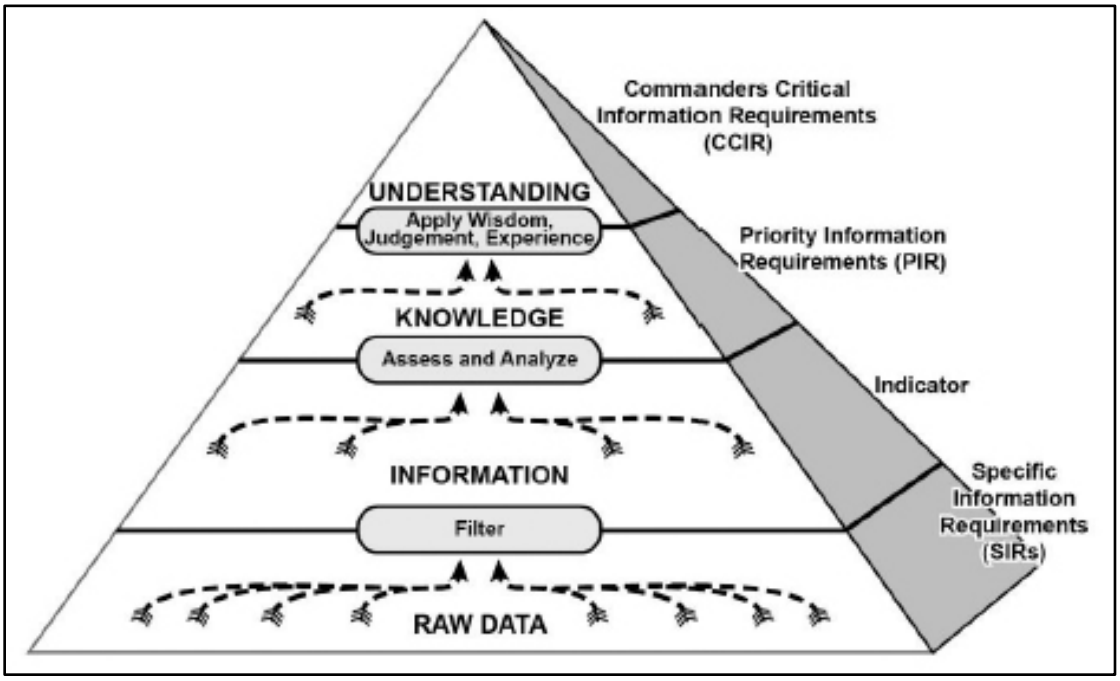


Figure 5-2. Data flow to an understanding

5-78. The engineer staff tracks and makes recommendations to the commander as part of its six CP functions by—

- Receiving subunit information.
- Distributing information horizontally and vertically.
- Analyzing information for relevance to engineer functions.
- Making recommendations to the command.
- Integrating engineer resources and those assigned to the battalion.
- Synchronizing resources.

INFORMATION MANAGEMENT

5-79. Proper information management ensures that the commander receives relevant insight to make timely decisions shared by one of the four management components (people, processes, tools, and organization). The staff must predict (or deduce) these insights for the commander to make timely decisions. The engineer's role in information management is to provide the commander with engineer-specific insight based on knowledge and prediction (or deduction). The commander's critical information requirements are used to predict what the enemy will do, rather than to react to actions that have already occurred. Two crucial aspects of information management are derived from asking, "So what?" and "Who else needs to know?" The staff provides information to higher, adjacent, and lower organizations, giving those staffs higher fidelity regarding the COP of assets that are task-organized to the engineer battalion.

5-80. Engineer staffs incorporate the six tactical-operations functions (receive information, distribute information, analyze information, make recommendations, integrate resources, and synchronize resources) as part of the routine to inform the engineer commander when decisions need to be made. Figure 4-2, page 4-4, depicts how staffs parse large volumes of information to present to the commander for decisions.

5-81. The commander applies judgment to relevant information to reach a situational understanding. The potential volume of information provided to the commander could be overwhelming, adversely affecting sound and timely decision making. Utilizing relevant information helps prevent information overload. The commander establishes the commander's critical information requirements to define information that is pertinent to the staff.

CREATE A COMMON OPERATIONAL PICTURE

5-82. The COP displays relevant information through a shared visual (analog and digital) workspace, allowing commanders and staffs to monitor operations, analyze data, share thoughts, and plan COAs. Even before planning starts, commanders direct COP requirements on what relevant information to display to make informed and effective decisions. These information requirements are based on the unit C2 system, unit capabilities, the mission, mission variables, and the commander's leadership philosophy.

5-83. The COP is a key consideration for each step within the operations process: plan, prepare, execute, and assess. The commander's requirements for incorporating a relevant and comprehensive COP into CP operations can include—

- An explanation about how intent and planning guidance are to be displayed.
- A description of posted relevant information.
- The level and type of knowledge required and templated enemy threats, hazards, activities, and locations.
- An explanation of how the organization will collaborate with higher and subordinate organizations.
- The use of planning and brief-back tools.
- Types of control measures, graphics, and efforts used.
- A description of the integration of the commander's critical information requirements, priority intelligence requirement, and friendly force information requirement and the higher-level unit decision support matrix.
- Display of significant activities.

- Display of key nodes and critical infrastructure.
- Level of battle tracking.

BATTLE TRACKING THROUGH TASK-ORGANIZATION CHANGES

5-84. Battle tracking involves monitoring elements of the COP that are tied to forecasted outcomes. Each engineer CP supporting the BCT (organic or augmenting) tracks the progress of the tactical tasks being executed. Because organic engineer company parent organizations differ among the three types of BCTs, the information flow may vary. The tracking includes all subordinate units.

5-85. EAB engineer units augmenting a BCT ensure that their CP maintains a COP of engineer work lines and effort, tracks engineer execution, and passes the information to the supported unit CP and the next higher engineer organization or staff. When a supporting engineer battalion is task-organized to a BCT, it gathers reports from its subordinate units and forwards them to the BCT main CP. Battle tracking for engineer forces includes—

- Friendly and enemy engineer unit locations and combat power (personnel, equipment, supplies).
- Status of the commander's critical information requirements.
- Current and future engineer missions.
- Obstacle control measures.
- Planned and executed obstacles.
- Friendly and enemy survivability preparations.
- Obstacle locations.
- Friendly and enemy breach sites and lanes.
- Condition of existing LOCs.
- Condition of gap-crossing sites.
- Results of engineer reconnaissance.
- Barrier material availability and locations.
- Key engineer Class V supplies (Volcano mines, MICLIC loads, 25-millimeter ammunition, explosives stock levels).
- Critical infrastructure (sewer, water, electricity, academia, trash disposal, medical care facilities, safety resources, cultural properties, other considerations assessments).

