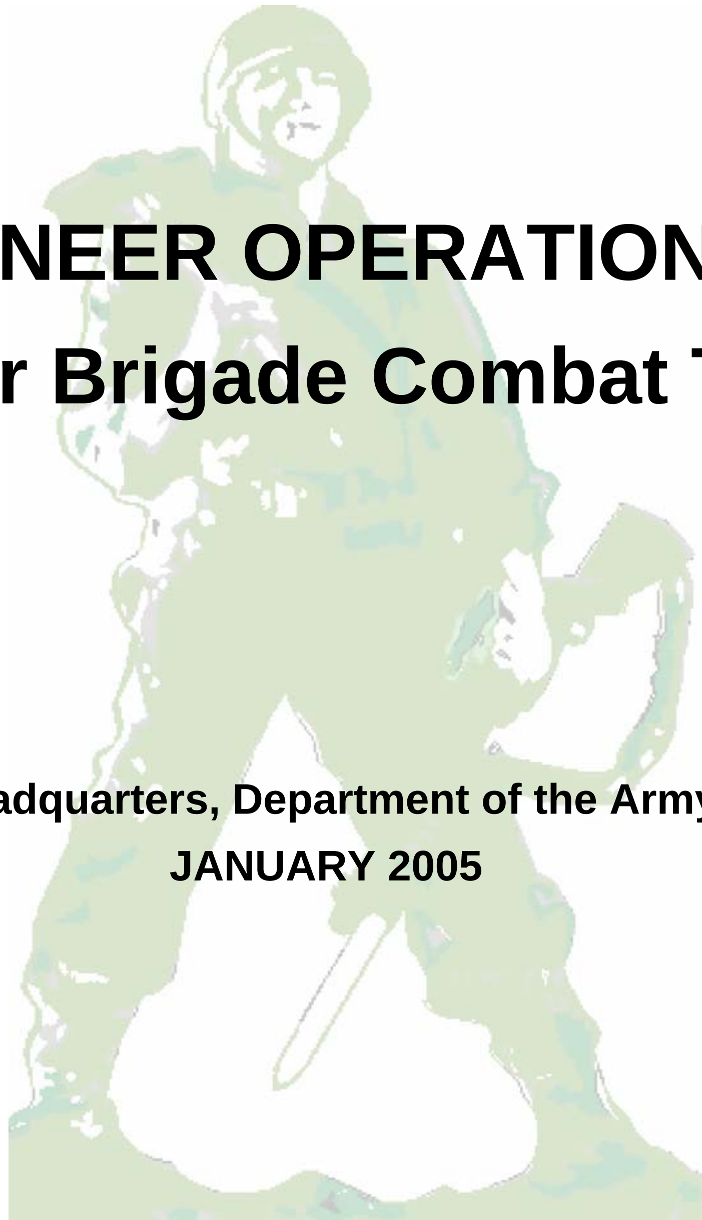
FM 3-34.221



ENGINEER OPERATIONS—
Stryker Brigade Combat Team

Headquarters, Department of the Army

JANUARY 2005

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Field Manual
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Headquarters
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Preface

Field Manual (FM) 3-34.221 supports engineer operations within and in support of the Stryker brigade combat team (SBCT). It is a guide for commanders and staffs within the brigade, the organic engineer company, and the engineer elements that augment or support the SBCT. Engineers perform critical battlefield functions and operate as key members of the combined arms team. As with all arms, engineers are integrated into the scheme of maneuver and massed at critical points during battles and operations.

This manual is built directly on the concepts of *FMs 3-0, 3-07, 3-21.31, 3-34,* and *3-90*. Given the magnitude of doctrinal changes in recent years, familiarity with these documents is necessary. *FM 3-90* primarily provides a framework for integrating combat engineering functions, but it is also applicable for many of the associated geospatial and general engineering functions as they apply to tactics. *FM 3-34.221* should be read in conjunction with—

- *FM 3-0.*
- *FM 3-06.11.*
- *FM 3-07.*
- *FM 3-21.21.*
- *FM 3-21.31.*
- *FM 3-34.*
- *FM 3-34.2.*
- *FM 3-34.230.*
- *FM 3-90.*
- *FM 3-100.4.*
- *FM 5-7-30.*
- *FM 5-71-2.*
- *FM 5-71-3.*
- *FM 5-103.*
- *FM 5-104.*
- *FM 5-170.*
- *FM 6-0.*
- *FM 7-0.*
- *FM 20-32.*
- *FM 90-7.*
- *FM 90-13.*
- *FM 101-5.*
- *Joint Publication (JP) 2-03.*
- *JP 3-34.*

In addition to being a guide for engineer commanders and staffs, *FM 3-34.221* also helps other commanders and staffs within the SBCT understand the engineer mission. It describes how to employ and integrate engineers during operations and furnishes the authoritative foundation for SBCT engineer doctrine and terminology, force design, materiel acquisition, professional education, and individual and unit training.

This manual builds on the collective knowledge and wisdom gained through recent operations, numerous exercises, and the deliberate process of informed reasoning throughout the Army. It is rooted in time-tested principles and fundamentals, while embracing new technology and acknowledging diverse threats to national security.

A metric conversion chart is provided in *Appendix A*.

The proponent for this publication is HQ TRADOC. Send comments and recommended changes on *Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms)* directly to Commandant, US Army Engineer School, ATTN: ATSE-DOT-DD, Directorate of Training, 320 MANSCEN Loop, Suite 336, Fort Leonard Wood, MO 64573-8929.

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

Chapter 1

Operational Environment and Engineer Company Operations

The SBCT is designed to optimize its organizational effectiveness by balancing the traditional domains of lethality, mobility, and survivability with responsiveness, deployability, sustainability, and a reduced in-theater footprint. The SBCT is nontraditional with respect to design, the deployment process, and the manner of employment. Its two core qualities are high mobility (strategic, operational, and tactical) and the ability to achieve decisive action through dismounted infantry assault. The major fighting components are its motorized infantry battalions and a unique organic reconnaissance, surveillance, and target acquisition (RSTA) cavalry squadron to facilitate situational understanding (SU) and enhance the common operational picture (COP). Assured mobility is critical to the success of the SBCT and for optimizing its design and mission profile.

STRYKER BRIGADE COMBAT TEAM

1-1. The SBCT is a full-spectrum combat force. It has utility in all operational environments against all projected future threats. However, it is designed and optimized primarily for smaller-scale contingency (SSC) operations in complex and urban terrain, confronting low-end and midrange threats that may employ conventional and asymmetric capabilities. Likely operational environments include urban and complex terrain, a weak transportation and logistics infrastructure, an uncertain political situation, coalition involvement, and the presence of an asymmetric threat that includes mostly mid- but some high-end technologies. The SBCT deploys very rapidly, executes entry operations, and conducts effective combat operations immediately on arrival to prevent, contain, stabilize, or resolve a conflict through shaping and decisive operations. The SBCT participates in major theater wars (MTWs) with augmentation. This may be as a subordinate maneuver component within a division or corps that performs in a variety of possible roles. The brigade also participates in peacetime military engagements (PMEs) as an initial-entry force and as a guarantor to provide security for stability forces through its extensive combat capabilities.