LIAISON TEAMS

5-86. If an LNO is designated to a higher or adjacent headquarters, he facilitates the communication of COP-related operational information between the sending and receiving headquarters. LNOs convey information and its context by interpreting and explaining it. An LNO represents the commander or staff officer and can directly transmit information, as necessary. LNOs can also expedite the passage of required information that answers the commander's critical information requirements as well as exceptional information. For example, an LNO from an engineer battalion task force headquarters in general support 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.

OPERATIONS IN DEGRADED ENVIRONMENTS

5-87. All units conducting offensive or defensive operations should expect to operate in a contested and degraded communications environment. Degradation may arise from environmental circumstances, enemy action directed against friendly communications and information systems, or malfunctions. A degraded communications environment may be permanent or temporary. Using mission orders and complying with the commander's intent are critical to remaining effective in a degraded communications environment, regardless of the source of the degradation. See FM 6-02 for more information on how units receive signal support.

5-88. Enemies use several methods to deny friendly use of the cyberspace domain and the electromagnetic spectrum. These methods include cyberspace attack (digital attack against Army, joint, and other networks), electronic attack (jamming of portions of the electromagnetic spectrum), and physical attack against

infrastructure and electronics. Units at each echelon require SOPs and drills for restoring functionality and connectivity.

5-89. A unit can employ any number of measures to restore functionality to degraded communications and information systems. A unit may—

- Use printed maps and overlays to maintain a COP within a CP.
- Use combat network radios to transmit orders and reports.
- Increase the use of LNOs.
- Use couriers to transport written orders, reports, overlays, digital media, and other information headquarters and between maneuver units.
- Run fiber-optic and telephone cables between headquarters. (Commanders and staffs should be aware that this technique increases the time required to establish and displace CPs.)
- Relocate to terrain that protects headquarters from enemy jamming.
- Limit electronic emissions.

5-90. Lower-echelon units are responsible for restoring communications with higher engineer and maneuver echelons. Each impacted engineer unit restores communications using available resources. Units establish maximum time-lapse interval standards for contact to be reestablished and the methods used for reestablishment. Commanders typically direct the establishment of these standards and methods as part of the OPORD, through a detailed primary, alternate, contingency, and emergency communication (PACE) plan.

Chapter 6
Sustainment Considerations

Army sustainment is the provision of logistics, financial management, personnel services, and health service support necessary to maintain and prolong operations until successful mission completion. Sustainment units enable engineer operations at the BCT and level below during offense, defense, stability, and DSCA operations.

SUSTAINMENT PLANNING

6-1. During the operations process, engineer commanders and staffs must plan, prepare, execute, and continuously assess sustainment requirements that support engineer capabilities. During the MDMP, engineer planners concurrently develop sustainment and operational plans. The engineer planner must understand the engineer and supported unit mission, commander's intent, and support plan concept to ensure an effective sustainment plan.

6-2. Developing the sustainment plan begins during mission analysis and is refined during wargaming. Upon receipt of the mission, engineer planners initiate their portion of the logistics estimate process (as described in ATP 5-0.1) as an analysis of logistics factors affecting mission accomplishment. The focus of the logistics estimate is based 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).
- Quantity of support required.
- Priority of support (type and unit).

6-3. After determining the support requirements, the engineer planner assesses the—

- Available sustainment resources (supported unit, parent unit, contractor, HN).
- Status of sustainment resources (location, maintenance, personnel).
- Time that sustainment resources are available to the engineer unit.
- Way in which resources become available.
- Shortfalls in equipment and supplies needed to support the operation.

6-4. Close integration with the supporting BSB and FSC helps simplify and accelerate the provision of a COP. Information is readily available across the BCT network using the Blue Force Tracker, Medical Communications for Combat Casualty Care System, and Battle Command Sustainment Support System.

6-5. After preparing the logistics estimate, engineer planners work with the supported-unit S-4 and compare the logistics requirements with the reported status of subordinate units to determine the specific amount of support needed for the operation. These requirements are then coordinated with the BSB or FSC to ensure that required supplies are identified and resourced through next-higher level stocks.

6-6. The engineer staff translates the logistics estimate into specific plans to determine the feasibility of support to maneuver unit COAs. After a COA is selected, the engineer staff incorporates the specific sustainment requirements into the supported-unit base OPORD.

6-7. In each BCT, the engineer staff works with the appropriate sustainment planner and executor to track essential sustainment tasks involving supporting engineer units. Accurate and timely status reporting helps the engineer staff provide the overall engineer status to the supported-unit commander and allows the engineer staff to intercede in critical sustainment problems when necessary. The engineer staff also ensures that supplies needed by task-organized or augmenting engineer units are integrated into supported-unit

sustainment plans. For the engineer staff to properly execute these missions, accurate and timely reporting and close coordination with sustainment planners and providers and organic and augmenting engineer commanders and staff are essential.

6-8. Before execution, sustainment rehearsals are typically conducted at the brigade, battalion, and company levels to ensure a smooth, continuous flow of materiel and services.

LOGISTICS

6-9. The tempo of the operation requires that the logistician and engineer commander maintain constant vigilance to ensure a continuous flow of logistics. Supplies are pushed forward (in a unit distribution method) when logistically feasible. Maneuver units typically rely on lulls in the tempo of an operation to conduct sustainment, while engineers may not. Engineers do not usually have that opportunity since many of their missions occur during a lull in maneuver, denying them the chance to use the supply point method. This increases the need for engineers to plan for continuous, routine, and emergency logistics support.

6-10. The eight Army principles of sustainment are defined in ADP 4-0. The application of these principles facilitates effective, efficient sustainment and enables operational success. Engineer commanders and staffs must understand and use these principles while planning engineer operations. The principles of sustainment with the same as those of logistics. Sustainment principles are discussed in the following paragraphs.

INTEGRATION

6-11. Integration requires deliberate sustainment coordination and synchronization between commanders and operational and sustainment planners to ensure that the BCT sustainment plan supports the BCT operational plan. Sustainment must be integrated into the tactical plan. Planners must examine the selected COA and ensure that it can be supported logistically.

6-12. 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 develop a clear and concise concept of support, integrating the commander's intent and operation concept.

ANTICIPATION

6-13. Logistics commanders and staffs must understand and visualize future operations and anticipate necessary support. The BSB commander guides sustainment commanders and staff to anticipate logistic requirements to fulfill rapidly changing operational plans. As the operational plan changes, logisticians within the BCT must quickly adjust and respond to logistical requirements and identify risks and shortfalls, which must be mitigated and incorporated into the overall plan.