OPERATIONAL CONCEPT

1-2. The integration of information technology is launching the Army into the 21st century. Operations Desert Storm, Just Cause, and Joint Endeavor opened a visionary window on the capabilities that information can provide. The future battlefield, with integrated technology, has a larger battlespace and moves at a higher tempo. It has increased lethality through precision munitions, the massing of effects versus the massing of forces, and most importantly, the increased ability to visualize the entire battlespace. Army Battle Command System (ABCS) technology and command and control (C2) systems integrate functional elements to plan, prepare, and execute a full range of operations in nearly any environment. This integration ultimately provides a secure, vigorous, and survivable communications network for voice, data, and video. Information operations give leaders the relevant friendly information and enemy intelligence, including weather and terrain data. Relevant information and intelligence help build the COP for the commander and the brigade combat team, providing a basis for battlefield visualization and situational awareness (SA).

ASSURED MOBILITY

1-3. Assured mobility encompasses those actions that enable a force commander to deploy, move, and maneuver where and when he desires, without interruption or delay, to achieve the mission. The imperatives and fundamentals of assured mobility allow friendly forces to exploit superior SU and, therefore, gain unsurpassed freedom of movement. Put simply, this framework describes the processes that enable the commander to *see first, understand first, act first, and finish (win) decisively*.

Imperatives

1-4. Assured mobility supports the maneuver commander's use of the elements of combat power to achieve decisive, shaping, and sustaining operations across the full spectrum of operations and conflict. The framework of assured mobility entails four proactive imperatives that ensure mobility only if integrated into the military decision-making process (MDMP).

1-5. **Develop Mobility Input to the Common Operational Picture.** This imperative is collecting and integrating geospatial, cultural, and enemy information (aided by automated mobility planning tools) to establish the mobility COP for the entire area of operations (AO). This information allows quick development of the initial and follow-on, real-time modified combined-obstacle overlay (MCOO) that enables the maneuver commander to select the focused operating areas within the AO that best provide positions of advantage. The operating areas are smaller areas designated within the AO that allow the commander to focus collection assets and efforts. The MCOO is defined by the desired end state and is updated with new information to reflect real-time mobility aspects. This imperative is absolutely critical and must be linked to intelligence, surveillance, and reconnaissance (ISR) operations.

1-6. Knowing existing obstacles and monitoring existing traffic patterns are two things that allow us to see the battlefield in near real time. Where obstacles **are** is just as important as where they **are not**. This information allows the maneuver commander to determine where he may maneuver, what resources will be required to get there, and how the enemy may attempt to influence the maneuver plan. The mobility COP enables the maneuver commander to identify the operating areas in the AO and the associated mobility challenges. Linked with ISR operations, this imperative continuously updates the commander and leaders with real-time mobility visualization. It also links the information element to the leadership element to provide SU.

1-7. **Establish and Maintain Operating Areas.** This imperative is identifying the threat, the restrictive terrain, and the location of countermobility efforts. It is the linkage between *seeing first* and *understanding first*. With the aid of automated tools, critical mobility choke points within operating areas are identified and a shaping plan is developed. This plan includes predicting enemy actions and intents and projecting required sensor coverage to fill any information voids within the operating areas. Battlespace terrain reasoning and awareness (BTRA) allow the templating of potential obstacles and locations where the enemy might place obstacles. Sensors dedicated within the collection plan are employed or focused from other assets on the critical areas to fill the information voids or improve SU and maintain the mobility COP. The system allows the commander to track existing obstacles and catalog threat patterns to facilitate predictive analysis of what the threat may do to terrain to impede friendly maneuver.

1-8. To solidify the mobility COP, sensors are employed at critical areas to protect them from enemy influence. In coordination with these sensors, conducting standoff attacks on selected enemy capabilities to perform mine or countermine activities (or deceiving the enemy to focus his attention on other areas) will fix the current mobility SU. Sensors and forces may be emplaced at choke points, such as bridges, to counter enemy attempts to disrupt the SBCT. Being able to control and monitor critical mobility areas is key to coordinating a mobility plan in conjunction with the scheme of maneuver. Simply put, *sensor staring* enables the force to *own* the operating areas. By identifying the locations that may impede movement, the lead element can resource where it wants to maneuver to avoid or neutralize these impediments while protecting the force and minimizing risks. This imperative supports the elements of protection and maneuver.

1-9. **Negate the Influence of Impediments on Operating Areas.** This imperative is accomplished by interdicting threat countermobility efforts and providing the maneuver commander with multiple avenue options. It is a proactive means of employing standoff detection and obstacle neutralization systems to maintain mobility within the operating areas and assist with ensuring the freedom of maneuver. The focus is on shaping noncontiguous operating areas for decisive operations. The engineer coordinator must integrate into the targeting process and link ISR systems to target caches and the movement of potential obstacles.

1-10. Standoff detection of obstacles and standoff neutralization (where necessary) or attacking obstacles in coordination with the maneuver plan is critical to preserve resources. This is a proactive attack of threat ability to employ obstacles. Negating enemy ability to shape the battlefield against us is a key enabler for mobility. Current sensor systems and future intelligent munitions and antipersonnel land mine alternatives (APLAs) will be used to attack the threat proactively.

1-11. **Maintain Mobility and Momentum.** This imperative is accomplished by using each of the engineer battlespace functions to support firepower and maneuver. The first three imperatives are command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR)-intensive. This imperative considers that the threat is thinking and will adapt to our operations. The purpose of this imperative is to allow maneuver forces to neutralize the effects of obstacles in the context of their maneuver. Their goal is the freedom of maneuver to seize objectives without delay along multiple and parallel routes. Detecting obstacles (including side-attack and wide-area mines) and neutralizing their effects without allowing them to adversely affect the maneuver plan or the momentum of the maneuver force are critical. As a last resort, an organic breaching capability exists to overcome enemy obstacles that may be encountered when it is necessary for the force to cross through the obstacles. Marking systems that provide visual, virtual, and active identification of obstacles and cleared and safe areas are required.

1-12. In addition to supporting the assaulting force, maintaining mobility and momentum is an important role to ensure that the force can be supported. This includes maintaining and operating routes for pulse logistics as well as forward landing areas for air resupply. Engineers must be able to neutralize the effects of obstacles without disrupting the maneuver momentum in one of four ways—detect and avoid, detect and destroy from standoff, detect and breach, or withstand the effects. Field force engineering (FFE) is used as an enabler for engineer battlespace functions to support assured mobility and the elements of combat power. (See *FM 3-34* for more information.)

1-13. When integrating new capabilities within the imperatives, engineers provide a combined arms proactive approach to mobility and use information to maximize avoidance without committing to threat massed effects. Engineers support maneuver dispersed on multiple parallel routes and provide computing power used to identify numerous routes to the objective. They focus on attacking or neutralizing individual mines that limit our mobility instead of reducing lanes in minefields.

Fundamentals

1-14. The six fundamentals of assured mobility are—

- **Predict.** Predict actions and circumstances that could affect the ability of the force to maintain momentum.
- **Detect.** Use ISR assets to detect early indicators of impediments to battlefield mobility and to identify solutions.
- **Prevent.** Act early to prevent potential impediments to maneuver from affecting the battlefield mobility of the force.
- **Avoid.** Detect impediments, identify alternatives, and avoid detected impediments to battlefield mobility of the force if prevention fails.
- **Neutralize.** Neutralize, reduce, or overcome (breach) impediments to battlefield mobility that cannot be prevented or avoided. The breaching tenets and fundamentals apply when forced to neutralize an obstacle.
- **Protect.** Protect against enemy countermobility effects.

1-15. These fundamentals are part of the full spectrum of operations that follow a continuous cycle of planning, preparing, and executing engineer operations that support decisive, shaping, and sustaining operations. Achieving assured mobility rests on the application of the fundamentals. In essence, they describe actions that sustain friendly maneuver and preclude enemy maneuver. They depend on superior SU, shared knowledge, and decisive execution.

1-16. The most critical aspect of this framework is the linkage between the fundamentals. For instance, the linkage between predict and prevent, detect and prevent, detect and avoid, and detect and neutralize is essential for success. The failure of any of these linkages diminishes the commander's ability to achieve decisive results. (*Figure 1-1* highlights the key aspects linked to assured mobility.)

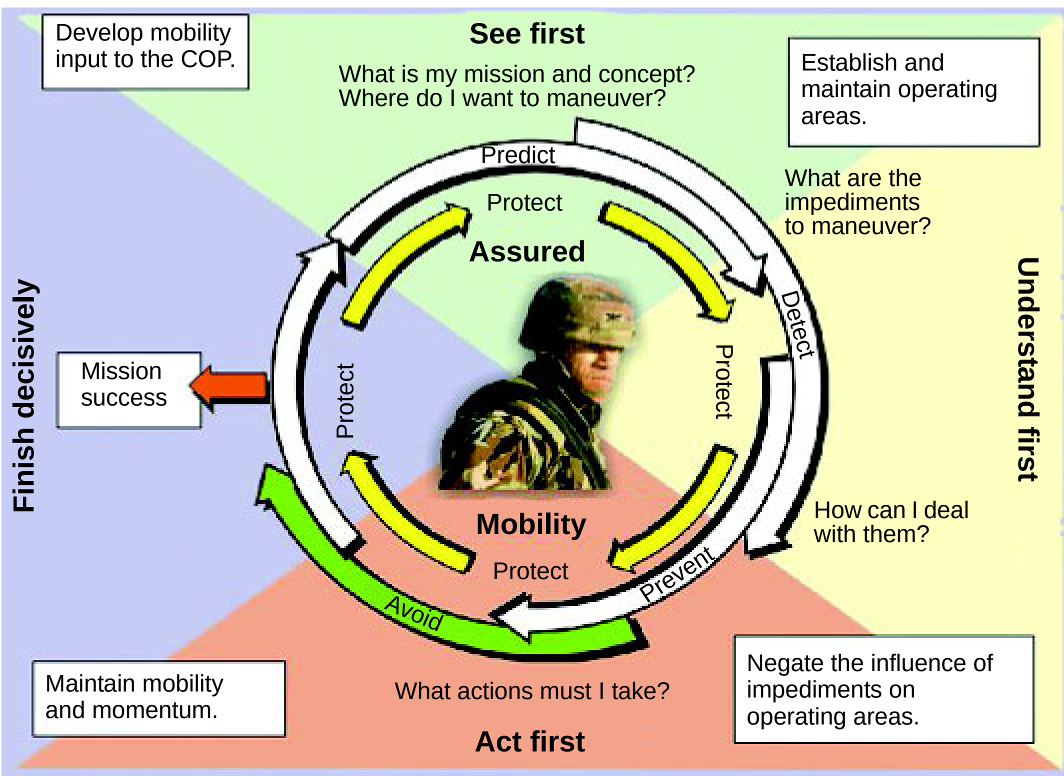


Figure 1-1. Assured Mobility and the Engineer Fundamentals

ARMY FORCE XXI BATTLEFIELD

1-17. The SBCT operates in an AO that is much more multidimensional than it has been in the past. In addition to the classical parameters of depth, width, height, and time, the SBCT must dominate the electromagnetic spectrum to ensure uninterrupted information flow and to degrade and deny that same data flow to its adversaries. Political, economical, legal, social, and cultural aspects of the battlespace environment must be accounted for more completely and at lower levels than in previous eras, particularly when confronting a nontraditional, asymmetric enemy.

Linear and Nonlinear Framework

1-18. While retaining the ability to operate linearly, the SBCT uses advances in information and mobility capabilities to operate routinely in a nonlinear manner. Depending on the nature and evolution of the contingency, conditions may require the SBCT to operate in a continuum of linear, contiguous operations or to conduct nonlinear operations. Tactical actions may be separated spatially, but focused with respect to timing and purpose against key enemy capabilities and assets.

Precision Effects

1-19. The SBCT ISR capabilities enable the brigade to identify and focus on enemy centers of gravity, decisive points, and key capabilities. Given that orientation, the brigade executes operations to achieve precise effects (lethal and nonlethal) against key enemy capabilities and resources to rapidly break down enemy will and his defensive and offensive schemes. Against an asymmetric adversary, precision includes the capability to rapidly identify the best means of influencing enemy behavior and synchronizing military and nonmilitary elements of power to achieve the desired effect(s) against the enemy force. The organic terrain team is a brigade enabler in achieving precision by integrating the geospatial products it can provide the SBCT.

Simultaneous Operations

1-20. Army Force XXI (FXXI) concepts call for simultaneous attacks of critical targets throughout the AO, synchronizing all fires with exploitative maneuver. An enhanced COP and outstanding tactical mobility (synchronized through digitization and organizational agility) provide the means for the SBCT to conduct synchronized, simultaneous combined arms attacks throughout its AO. The SBCT also executes the less demanding requirements of a deliberately sequenced campaign. Against a nontraditional enemy, simultaneous operations include the concurrent application of military force with other nonmilitary elements of power to achieve the desired effects. The nature of SSCs often demands that the SBCT conduct combat operations simultaneously with the execution of stability, support, and sustainment tasks—including population and area control, support to humanitarian operations, and peace enforcement.

Battlefield Organization

1-21. As part of the MDMP, commanders visualize their battlespace and determine how to arrange their forces. The battlefield organization is the allocation of forces in the AO by purpose. It consists of three all-encompassing categories or operations—decisive, shaping, and sustaining. The purpose unifies all elements of the battlefield organization by providing a common focus for all actions. Commanders organize forces according to purpose by determining whether each unit operation will be decisive, shaping, or sustaining. These decisions form the basis of the concept of operations. When circumstances require spatial reference, commanders describe the AO in terms of deep, close, and rear areas. These spatial categories are especially useful in operations that are generally contiguous and linear and feature a clearly defined enemy force.

1-22. **Decisive Operations.** Decisive operations are those that directly accomplish the task assigned by the higher headquarters. They conclusively determine the outcome of major operations, battles, and engagements. Successful decisive operations against symmetric adversaries in the foreseeable future still require Army forces (ARFORs) to defeat or destroy enemy forces. Decisive operations primarily depend on the simultaneous, synchronized delivery of precision fires and effects, coupled with exploitative maneuver that leaves the enemy incapable of physical or moral resistance. When employed within its optimal SSC environment, SBCT shaping operations can transition quickly to decisive operations without reinforcement by follow-on forces. The SBCT is best applied against decisive points and in urban and complex terrain, where it exploits its core capabilities for close combat and dismounted assault.