RESPONSIVENESS

6-14. The planner who reacts to changing operational requirements and responds to meet the needs before, during, and after operations is responsive. 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 ability of commanders, logisticians, and engineers to respond to requirements. When planning responsive support for engineer operations, engineers consider joint, multinational, contract civilian, and interagency assets. Engineers—

- Use all available resources (especially acceptable HN assets) to the fullest extent possible.
- Prioritize critical engineer activities based on the concept of operations.
- Anticipate engineer requirements based on wargaming and the rehearsal of concept drills, incorporating experience, historical knowledge, and calculable resource characteristics.
- Participate in and evaluate the engineer significance of each phase of the operation throughout the entire MDMP.

6-15. The engineer staff 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.
- Engineer-specific Class IX repair parts.
- Large amounts of Class IV construction and barrier materials.
- Demolitions for the offense and defense.
- Maintenance and transportation support.
- Financial services to support the local purchase and contracting of HN assets and materials.

SIMPLICITY

6-16. Engineer commanders and staffs establish priorities and allocate supply classes and services to simplify sustainment. Obstacle packages are preconfigured loads (commonly called combat-configured loads) of specialized classes of supplies to facilitate transport to the location where they are to be employed.

ECONOMY

6-17. Economy requires the provision of resources in the most efficient manner. This requires that commanders set clear priorities when resourcing the operational plan. The priority of effort is established while balancing the mitigation of risk to the operation. Engineer commanders may need to improvise to meet the intent of the higher commander and to mitigate the risks.

SURVIVABILITY

6-18. Survivability is based on the ability to protect support functions from destruction or degradation. Engineers contribute to ensuring that sustainment means are survivable by constructing sustainment bases and clearing LOCs. For more information on survivability, see ATP 3-37.34.

CONTINUITY

6-19. At the BCT level, continuity is achieved through a system of integrated and focused networks, cells, and communication means. Sustainment cells, networks such as the Battle Command Sustainment and Support System, and continuous coordination among sustainment leaders link the three sustainment elements of logistics, personnel services, and health service support to operations.

IMPROVISATION

6-20. Sustainment organizations must improvise to meet current needs and respond to unforeseen emergencies. They 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. 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.

6-21. 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 whatever 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. See ATP 3-34.81 for more information on engineer resource assessments.

ENGINEER SUSTAINMENT PLANNING CONSIDERATIONS

6-22. The engineer staff at all echelons prepares engineer logistics estimates and plans and monitors engineer-related sustainment execution within the supported unit. When engineer elements are task-

organized within the supported unit, the engineer staff recommends the most useful command or support relationship. The engineer staff at battalion and brigade—

- Writes the engineer annex and associated appendixes to the OPLAN or OPORD to support the commander's intent. A recommended distribution for engineer-related, command-regulated supply classes and special equipment is included.
- Assists in planning the locations of engineer forward supply points for the delivery of engineer-configured loads of Class IV and V barrier material. These sites are coordinated with the unit assigned to 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 assigned to the terrain and the appropriate S-4.
- Coordinates for appropriate material-handling equipment to unload supplies and equipment at engineer forward supply points and engineer equipment parks.
- Works closely with the sustainment staff (including HN) to identify available haul assets and recommend priorities to the sustainment planners.
- Identifies extraordinary medical evacuation 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. The staff also monitors advice implications of statutory, regulatory, and command policies for procurement of construction materials. Ensuring the timely delivery of materials that meet the required specifications, regardless of their source, is a critical issue for the engineer staff.
- Tracks the flow of mission-critical Class IV and V supplies into support areas and forward to the supporting engineer units. The staff also provides engineer assistance, as required, to accept delivery of construction materials.
- Coordinates MSR clearing tasks and tracks their status at the main CP.
- Coordinates with the EOD company for EOD support to missions that are outside of engineer capability or capacity.
- Develops engineer SOPs and integrates engineer considerations into maneuver unit SOPs to facilitate the planning and execution of sustainment.
- Provides terrain visualization and analysis in support of sustainment planning.

CONTROLLING SUPPLY RATES

6-23. The availability of engineer munitions can be an issue during operations, especially long-term and high-intensity operations. Engineers and planners must balance competing requirements for limited transportation assets to move bulk ammunition with other pressing needs. The relationship between the RSR developed by lower echelons and the CSR developed by the theater army or joint task force in conjunction with its supporting sustainment command. RSR and CSR are expressed as—

- The amount of ammunition expressed in terms of rounds per weapon per day fired by weapons, in terms of other units of measure per day for bulk allotment, and other items estimated to be required to sustain operations of any designated force without restriction for a specified period. See ATP 3-09.23 for more information. RSR computation and routing are not a logistics function. RSR computation and routing are developed by maneuver commanders and submitted to their higher headquarters. The period could be per day, per phase of an operation, or for the overall operation itself. RSRs for LSCO are often expressed per day or phase; however, high value, low-density munitions such as MICLIC tubes, rockets, and remote antiarmor mine rounds may continue to be described in terms of individual munitions.
- When there is a shortfall in the ability to supply any ammunition type, the higher-level commander determines how much can be supplied to subordinates. CSR is the rate of ammunition consumption

that can be supported, considering availability, facilities, and transportation. It is expressed in terms of rounds per unit, individual, or vehicle per day. Commanders adhere to CSR when the RSR exceeds the capability of the logistics system to support. Commanders, advised by their staffs, determine how ammunition will be distributed across their subordinate units. Different subordinates may be given different CSR values to weight main and supporting efforts. In some instances, a supporting effort receives more of a given munition type than the designated main effort if that type of munition or ammunition is crucial for the overall effort's success. Units may not draw more than their assigned CSR without the approval of their higher headquarters.

PLANNING SUSTAINMENT REQUIREMENTS THROUGH TRANSITIONS

6-24. Leading and planning through transitions in an operation require engineers to anticipate and review updated running engineer estimates. Transitions from offensive to defensive operations require early requests for Class IV barrier material and Class V engineer munitions for terrain-shaping obstacles. Class III rates of use may decrease for maneuver forces during the defense; however, Class III rates of use may drastically increase for engineer units as engineer vehicles are used to create survivability positions, new assembly areas, improvements to roads and trails, antitank ditches, and the like. A transition from large-scale combat operations to stability operations also requires a new set of resource requirements, including new base camps, the construction of security zones with associated defensive positions, and new essential-service requirements such as generators and infrastructure materials. Engineers must advise commanders, staffs, and respective sustainment units on new requirements that support future BCT mission sets.