1-23. **Shaping Operations.** Shaping operations create and preserve conditions for the success of decisive operations. Responding to an SSC, the SBCT may conduct shaping operations before decisive operations through early deployment, manifest presence (movement to within employment range), information operations, and other activities intended to influence enemy will and assessment of his chance for success. Once combat is joined, shaping operations occur concurrently with decisive operations. Together, shaping and decisive operations overwhelm the enemy center of gravity and deprive him of the ability and will to fight.

1-24. With respect to a traditional, symmetric enemy, SBCT capabilities for entry operations and exploitation of joint effects coordinated through the ARFOR commander shape the battlespace at the operational and tactical levels. The SBCT can conduct feints, demonstrations, offensive information operations, extended reconnaissance, and integrated maneuver and shaping fires to place the enemy at a disadvantage. It can isolate, neutralize, or destroy critical C4ISR and logistics elements of the enemy force, deny the enemy use of key terrain or resources, and prevent the enemy from achieving initial objectives or setting conditions favorable to its plans. In short, SBCT shaping operations degrade or destroy key enemy capabilities, posture the enemy for failure, set conditions for success, and shorten the timeline for successful decisive operations.

1-25. When dealing with a nonconforming, asymmetric adversary, SBCT shaping operations assume a broader nature for a variety of reasons. In many situations, military capabilities are not the primary vulnerability or means of influencing the asymmetric adversary. As a result, the traditional approach of employing lethal and nonlethal effects to degrade and destroy specific enemy capabilities is not sufficient to shape the battlespace and affect enemy will. A more holistic approach is required. Other measures and activities encompassing all elements of national power—diplomatic, economic, social, political, and information (media, public affairs)—must be fully synchronized with all military operations.

1-26. In addition to the COP, SU demands a comprehensive understanding of international, regional, and local issues and factors that are likely to affect friendly and enemy actions. This understanding must also reflect extraordinary insight into the nature of the nontraditional adversary—enemy objectives, options for actions, inclinations, and vulnerabilities—to determine the best means of altering enemy attitudes and influencing enemy will. In effect, the SBCT implements a rapid cycle of decision, action, assessment, and adjustment to identify what does and does not work, enabling the command to optimize and intensify the effects of its multidimensional shaping operations against an asymmetric enemy.

1-27. **Sustaining Operations.** The purpose of sustaining operations is to generate and maintain combat power. Sustaining operations are operations at any echelon that enable shaping and decisive operations by providing combat service support (CSS), rear-area and base security, movement control, terrain management, and infrastructure development. The organic engineer capability within the SBCT is primarily focused on supporting decisive and shaping operations. While there are limited organic assets available to commit to sustaining operations, it is likely that most of the engineer support for sustaining operations within the SBCT will come from augmenting engineer assets.

OPERATIONAL ENVIRONMENT

1-28. Operationally, the SBCT normally fights under a division or corps headquarters acting as the ARFOR command, joint-forces land component command (JFLCC), or joint task force (JTF) headquarters within a joint- or combined-forces command. In many contingencies, the SBCT may initially be the single United States (US) maneuver command operating under the ARFOR or JFLCC, although other coalition elements may be present. The SBCT depends on reach to expand its capabilities in the areas of information, intelligence, joint effects, force protection, and sustainment. The SBCT is also fully complementary to and compatible with air expeditionary forces and United States Marine Corps (USMC) forces.

1-29. As a full-spectrum combat force, the SBCT typically maintains an offensive orientation. However, depending on the nature and evolution of the contingency, the SBCT is capable of conducting offensive, defensive, stability, and support operations. Its core capability rests on excellent operational and tactical mobility, an enhanced COP, SU, combined arms integration down to company level, and an enhanced dismount capability for close combat in urban and complex terrain. Properly integrated, these core capabilities compensate for platform limitations that may exist in the close fight and lead to enhanced force effectiveness. When employed in the operational environment for which it is optimized, the SBCT can achieve operational success as a result of its entry, shaping, and decisive operations.

Threat

1-30. Worldwide challenges focus a US national security strategy of engagement that contributes to global stability and prosperity in the 21st century. The rapid emergence of regional instabilities and transnational issues (such as terrorism, rogue states seeking power and resources, proliferation of weapons of mass destruction, natural disasters, and belligerent actions between state and nonstate actors) signal a less predictable and more diverse world. As a result of global concerns and the national military strategy, the Army is transforming itself into a force for shaping the strategic environment and responding to crisis, while simultaneously preparing for future threats.

1-31. A visible force of trained and ready professional soldiers, leaders, and units spotlights a credible means of demonstrating US ability and resolve to defend its policies and vital interests. Today, the Army maintains a full-spectrum force that is capabilities-based, trained, and ready to support increasing operational deployments with a wide variety of missions and contingencies. Recent worldwide experiences confirm that the Army must have the ability to act quickly and decisively. Joint warfare with land forces is at the core of the joint war-fighting capability from humanitarian assistance to high-end conflict. Additionally, military operations across the spectrum of conflict often include multinational, interagency, and numerous private and nongovernmental organizations (NGOs).

1-32. One of the most dangerous threats the 21st century leader faces comes from an armed force of an industrialized or developing nation that seeks to combat US forces using asymmetric means. This threat may include tangible efforts in information warfare. The realities of changing threats, complex environments, and increased requirements with fewer resources create an operational environment where conditions are replete with crisis, change, and instability.

Asymmetric Adversary

1-33. Asymmetric warfare focuses the comparative advantages of one side against the relative vulnerabilities or weaknesses of the other side. A defining and distinguishing aim of asymmetric warfare is to create conditions in which enemy relative advantage cannot be applied, is degraded, or is neutralized. Elements of asymmetric warfare incorporate strategy, tactics, organizations, end states, forces, international and regional situational knowledge and understanding, geography, sociological demographics, and national will.

1-34. For the asymmetric adversary, decisive operations are those operations that compel the enemy to cease resistance and agree to seek conflict resolution through a negotiated settlement. In this context, decisive operations extend further in time (for example, beyond a cease-fire) to include the postconflict stability operations required to ensure that negotiations and implemented political solutions take place in a controlled environment and lead to long-term stability. For the SBCT, decisive operations against an asymmetric adversary are characterized by integrated, multidimensional activities of similar scope and quality to shaping operations.

ENGINEER COMPANY

1-35. The SBCT engineer company rapidly deploys and, on order, provides combat (mobility, limited countermobility, and survivability), general (primarily sustainment), and imbedded geospatial engineering support to the

SBCT. Engineers integrate other engineer forces to augment and enhance the capabilities of the SBCT.

CAPABILITIES

1-36. The SBCT engineer company provides organic mobility, countermobility, and survivability (M/CM/S) support. The focus of this company is mobility operations. Due to the streamlined, mission-focused structure of the engineer company, it has limited capability to conduct countermobility or survivability missions without affecting the mobility mission. General engineering missions and increased mission requirements will require augmentation by other engineer forces. The engineer company provides mobility support to mounted maneuver, dismounted assault, and urban operations. The company is equipped with reduction assets for natural and reinforcing obstacles in open, rolling terrain and in challenging complex and urban terrain. A medium weight (military load classification [MLC] 30) Rapidly Emplaced Bridge System (REBS) provides the brigade with limited capability (4- by 13-meter bridges) for dry and wet gap crossing. The REBS is not intended for assault crossings. The capability of the company to assist in force protection reduces brigade exposure to direct and indirect fires and other threats. Countermobility assets enhance the ability of the brigade to preserve and protect friendly forces; shape enemy maneuvers; and gain, retain, or secure the positional advantage. The survivability capability of the company preserves the combat power of the brigade during assembly area and base camp operations and while in a transition to the defense. General engineering (sustainment) capabilities provide the brigade with movement, maneuver, and force protection throughout the brigade area of responsibility (AOR).

1-37. The engineer company has no dedicated reconnaissance assets. However, it has the capability to provide engineer reconnaissance teams (ERTs) to augment the RSTA assets of the brigade organic cavalry squadron or the task force (TF) scouts of the infantry battalions. This requires measured risk in other capabilities when ERTs are employed. ERTs require special, focused training before commitment, and the number of committable ERTs will be limited to those that the commander has been able to previously train.

1-38. Engineer representation in the brigade headquarters provides the ability to plan, integrate, and synchronize engineer operations with the brigade scheme of maneuver. The brigade senior engineer brings knowledge and experience in maneuver support (MANSPT) to the brigade and facilitates the planning for and integration of augmentation forces. This includes the responsibility to initiate and orchestrate contracting with local officials as required. Responsibilities also include monitoring the status and synchronizing all engineer operations, thereby providing updated information to help shape the COP. The inclusion of a terrain team is a powerful enhancement capability for the brigade.

CONCEPT OF OPERATIONS

1-39. The engineer company is rapidly deployable, with the organic capability to maintain the freedom of maneuver through high tactical mobility and SA derived from an accurate COP. While normally employed in support of the brigade, the company is capable of being task-organized to subordinate elements in support of specific missions. Engineers support full-spectrum operations across all types of terrain. The organic geospatial (topographic) assets, integrated into the engineer section of the brigade staff, use their reach capabilities to provide detailed terrain analysis, enabling commanders to visualize the battlespace and anticipate, forestall, and dominate threats.

Maneuver

1-40. Engineers support the movement and maneuver of combat forces and achieve a position of advantage with respect to enemy forces. Mobility operations maintain the freedom of movement for personnel and equipment within the AO without delay. Combat mobility platoons are task-organized to provide mobility support to mounted maneuver, dismounted assault, and urban operations. A mobility support platoon, consisting of three sections, provides the enabling equipment to facilitate the freedom of maneuver, reduce force exposure to direct and indirect fires, and increase force effectiveness in complex and urban terrain. Sections can be task-organized to the combat mobility platoons, or the mobility support platoon may be employed as an integral unit to weight the main M/CM/S effort. The task organization is based on mission, enemy and threat, terrain and weather, troops, time available, and civilian considerations (METT-TC) and the alignment of essential mobility/survivability tasks (EMSTs). Engineer squad vehicles (ESVs) (equipped with rollers/plows and pulling mine clearing line charges [MICLICs], scatterable mines [SCATMINEs] [light Volcanos], and bridging) provide tactical mobility and support dominant maneuver by the brigade.

1-41. Organic countermobility capabilities require planning, integration, and construction of reinforcing obstacles to attack the maneuver of an enemy force, and they provide the SBCT with increased time for target acquisition and the massing and increased effectiveness of weapons. SCATMINEs provide capabilities in obstacle integration for close-in force protection, flank protection, and battlefield shaping for the decisive fight. Obstacle protection measures include improvised obstacles from native materials. They focus on counterreconnaissance to prevent the enemy from gathering obstacle intelligence (OBSTINTEL) and obstacle reduction.

1-42. Engineer capability enhances force mobility in the forward AO through route clearance and construction and repair of combat roads and trails. The requirements for forward airfields and landing zones (LZs) will likely require engineer augmentation.

1-43. Engineers provide survivability capabilities to the brigade to protect and conserve the fighting potential of the tactical force. Survivability operations may include protection against enemy hazards within the AO by reducing or avoiding the effects of enemy weapon systems, constructing fighting and protective positions, and synchronizing explosive ordnance disposal (EOD) support. Engineers protect friendly forces, personnel, materiel, equipment, and information system nodes from observation and surveillance through the use of natural and artificial means. This includes employing people, objects, or events to deceive enemy surveillance devices or mislead enemy evaluation. Due to limited assets and likely time constraints, the brigade must prioritize its assets and the level and type of survivability it directs. Prioritizing will help ensure the optimum use of the limited organic engineer assets of the brigade.

Intelligence, Surveillance, and Reconnaissance

1-44. Future operations are likely to be executed in some of the most varied ecologically devastated environments, against diverse opponents, and in theaters of operation known for their asymmetric view and use of mines. SBCT engineers provide threat engineer and terrain knowledge in asymmetric and symmetric environments. Geospatial and reconnaissance abilities generate information and products portraying the enemy and environmental features needed for real-time visualization of the battlefield. Engineers embedded in the planning cycle of the brigade (and perhaps the battalion or cavalry squadron) provide an analysis of information on enemy capabilities, intentions, and vulnerabilities and the environment. Geospatial and reconnaissance capabilities include the collection and analysis of environmental information (weather and terrain) and the impacts on friendly and enemy operations.

NOTES:

1. See *Chapter 3* for a discussion of ISR operations and *Chapter 8* for a discussion of engineers and reconnaissance.

2. ISR begins the process for the engineer estimate as discussed in *Appendix B* and the creation of orders and annexes as discussed in *Appendix C*.

Fires

1-45. SBCT engineers may assist in preparing positions for direct- and indirect-fire weapons and for other crew-served weapons, ensuring that obstacles are fully integrated with all fires and maneuver.

Logistics and Combat Service Support

1-46. The only CSS assets organic to the engineer company are its four medics. All additional CSS support is provided through the SBCT brigade support battalion (BSB) or through the supported maneuver force if engineers are task-organized. This includes all classes of supply, maintenance, administration, recovery, and area medical evacuation (MEDEVAC).

1-47. The organic engineer company has essentially no capability for constructing and sustaining lines of communications (LOC), ports, and airfields. Engineer echelon above brigade (EAB) augmentation is required to support these missions. This company is not equipped to perform rapid runway repair (RRR) or construct landing strips for the brigade organic tactical unmanned aerial vehicles (TUAVs). Organic engineer forces can provide some limited support for the construction or renovation of facilities, but generally this will be performed by augmenting engineers or capabilities. Augmentation is also needed for real estate support.

Command and Control

1-48. Engineer C2 provides the SBCT commander with the ability to plan, integrate, and synchronize engineer operations with decisive, shaping, and sustaining operations. The brigade engineer's knowledge of maneuver and force integration allows effective augmentation of the brigade with other engineer assets to support specific missions. This includes monitoring the status of and synchronizing all brigade engineer operations and providing updated information (some from reach capabilities) to shape the COP and support SU. Engineers analyze information requirements against a mission and the commander's intent to identify, prepare, and recommend the commander's critical information requirements (CCIR).

ORGANIZATION AND FUNCTIONS

1-49. The organization and functions of the SBCT are discussed below.