SUPPORTING SUSTAINMENT PREPARATION OF THE OPERATIONAL ENVIRONMENT

6-25. *Sustainment preparation of the operational environment* is the analysis to determine infrastructure, physical environment, and resources in the operational environment that will optimize or adversely impact friendly forces means for supporting and sustaining the commander's operations plan (ADP 4-0). Sustainment preparation of the OE assists the planning staff refine the sustainment estimate and concept of support. It identifies friendly resources (HN support, contractible or accessible assets) or environmental factors (endemic diseases, climate) that impact sustainment. Some of the (non-all-inclusive) factors considered are—

- **Geography.** Information on climate, terrain, and endemic diseases in the AO which determines what types of equipment are needed and when. For example, water information determines the need for early deployment of well-drilling assets and water production and distribution units.
- **Supplies and services.** Information on the availability of supplies and services that are readily available in the AO. Supplies such as subsistence items, bulk petroleum, and barrier materials are the most common. Common services consist of bath, laundry, and sanitation services and water purification.
- **Facilities.** Information on the availability of warehousing, cold-storage facilities, production and manufacturing plants, reservoirs, administrative facilities, hospitals, sanitation capabilities, and livable buildings/lodging options.
- **Transportation.** Information on road and rail networks, inland waterways, airfields, truck availability, bridges, ports, cargo handlers, petroleum pipelines, materials-handling equipment, traffic flow, choke points, and control problems.
- **Maintenance.** Availability of HN maintenance capabilities.
- **General skills.** Information on the availability of general skills such as those provided by translators and skilled and unskilled laborers.

BRIGADE ENGINEER BATTALION STAFF SUSTAINMENT TASKS

6-26. The commander ensures that sustainment supports the maintenance of the battalion fighting potential and the ability of the battalion to enhance the combat power of the BCT. The battalion commander provides critical insight during BCT planning and guidance in developing BCT sustainment requirements.

6-27. The engineer battalion staff—

- 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(s).
- Executes sustainment tasks 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 adequately 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.

SUPPORT AREA PLACEMENT AND ARRANGEMENT

6-28. Just as the brigade support area (BSA) is the sustainment hub of the BCT, the battalion support area is the sustainment hub of the supported battalion. The HHC and FSC are usually collocated to share the effort, weapons systems, and manpower. However, the FSCs in a BCT may be collocated in the BSA to support a consolidated mission to push supplies forward to maneuver, engineer, and artillery and aviation battalions.

6-29. The FSC, along with the S-3 and S-4, recommends the layout of the battalion support area to the BEB commander. The support area must allow for the provision of sustainment capabilities and maximization of security but not interfere with the tactical movement of units or units that pass through the BEB area. SOPs commonly call for the creation of a triangular BEB CP, with HHC, FSC, and an engineer company forming as the three legs of a tactical assembly area.

FORWARD SUPPORT COMPANY CAPABILITIES

6-30. The BEB receives support from an FSC and the distribution and supply, field maintenance, and brigade support medical companies within the BSB. The FSC is the link from the BSB to the engineer battalion. It is the organization that allows the BCT, battalion, and BSB commanders the greatest flexibility for providing logistics support to the BCT.

6-31. Each FSC is organized to provide direct support to a specific combined arms, cavalry, infantry, engineer, or fires battalion. FSCs provide field feeding, fuel, ammunition, field maintenance, and distribution support to a battalion. The forward support companies are similarly structured, with the most significant differences occurring in the maintenance capabilities.

6-32. The FSC commander assists the engineer battalion S-4 with the battalion logistics plan and executes the logistics plan according to the BSB and supported engineer battalion commander's guidance. Early integration of the logistics plan into the supported engineer battalion S-3 operational plan helps mitigate logistic shortfalls and support the commander to seize, retain, and exploit gains.

6-33. The FSCs are organic to the BSB. The FSCs receive technical logistic directions from the BSB commander. This allows the BSB commander and the BSB support operations officer to task-organize the FSC and cross-level assets when necessary to weigh logistics support to the BCT. The task organization of

the FSC is a collaborative, coordinated effort that involves analysis by the staff and consensus amongst all commanders within the BCT. Since the FSCs are assigned to the BSB, they depend on the BSB for administrative support, logistic support, and technical oversight.

6-34. An FSC may be attached to, or placed under the operational control of, its supported battalion. The BCT commander decides how to establish these command relationships based upon the BSB commander's advice after conducting a careful and thorough mission analysis. All commanders must understand that these types of command relationships limit the BSB commander's, and ultimately the BCT commander's, flexibility to support the BCT. The attachment of an FCT or its placement under operational control of the supported battalion is generally limited in duration and may be done for a specific mission or operation phase. See ATP 4-90 for more information on FSC capabilities.

FORWARD SUPPORT COMPANY EMPLOYMENT CONSIDERATIONS

6-35. FSCs typically operate in close proximity to supported battalions. The supported battalion determines the location of the FSC. The distance separating the FSC and the battalion is METT-TC-dependent, with logistics asset force protection and required resupply turn-around times being key considerations.

6-36. The FSC may be divided, with some elements collocated with the supported battalion and others with BSA elements. For example, it may be desirable to locate the FSC field maintenance teams with the supported battalion and the remainder of the FSC in the BSA. This type of task organization must be determined by the FSC commander in collaboration with the BSB and maneuver battalion commanders.

6-37. Collocation of the FSC with the BEB provides responsive and flexible support to the BEB and may enhance the company LOC with the BSB. In addition, the FSC commander can influence sustainment decisions due to the proximity of the BEB CP. This balance is dependent upon the BSB providing consistent logistics packages to the Company E FSC. When the BSB cannot push supplies to the FSC, risks to vehicles, Soldiers, and mission success may be elevated. A combined CP with the FSC and BEB S-4 team can work as a cohesive team, increasing visibility of the battalion's logistical requirements and ultimately enhancing LOCs between multiple nodes. Some of the best practices or considerations that leaders may take into account to remain flexible for unknown or changing requirements are—

- **Field maintenance teams.** FSCs creates field maintenance teams consisting of a contract truck, family of medium tactical vehicles; team/squad of Soldiers; and basic load of petroleum, oil, and lubricant products to provide the line companies with immediate maintenance support. Considerations include communications systems, security, and C2 authority levels for each of these small teams.
- **Battle rhythm reporting.** The FSC and BEB staff ensure that accurate maintenance reports are submitted to the FSC maintenance section according to the unit primary, alternate, contingency, and emergency communications plan. These reports support the BEB staff in maintaining and accurately portraying the BEB combat power statistics.
- **Enabler maintenance support.** BEBs must prioritize the effort to track multiple enablers who are constantly attached and detached to other units within the BCT. The FSC Maintenance Control Section must account for enablers who would not usually fall into the FSC global C2 system-Army. Due to degraded communications environments, FSCs should plan for digital and analog tracking systems to dispatch vehicles, requisition classes of supply, and track maintenance status. The risk is an inaccurate equipment availability picture and critical mission decisions that are not backed up by accurate evidence. See Training and Evaluation outline 43-2-4506, *Perform Maintenance Control Functions*, to review how the unit executes essential maintenance functions.
- **FSC or S-4 liaisons at the task force FSC, BSB, or the BSA.** These liaisons provide knowledge of local problems; achieve situational awareness of battlefield changes; and anticipate transitions between phases and missions. Routine logistics synchronization events between units, in person or distributed across hundreds of kilometers, support the sharing of and focus on, information to make decisions.
- **Distribution and tactical convoy operations.** The BEB FSC has a distribution platoon and may require oversight or an expansion of load and security capability to support attached units. Each distribution convoy is a combat mission that requires focused leadership, precombat checks, precombat inspections, and rehearsals to account for integrating different platforms.

- **Lift capacity.** Offensive, defensive, stability, and DSCA missions require that units increase their supply lift capacity beyond a standard 1–3 days of supply. Requirements such as defensive Class IV items like wire, wire gabions, and Volcano tubes exceed the designated storage and haul capacity of the battalion, requiring multiple convoy turns and greater security. The standardization of load plans and standardized load packages and the anticipation of transitions between phases and missions decrease friction points.
- **Specialized-ammunition management.** The FSC, BEB, and BCT S-4 should manage specific requirements for ammunition, including engineer ammunition such as MICLICs, shape charges, Volcano tubes, and spider modules. Tracking, managing, and reporting specialized Class IV and V items may require more Soldiers or liaisons at the unit ammunition supply point. Liaisons are subject matter experts on those types of munitions.

SUSTAINMENT FUNCTION PLANNING CONSIDERATIONS

6-38. The sustainment concept-of-support format is structured according to the warfighter's operational plan. The concept-of-sustainment method used by the sustainment planner must match the operational concept. This ensures clarity and synchronization in planning.

6-39. The intent of the sustainment concept-of-support is not to "boilerplate" unnecessary information. Instead, it is to think through key sustainment planning considerations that are directly tied to the concept of operation. The sustainment planner should craft a word picture that commanders and their primary staffs can visualize and follow. Sustainment planners can locate the details of their key support actions in paragraph 4, published in annex F of the OPORD. Example sustainment concepts of support for brigades and divisions are provided in appendixes B and D. These are not related to any specific concept of operation but are provided to illustrate format and provide a feel for sustainment concepts-of-support at various levels.

6-40. The logistician's role in the overall OPLAN or OPORD briefing is to brief regarding the concept of sustainment. Still, the logistician must first understand the concept of the operation and the commander's intent. This briefing facilitates communication of the concept-of-sustainment to the commander and subordinate commanders. The concept-of-sustainment briefing should address the critical, non-SOP, or unusual aspects of logistic support by the operation phase by essential sustainment functions. Doctrinal, usual, or SOP matters should not be addressed unless there is a deviation in support relationships or normal methods. The sustainment planner briefs the concept of sustainment, working through the operation by phase. This briefing should go into greater detail than is laid out in the written concept of sustainment.

6-41. Some rules of thumb for the concept-of-sustainment briefing include—

- Inform commanders of what they can expect from sustainment and how many days or hours they can operate based on materiel readiness, available quantities of supplies, and the like. Use standard terms such as Department of State or other terms meaningful to the commander. Avoid jargon, technical terminology, or SOP information.
- Address the "culminating point" from a logistic perspective.
- Avoid briefing about extensive number crunching associated with the logistics estimate process. Brief about the impact (the "so what" for critical logistics or classes of supply). Be prepared to present or discuss the unit methodology.
- Do not read a written product; explain the product using the sustainment overlay and appropriate visual aids, such as a concept-of-sustainment overview matrix. Show the commander how the concept of sustainment is synchronized with and supports the concept of the operation.
- Include locations of critical logistic assets, headquarters, and events.
- Address priorities, shifts in priorities, problem areas and solutions, and critical events.
- Tell the commander what he needs to know.

BALANCING DISTRIBUTION ASSETS THROUGH LOGISTICS RELEASE POINTS

6-42. FSC distribution platoons are often overused, while transportation platoons from the BSB distribution company are often underused. The BEB FSC distribution platoon regularly covers long distances and conducts multiple daily logistics packages to support the BEB and its enablers. The BEB distribution platoon

frequently operates between field trains and combat trains. They break down loads at the field trains and then push them forward to combat train areas. The BEB executive officer, S-4, and FSC should consider those supplies that can utilize the BEB distribution company transportation platoon use a logistics release point operations method to move commodities between the forward train and combat train CPs to help offset this imbalance of load on the FSC.

6-43. Echeloned trains at the battalion and squadron levels can be organized into combat trains and field trains. Battalion and squadron trains are used to array subordinate sustainment elements (unit personnel, vehicles, and equipment), including their designated FSC. The battalion or squadron commander and staff, BSB commander and staff, and FSC commander collaborate to determine the best employment method commensurate with the BCT concept of support and the commander's guidance. The echeloning of support can include the battalion or squadron aid station, elements of the S-1 section and S-4 section, and the FSC.

Combat Trains

6-44. Combat trains usually consist of elements of the battalion or squadron S-1 section, S-4 section, aid station, maintenance collection point, and other selected elements of the FSC. The FSC typically positions its commander or first sergeant, field feeding section, portions of the distribution platoon, maintenance control officer, and portions of the maintenance platoon in combat trains. The battalion and squadron commanders position key personnel, staff, subordinate company leaders, and assets in the trains based on the best location to support the mission. Commanders consider the mission variables of METT-TC when selecting the location for their combat trains.

6-45. When established, the combat train CP plans and coordinates sustainment operations in support of tactical operations. The combat train CP serves as the focal point for all administrative and logistical functions of the battalion or squadron. The combat train CP may serve as an alternate CP for the main battalion or squadron CP. The battalion or squadron S-4 usually serves as the combat train CP sustainment officer in charge. The maintenance control officer usually serves as the maintenance collection point officer in charge. The HHC (battery or troop) commander usually exercises C2 for the respective combat train CP. The combat train CP serves the following functions:

- Tracks the current battle.
- Controls sustainment support to the current operation.
- Provides sustainment representation to the main CP for planning and integration.
- Monitors supply routes and controls the sustainment flow of materiel and personnel.
- Coordinates the evacuation of casualties, equipment, and detainees.