MANEUVER SUPPORT CELL

1-50. The SBCT MANSPT cell is organic to the SBCT headquarters and is responsible for planning, integrating, and synchronizing MANSPT for all SBCT operations. The MANSPT cell is composed of an engineer section and a military police (MP) section. Although not organic to the MANSPT cell, significant coordination is required with the chemical section to integrate MANSPT considerations into the cell. While no organic EOD capability exists in the SBCT, it is an area of MANSPT that must be integrated into this cell. If the brigade engineer is the senior officer in the MANSPT cell, he may also function as the MANSPT coordinator. In this case, he must rely heavily upon the MP and chemical sections for their expertise to ensure that the MANSPT cell is providing integrated and synchronized MANSPT to the SBCT.

NOTE: For more information on the specific duties of the MANSPT coordinator, see *FM 3-21.31*.

Engineer Section

1-51. The SBCT engineer section plans, integrates, and synchronizes engineer operations throughout the brigade battlespace. To provide 24-hour operations and ensure coverage in the different planning staffs of the brigade, two engineer officers and one senior engineer noncommissioned officer (NCO) are required for planning operations. The brigade engineer coordinates all military and civilian engineer efforts within the brigade AO. The brigade engineer or senior engineer is responsible to the SBCT commander for all engineer efforts and requirements within the brigade AO. Additionally, the brigade engineer has the staff focus and responsibility for assured mobility, just like the Intelligence Officer (US Army) (S2) has the responsibility for integrating and leading the intelligence preparation of the battlefield (IPB) effort. One of the primary responsibilities of the brigade engineer is to recommend and coordinate for EAB support.

1-52. The terrain team and its organic Digital Topographic Support System (DTSS) provide the SBCT with timely digital terrain products and integrated terrain analysis. The team also provides the ability to obtain other geospatial products through reach capabilities. The team supports the commander with a clear understanding of the physical environment by enabling visualization of the terrain and explaining its impact on friendly and enemy operations. It identifies terrain aspects that the commander can exploit to gain advantage over the enemy as well as those that the enemy will exploit. The engineer section is comprised of five soldiers, including a topographic warrant officer (chief warrant) and a senior NCO. They are embedded into the staff planning process and provide quality assurance and supervision over the terrain team. Two junior NCOs and one enlisted soldier provide 24-hour digital terrain data production support and analysis using the DTSS.

Military Police Section

1-53. The MP section contains an MP officer and one MP NCO. This section is integral to MANSPT planning and execution. The officer provides the provost marshal's staff function for the SBCT and assumes operational control (OPCON) over any MP assets provided to the brigade. If the MP officer is also the senior officer within the MANSPT cell, he may function as the MANSPT coordinator. In this case, he would rely heavily upon the engineer and chemical sections for their expertise to ensure that the MANSPT cell is providing integrated and synchronized MANSPT to the SBCT. This section is a significant contributor to assured mobility for the SBCT.

ENGINEER COMPANY

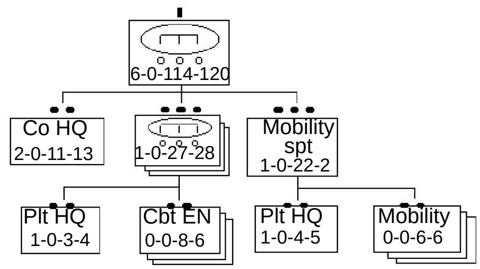
1-54. The engineer company supports the maneuver force and is suited for integration into maneuver operations at all levels. It is an agile organization that ensures the freedom to maneuver on the battlefield within the combined arms team framework. Its structure and operational characteristics enhance force momentum and lethality and increase the synchronization of engineer actions within the maneuver battlespace. The SBCT engineer company has three combat mobility platoons, one mobility support platoon, and a company headquarters section (*Figure 1-2*). (*Appendix D* contains information on some of the systems shown.) The engineer company is the lowest engineer echelon organic to the brigade that can plan and execute continuous, 24-hour operations in support of brigade operations. The company either organizes as an engineer-pure element or task-organizes its platoons in command and support relationships to provide a tailored package for a particular mission.

ENGINEER COMPANY HEADQUARTERS

1-55. The engineer company headquarters commands and controls the unit tactical employment and administrative operations. The company headquarters includes the commander; executive officer (XO); first sergeant (1SG); operations NCO; supply sergeant; nuclear, biological, and chemical (NBC) sergeant; two communications specialists; two administrative specialists; two drivers; and four medics. The communications specialists and medics are task-organized to provide support to the platoons.

COMBAT MOBILITY PLATOON

1-56. The combat mobility platoon is normally the lowest-level engineer unit that can effectively plan for independent missions and tasks. It is capable of



Engineer Company Equipment		
9 - ESVs	3 - Volcanos (towed)	10 - HMMWVs
9 - Blades	6 - MICLICs	7 - ¾-ton trls
9 - Rollers	1- Water trl (400-gal)	9 - 2½-ton trls
4 - Bridges (REBS w/trl)	4 - Trks, cbt	1 - MTV cargo trk
6 - DEUCEs	6 - IHMEEs	1 - MTV trl

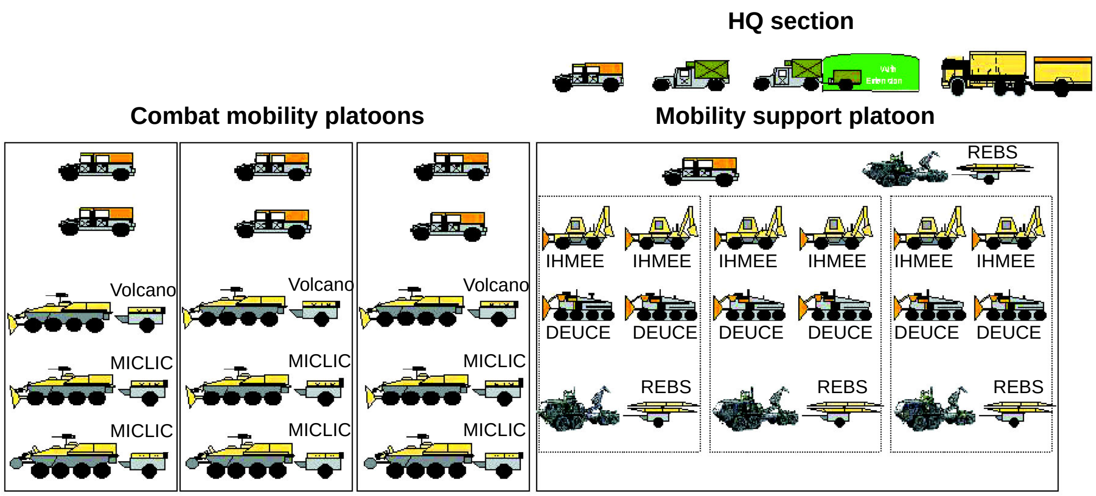


Figure 1-2. SBCT Engineer Company

maneuvering during combat operations, and it can fight as part of the engineer company, TF, cavalry squadron (RSTA), or maneuver company or team (for selected missions). The engineer platoon consists of a platoon headquarters section and three combat engineer squads. On the battlefield, the engineer platoon can facilitate rapid and frequent movement. It is capable of fighting mounted and dismounted. The combat mobility platoon frequently receives augmentation in the form of special equipment from the mobility support platoon. With some risk to mobility support, engineer squads can be task-organized to elements of the cavalry squadron for specific engineer reconnaissance missions. Platoon assets include the ESV with mountable rollers/blades, an eight-soldier engineer squad (six soldiers are dismountable) and associated engineer equipment, demolitions, and weapons. The dismountable soldiers are generally the minimum force required when providing effective dismounted MANSPT. However, independent squads are not usually task-organized to maneuver elements.