6-46. Units position the maintenance collection point where recovery vehicles have access or where maintenance personnel perform major or difficult maintenance. Time and terrain permitting, combat trains must be mobile enough to support frequent changes in location when heavy traffic in the area may cause detection; the area becomes worn by heavy use, such as in wet and muddy conditions; or security is compromised.

Field Trains

6-47. Field trains are positioned based on METT-TC considerations and are often located in the BSA. Field trains include battalion or squadron sustainment assets that are not located with the combat trains. Field trains can provide direct coordination between the battalion or squadron and the BSB.

6-48. When established, field trains usually consist of the elements of the HHC (battery or troop) and the battalion or squadron S-1 and S-4 sections. They may include FSC elements that are not located in combat trains. Field train personnel help facilitate the coordination and movement of support from the BSB to the battalion or squadron. The battalion or squadron S-4 coordinates all unit supply requests with the BCT S-4 and BSB. The BSB fills orders of stocked items through unit distribution to the FSC, typically located at the combat trains. Requests for items that are not on-hand in the BSA are forwarded to the BCT S-4.

6-49. The FSC typically places personnel in field trains to facilitate the resupply of rations, water, fuel, and ammunition. These FSC elements should also enable the flow of Class IV, VIII, and IX supplies. FSC elements in the field trains may consist of the FSC executive officer and/or first sergeant, ammunition

handlers, field feeding Soldiers, fuel handlers, motor transport operators, the supply sergeant, or other representatives from the FSC. Food operations NCOs may coordinate ration ordering and Class I break bulk cargo configuration for units and Soldiers in field trains.

6-50. When established, the field train CP serves as the battalion or squadron commander's primary direct coordination element with the supporting BSB in the BSA. The field train CP usually consists of the HHC (battery or troop) executive officer and first sergeant, an S-4 and S-1 representative, and a supply sergeant or representative. The HHC executive or designated representative can control the field train CP. The field train CP serves the following functions:

- Synchronizes and integrates the BCT concept of support.
- Coordinates logistics requirements with the BSB support operations.
- Configures logistics packages tailored to support requirements.
- Coordinates with the BCT for personnel services and replacement operations.
- Forecasts and coordinates future sustainment requirements.
- Coordinates retrograde of equipment.
- Coordinates retrograde of personnel (casualty evacuation, personnel movement, and human remains).

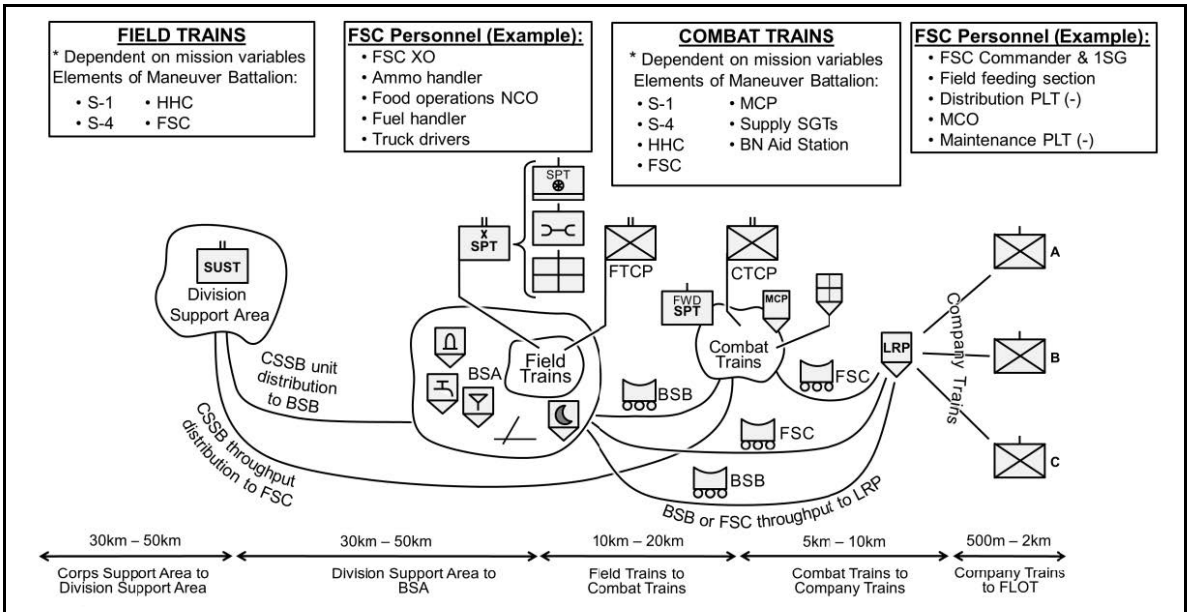
BUILDING THE SUSTAINMENT OVERLAY AND MATRIX

6-51. The sustainment overlay is a graphic representation of the tactical array of support areas and units. Ideally, it accompanies copies of the OPLAN and/or OPORD that are distributed to the platoons and companies and is used as a graphic backdrop for OPORD paragraph 4, concept of sustainment. The BEB S-4 usually produces this product and the FSC continuously updates it.

6-52. The sustainment overlay should include (at a minimum)—

- Locations of current and proposed support areas, the BSA, and sustainment units.
- Boundaries for sustainment responsibilities.
- MSRs/ASRs.
- Locations of headquarters, BSBs, and forward support companies.
- Locations of sustainment installations and units (forward area rearm/refuel points, shadow platoon airfields).
- Locations of critical resources (potable water, maintenance collection facilities, casualty collection points, or ambulance exchange points).

6-53. An oral concept-of-sustainment briefing allows the commander and his subordinates to visualize how the operation is sustained. The sustainment planner's oral briefing, using the sustainment overlay, is useful in communicating the concept of sustainment to the commander and clarifying issues, problems, and concerns. A completed sustainment matrix can easily support the development of paragraph 4a in the OPLAN/OPORD, which makes complex sustainment support actions and key events easier to understand. See figure 6-1 for an example of a concept-of-support sketch.



Legend:

1SG	first sergeant	LRP	logistics release point
BN	battalion	m	meter
BSA	brigade support area	MCO	maintenance collection officer
BSB	brigade support battalion	MCP	maintenance collection point
CSSB	combat sustainment support battalion	NCO	noncommissioned officer
CTCP	combat trains command post	PLT	platoon
FLOT	forward line of own troops	S-1	battalion personnel staff officer
FSC	forward support company	S-4	battalion logistics staff officer
FTCP	field trains command post	SGT	sergeant
FWD	forward	SPT	support
HHC	headquarters and headquarters company	sust	sustainment
km	kilometer	XO	executive officer

Figure 6-1. BCT notional concept of support

6-54. Sustainment rehearsals synchronize supply flow and the command and support relationships needed to support each assigned mission. Changes identified in the rehearsal must be captured and distributed in the OPORD or a FRAGORD through digital and analog communication. The list below outlines what is necessary to conduct a sustainment rehearsal, which usually follows the command/maneuver rehearsal.

- Attendees.
- Equipment that includes a logistics execution matrix and unit sustainment graphics.
- A specific time and place. This rehearsal can also be accomplished by radio.
- The BCT S-2, who briefs the intelligence and environmental situation.
- The BCT S-4 or S-3, who briefs the friendly maneuver plan and critical decision points.
- The BSB support operations officer, who briefs the sustainment plan and concept of sustainment.
- A briefing from each unit about their sustainment status by the phase of the operation.
  - Summarizing Class III and V supplies, casualties, and damaged/destroyed vehicles.
  - Describing the unit and logistics locations and actions by phase.
- A BCT or BSB medical brief.
- A dissemination of key changes into the FRAGORD or other OPORD product.

INTEGRATION INTO THE LOCAL SUSTAINMENT ENTERPRISE

6-55. Echeloning support within the BCT is a carefully planned and executed process. The choice of method employed to echelon support is a deliberate, collaborative decision based upon a thorough mission analysis

within the MDMP. During this analysis, there must be an understanding of the capabilities of each support organization within and supporting the BCT at all levels. Commanders must understand that echeloned support will vary by BCT and each battalion or squadron. As the primary sustainment organization of the BCT, the BSB organization facilitates echeloned support. Common echelon of support at the lowest level of sustainment is executed at the battalion, squadron, company, battery, and troop echelons. BCT echelon-specific-sustainment Army techniques publications address the methods with which each tactical echelon employs its echeloning of support.

6-56. The sustainment enterprise may need to rely on other Department of Defense Services. There is a joint interdependence among Services to provide capabilities to maximize the complementary and reinforcing effects of joint forces supporting each other. As part of joint interdependence, the Army plays a crucial role in opening and setting the theater. Setting the theater is a continuous shaping activity conducted as part of steady-state posture and for contingency or crisis response operations. Setting the theater describes the broad range of actions undertaken to establish the conditions to execute strategic plans in an operational area. It includes whole-of-government initiatives such as bilateral or multilateral diplomatic agreements that allow U.S. forces to have access to ports, terminals, airfields, and bases within the area of responsibility to support future military contingency operations.

6-57. Engineer leaders and logisticians in the FSC must be aware of regional or local agencies that can contribute, enhance, or fill roles to accomplish any mission assigned. These agencies and functions include sustainment units (outlined below) and contracting units. Echelon-specific sustainment ATPs address the methods with which each tactical echelon employs its echeloning of support.

ARMY FIELD SUPPORT BATTALIONS

6-58. Army field support battalions provide material-readiness-focused support, including the coordination of acquisition logistics and technology actions with Army operational forces. Army field support battalions serve as the Army service component link between the generating force and the operational force. These units provide material readiness that may otherwise not exist in BCTs. Army field support battalions synchronize contracted support for acquisition, logistics, and technology systems with sustainment maintenance support for senior sustainment commands in-theater.

SUSTAINMENT BRIGADE

6-59. When deployed, the sustainment brigade is subordinate to the theater support components or the expeditionary support command. The sustainment brigade is a flexible, multifunctional sustainment organization, tailored and task-organized according to METT-TC. It plans, prepares, executes, and assesses sustainment operations within an AO. It provides C2 of sustainment operations and distribution management.

COMBAT SUSTAINMENT SUPPORT BATTALIONS

6-60. The combat sustainment support battalion is a flexible and responsive unit that executes logistics, including transportation, maintenance, ammunition, supply, mortuary affairs, airdrop, field services, water, and petroleum support throughout the depth of an AO. Combat sustainment support battalions are building blocks attached to sustainment brigades. Each level of capacity and type of unit is different for each mission and theater. Engineer leaders must understand where each skill or capability can be provided, levels of command and support relationships, and reporting and requesting procedures. Combat sustainment support battalions may operate remotely from the sustainment brigade and, therefore, must maintain communications with their sustainment brigades and supported units.

BRIGADE SUPPORT BATTALION

6-61. The BSB is the organic sustainment unit of the BCT. (See chapter 4.) The BSB plans, prepares, executes, and assesses replenishment operations to support brigade operations. The BSB ensures that the BCT can conduct self-sustained operations. The six forward support companies provide each battalion and squadron commander within the BCT with dedicated logistic assets (except for Class IV [medical supplies]), that meet the supported unit. The BSB also has an assigned distribution company, a field maintenance company, and a Role 2 medical company. The Role 2 medical company provides Army Health System

(health service support and force health protection) and Class VIII support. The BSBs within the SBCT and the ABCT provide the same function and have the same general configuration as the BSB within the IBCT, with the most significant differences in the maintenance capabilities. (Refer to ATP 4-90 for additional information.)

AVIATION SUPPORT BATTALION

6-62. Aviation support battalions are the support battalions for combat aviation brigades, expeditionary combat aviation brigades, and theater aviation brigades. See FM 3-04 for additional information. The aviation support battalion differs from the BSB in that—

- The brigade medical support company becomes a medical company air ambulance in the general support aviation battalion in the same brigade. The company has significantly less medical capability than a typical brigade medical support company.
- The forward support companies are distributed to helicopter battalions in the brigade.
- A signal company is added (similar to a maneuver enhancement brigade).

OPERATIONAL CONTRACT SUPPORT

6-63. Operational contract support is the integration of commercial sector support into military operations. Operational contract support consists of two complementary functions: contract support integration and contractor management. See ATP 4-10 for a full discussion on operational contract support. There are three types of operational contract support:

- Theater support contracts.
- External support contracts. These are the logistics civil augmentation programs.
- System support contracts (such as vehicle warranty and maintenance support).

SIGNAL COMPANY MAINTENANCE CONSIDERATIONS

6-64. Most signal equipment consists of either life cycle-managed items or nonstandard, commercial, off-the-shelf equipment. For deployed BCTs, field maintenance takes place at or near the point of use. Equipment operators, operator maintainers, and ordnance-trained maintainers perform field maintenance on or near the system. The owning unit retains the equipment or receives it back from the maintenance support facility when repairs are completed. Army maintenance units also provide field maintenance support.