MOBILITY SUPPORT PLATOON

1-57. The mobility support platoon consists of a platoon headquarters and three equipment-based mobility sections. This platoon is not organized or designed to operate independently or outside the control of the engineer company like the combat mobility platoons. Each section is structured for mobility missions (focused on reducing enemy obstacles and fortifications that inhibit friendly maneuver) and survivability missions (focused on protecting key brigade assets). The platoon provides the commander with specialized equipment capabilities to weight the EMSTs. Each section has gap crossing and obstacle reduction capabilities, specialized vehicle-mounted tools, and excavating equipment. The mobility support platoon has four REBS, each capable of crossing a 13-meter wet or dry gap (MLC 30), and three trailer-mounted Volcanos. The platoon also has six deployable universal combat earthmovers (DEUCEs) and six interim high-mobility engineering excavators (IHMEEs). The same task organization and equipment required for mobility operations also provides a limited capability for countermobility, survivability, and general engineering tasks in support of sustaining operations.

AUGMENTATION

1-58. The SBCT is a full-spectrum combat force. Even though it is optimized and organized for a particular segment of the spectrum of operations, it is not always employed under those conditions. This may require it to acquire and integrate additional engineer capabilities through the process of augmentation. Previous discussion has already identified numerous instances and circumstances under which the brigade may require engineer augmentation.

1-59. Augmentation is the addition of units or elements (personnel and equipment) to execute tasks for specific missions (armor, air defense, aviation elements, specialized engineer capabilities, EOD, and others) beyond the organic capability of the brigade. (See *Appendix E* for likely engineer augmentation packages.)

1-60. Critical to a discussion of augmentation is the issue and specifics associated with the contemporary operational environment (COE) where the brigade will be operating. Address the following questions:

- **Who** is the enemy?
- **What** are his weapons and technology?
- **Where** is the battlefield and terrain, and what are their characteristics?
- **Why** does the enemy fight, and what are his objectives?
- **How** does the enemy fight?

1-61. An analysis of these questions will help identify engineer or engineer-related augmentation capabilities, such as EOD support, that should be considered to support the brigade.

FULL-SPECTRUM OPERATIONS

1-62. *Figure 1-3* addresses the range of full-spectrum operations across the spectrum of conflict. Offensive and defensive operations normally dominate military operations in war and some SSCs. Stability operations and support operations predominate in military operations other than war (MOOTW) that include SSCs and PMEs. The SBCT may be engaged in a different operation than other elements of its JTF or higher headquarters. For example, the JTF may be involved in an SSC and be performing stability operations, while the particular mission for the SBCT may be an offensive mission. Given a look at the spectrum of conflict, potential engineer augmentation to the SBCT is addressed in the following paragraphs.

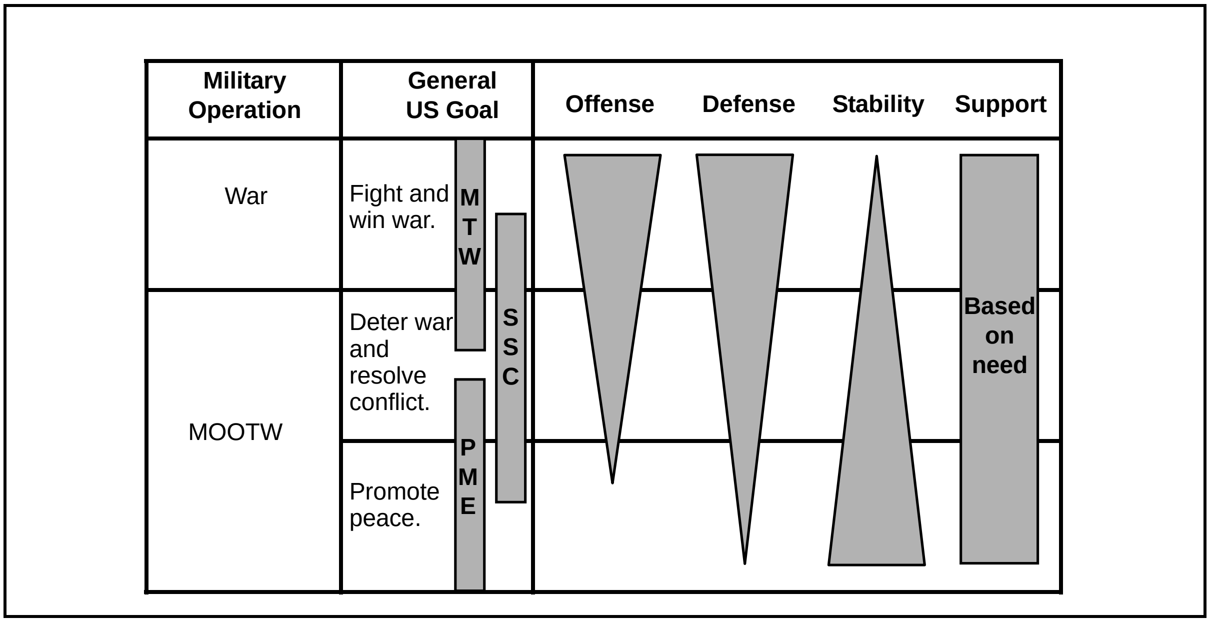


Figure 1-3. Range of Army Operations

MAJOR THEATER WAR

1-63. Additional engineer capabilities across all engineer battlespace functions—combat (M/CM/S), geospatial, and general engineering—are required in an MTW. In essence, engineer augmentation requires a multifunctional, battalion-size TF headquarters for C2 (including, or in addition to, the organic company) that can be task-organized for improved direct support (DS) to maneuver elements and can accomplish other significant engineer tasks inherent in an MTW. Augmentation requirements include elements to perform a wide range of general engineering tasks, including engineer reconnaissance, EOD, expanded terrain visualization capabilities, additional combat engineer elements, and expanded staff support at brigade and maneuver battalion or cavalry squadron levels.

SMALLER-SCALE CONTINGENCY

1-64. An SSC contains many of the same requirements as an MTW or a PME. Engineer capabilities will be in high demand as the SBCT shifts between the four types of operations or perhaps performs more than one at a time with subordinate elements of the brigade. Augmentation will almost certainly be required to enable the brigade to meet the multiple missions it will face. Given the lack of EOD and general engineering capability organic to the SBCT, these will clearly be at least two of the requirements for augmentation. If significant urban operations are expected, additional combat engineers may also be required.

PEACETIME MILITARY ENGAGEMENT

1-65. Engineer capabilities are often in high demand during a PME because of requirements to relieve human suffering locally and restore basic public functions. Augmentation may be required to enable the brigade to assist the PME force in meeting requirements regarding construction, facilities repair and management, infrastructure improvements (roads, bridges, and so forth), sanitation, water supply, shelter, and real estate management. If the SBCT is operating fairly independently, a multifunctional, battalion-size TF headquarters and a variety of engineer assets and capabilities (focused on general engineering requirements) will be needed to augment the brigade. If operating as one of several maneuver brigades under a JTF or other higher headquarters, the SBCT will still need significant augmentation, even if a full battalion-size engineer element is not required.