6-65. The network management technician and electronic systems maintenance warrant officer, possibly on the G-6 staff, handle requests for external support of C2 information systems, tactical network systems, and tactical radios. This ensures centralized reporting and readiness efforts from the U.S. Army Communications-Electronics Command, the brigade logistics support team, the regional support center, and contract field service representatives.

6-66. The S-6, in coordination with the logistics staff, communications-electronics maintenance facility, and the FSC commander, develops a comprehensive maintenance plan that supports operations. The maintenance plan includes the complete process, from preventive maintenance checks and service, fault identification, failed component removal and replacement procedures, and evacuation of equipment to communications-electronics support, if required. The maintenance plan becomes part of the unit maintenance SOP. This establishes responsibilities and procedures to preserve battalion maintenance readiness.

6-67. The brigade S-6 maintains and monitors the status of the brigade portion of the Department of Defense Information Network–Army. The S-6 works closely with the brigade signal company commander, BEB staff, and the executive officer to ensure that critical network maintenance and parts are available to support operations.

6-68. Maintenance managers should add pacing items and critical communications systems to combat power reports to increase awareness of their mission criticality beyond the signal community. These reporting efforts and the increased emphasis drive maintenance priorities and enhance maintenance readiness. The brigade S-6 must clearly state the requirements for WIN-T spares and onboard spares to support maintenance demands.

6-69. The brigade signal company tracks network performance and maintenance issues in collaboration with the brigade S-6. Signal operator-maintainers perform field maintenance on the brigade organic signal equipment. The signal company executive officer coordinates training and maintenance support for organic equipment and maintains logistical and maintenance oversight. Considerations include—

- Attached enablers with no organic signal maintenance capability.
- Spares management and accountability for signal platforms and C2 systems.
- Physical security and mobility of spares storage.
- Environmental and weather impacts affecting spares.

MILITARY INTELLIGENCE COMPANY MAINTENANCE CONSIDERATIONS

6-70. MICOs have unique maintenance and expendable supply requirements. The MICO contains a unique set of low-density intelligence capabilities. These capabilities include intelligence, analytical processing, exploitation, dissemination systems, and terrestrial and aerial-based intelligence systems.

6-71. The MICO also has an organic Intelligence Systems Integration/Maintenance Section. The Systems Integration Section directs support maintenance of military intelligence systems. Intelligence systems integrators/maintainers execute the support mission. Their responsibilities include supporting intelligence systems and integrating access to classified networks used by military intelligence Soldiers in the MICO and the brigade S-2.

6-72. The Intelligence Systems Integration/Maintenance Section establishes and maintains liaison support with the brigade S-2, S-3, S-4, S-6, and CECOM personnel to support intelligence operations. The Intelligence Systems Integration/Maintenance Section integrates intelligence systems and coordinates architecture to support intelligence operations. This includes the coordination of physical space, power, and environmental requirements.

6-73. The systems integration section utilizes the Global C2 System–Army to report equipment readiness and maintain a fully supported shop stock. The automated logistical sergeant tracks, reports, ships, and receives parts that support military intelligence systems.

6-74. The intelligence systems maintenance technician serves as the officer in charge of the Intelligence Systems Integration/Maintenance Section and works directly with battalion and brigade staff, communications electronic command support elements, and other staff elements for maintenance support and military intelligence systems integration. The officer in charge supports the MICO commander in developing a comprehensive maintenance plan that supports operations. The maintenance plan includes the complete process of preventive maintenance checks and services, fault identification, component removal and replacement procedures, and equipment evacuation to higher-level maintenance support, if required. The maintenance plan becomes part of the unit maintenance SOP. This establishes responsibilities and procedures to preserve the organizational maintenance readiness of military intelligence systems.

Glossary

The glossary lists acronyms and terms with Army or joint definitions. Where Army and joint definitions differ, (Army) precedes the definition. Terms and acronyms for which ATP 3-34.22 is the proponent are marked with an asterisk (*). The proponent publication for other terms is listed in parentheses after the definition.

SECTION I—ACRONYMS AND ABBREVIATIONS

ABCT	armored brigade combat team
ABE	assistant brigade engineer
ADA	air defense artillery
ADP	Army doctrine publication
AO	area of operations
ATP	Army techniques publication
BCT	brigade combat team
BEB	brigade engineer battalion
BSB	brigade support battalion
C2	command and control
CA	civil affairs
CBRN	chemical, biological, radiological, and nuclear
COA	course of action
COP	common operational picture
CP	command post
CSR	controlled supply rates
DA	Department of the Army
DD	Department of Defense form
DOD	Department of Defense
DSCA	defense support of civil authorities
EAB	echelons above brigade
EOCA	explosive ordnance clearance agent
EOD	explosive ordnance disposal
EP	engineer publication
FM	field manual
FRAGORD	fragmentary order
FSC	forward support company
HHC	headquarters and headquarters company
IBCT	infantry brigade combat team
IPB	intelligence preparation of the battlefield
JP	joint publication

LNO	liaison officer
LOC	lines of communication
LSCO	large-scale combat operations
MCWP	Marine Corps warfighting publication
MDMP	military decisionmaking process
METT-TC	mission, enemy, terrain and weather, troops and support available, time available, civil considerations [mission variables]
MICLIC	mine-clearing line charges
MICO	military intelligence company
MSR	main supply route
MTF	medical treatment facility
NCO	noncommissioned officer
NTTP	Navy tactics, techniques, and procedures
OE	operational environment
OPLAN	operation plan
OPORD	operation order
PSYOP	psychological operations
RAAM	remote anti-armor mine
RSR	required supply route
S-1	battalion or brigade personnel staff officer
S-2	battalion or brigade intelligence staff officer
S-3	battalion or brigade operations staff officer
S-4	battalion or brigade logistics staff officer
S-6	battalion or brigade signal staff officer
SBCT	Stryker brigade combat team
SOP	standard operating procedure
SWEAT-MSO	sewer, water, electricity, academics, trash, medical, safety, and other
TOC	tactical operation center
TUAS	tactical unmanned aircraft system
UAS	unmanned aircraft system
U.S.	United States
USACE	United States Army Corps of Engineers
WIN-T	warfighter information network-tactical

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Index

Entries are by paragraph number.

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ATP 3-34.22
14 April 2021

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JAMES C. MCCONVILLE
General, United States Army
Chief of Staff

Official:

KATHLEEN S. MILLER
Administrative Assistant
to the Secretary of the Army
2109800

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