Chapter 2

Command and Control

The SBCT requires advanced C4ISR technologies to operate within the commander's intent and execution-centric environment. The C4ISR organization provides commanders with the capability to—

- See and understand their battlespace in all its dimensions (assured mobility is a key enabler of this).
- Provide a common picture of the situation.
- Precisely locate and track critical targets.
- Conduct simultaneous operations with lethal and nonlethal means.
- Operate with joint and multinational forces.
- Recognize and protect their own forces and other friendly forces.

These capabilities are critical for the SBCT to execute its operational style—the enhanced synchronization of widely dispersed, highly mobile forces operating through an extended battlespace. The C4ISR system employs *smart technology*, enabling organizations to identify and adapt to the changing patterns of a nontraditional, non-pattern-forming adversary. Developing the mobility COP is the most critical assured mobility imperative to C2.

DIGITAL MANAGEMENT FUNCTION

2-1. The Maneuver Control System (MCS), MCS-Light, DTSS, and Force XXI Battle Command–Brigade and Below (FBCB2) located in the SBCT engineer section of the MANSPT cell and the FBCB2 located in the engineer company are the ABCSs that speed information sharing, planning, and decision making. Digital information is shared between the SBCT main, engineer company, subordinate engineer units, and supported maneuver battalions. Sharing is done through the tactical internet, using the engineer company MCS linkage to the following systems of the supported maneuver elements:

- MCS.
- All-Source Analysis System–Remote Workstation (ASAS-RWS).
- Combat Service Support Control System (CSSCS).
- Advanced Field Artillery Tactical Data System (AFATDS).
- Air and missile defense workstation (AMDWS).

NOTE: See *Appendix D* for a discussion of the FXXI digital systems.

2-2. The complexity of the digital system and the large amounts of information that can be passed via digital systems require the development of an ABCS management structure. The personnel that comprise the structure are the SBCT brigade engineer, engineer company commander and XO, combat mobility platoon leaders, mobility support platoon leader, present Battlefield Operating System (BOS) supervisors, system operators, and SBCT and maneuver battalion staff elements. This management structure satisfies technical and tactical requirements.

2-3. The amount of information available to the commander and staff in the FXXI command post (CP) has become so large that techniques and procedures must be developed for its management. One technique is to appoint an individual in the CP who will screen all incoming data and send only necessary decision-making information to the commander. The information manager must have the tactical and technical proficiencies necessary to determine what information is key and what is just *good-to-know* information.

2-4. It is essential that engineer organizations fully optimize the capabilities inherent in the ABCS by establishing techniques, procedures, and standing operating procedures (SOPs) that account for the components which do not digitally interface with each other. As software improvements are developed, this process will become essentially seamless.

DEFINITION

2-5. Command is the art of assigning missions, prioritizing resources, guiding and directing subordinates, and focusing the entire engineer company energy to accomplish clear objectives. Control is the science of defining limits, computing requirements, allocating resources, prescribing requirements for reports, monitoring performance, identifying and correcting deviations from guidance, and directing subordinate actions to accomplish the engineer battalion commander's intent.

FUNCTION

2-6. The C2 function is comprised of coordinating, planning, directing, and controlling. It is executed through leadership, C2 facilities and nodes, the planning process, and communications (signals, written, digital, and verbal).

2-7. Command includes the responsibility of leading soldiers and units to accomplish the assigned mission successfully. An inherent responsibility of command is safeguarding soldiers entrusted to a commander.

2-8. To control is to define limits. Control within the SBCT engineer company is the science of using digitized systems to compute requirements, allocate means, and synchronize and integrate combined arms efforts. Establishing sound digital techniques and procedures and digitized SOPs assists the commander in monitoring the status of organizational effectiveness as well as identifying any variance from standards and guidance. The controls that the commander sets provide the means to accomplish intent and develop specific instructions.

2-9. Control serves its purpose if it—

- Allows the commander freedom to operate.
- Delegates authority appropriately.

- Enables the commander to lead from any critical point in the battlespace.
- Synchronizes engineer company operations across the AO.

2-10. The digital C2 system supports the ability of the brigade engineer and the company commander to adjust plans for future operations while focusing on the current fight. The tools for implementing command decisions include orders, SOPs, communications, and digitized systems.

GUIDELINES

2-11. Some basic guidelines to improve successful C2 using digitized systems are listed below and are applicable to both the SBCT MANSPT cell and the engineer company:

- Commanders must clearly communicate their battle intent, information needs, and information operation requirements to eliminate confusion and the potential for information overload.
- Commanders and leaders at all subordinate levels must accurately and succinctly forecast their information needs to support planning and mission execution.
- Commanders should request back briefs when they give subordinate commanders a new or revised mission through digital or voice means to ensure that they understand the commander's intent and the scheme of maneuver.
- Commanders and leaders at all levels must guard against micromanagement of their subordinates with increased SU and precision maneuver and movement capabilities.
- Staffs must be trained to operate the digitized systems that support all BOSs in an integrated and synchronized manner.
- Commanders must ensure that SOPs address the requirement to conduct daily precombat checks of all digital systems and report the status of critical components. These are critical to maintaining the COP and combat information.
- Efficient operations and the use of digitized systems depend on soldier skills and experience, which must be practiced constantly in garrison and field environments. The complexities of network establishment and interconnection must be practiced on a weekly, if not daily, basis. At a minimum, the entire network should be exercised monthly to ensure that soldiers' skills do not erode.
- Digital SOPs must address automation security requirements, including system and message handling, safeguarding, and destruction when necessary.
- Automated systems rely heavily on data stored on hard drives within the system. In order to protect against inadvertent data loss due to human errors, system failure, or enemy attack (virus), a system of backup procedures must be considered in unit SOPs.
- Digital SOPs must emphasize the need to include integrating, using, and synchronizing digital systems during preexecution rehearsals and battle drills.

NOTE: Tactics, techniques, and procedures (TTP) need to be developed to address how control and coordination will be conducted with engineer units that are not FBCB2-equipped but provide support to brigade and below maneuver elements.

BRIGADE

2-12. The brigade C2 function is one of planning, preparing for, and executing the battle. The brigade commander ensures that the intent is clearly understood by subordinate commanders throughout the C2 function. The principal component of the brigade C2 function is the MDMP.

MILITARY DECISION-MAKING PROCESS

2-13. The MDMP is a proven analytical process that aligns itself with the standard problem-solving process. It is as detailed or as simple as time, requirements, and experience permit (see *Figure 2-1*). The MDMP helps the commander and staff reach logical decisions through detailed examination of the battlefield. When used in a deliberate, fully staffed integrated fashion, the MDMP becomes the commander's planning foundation. Products created during the MDMP become the basis for subsequent planning.

2-14. The commander plays a key role in the process, with the staff providing advice and information related to their areas. From start to finish, the commander's role is central, providing focus and guidance to the staff. The amount of time available for planning determines the use of the full MDMP or an abbreviated version.

2-15. The MDMP has several steps. Each step is driven by the preceding step(s), which forces the process to become cumulative in nature.

Step 1. Receipt of mission.
Step 2. Mission analysis.
Step 3. Course of action (COA) development.
Step 4. COA analysis.
Step 5. COA comparison.
Step 6. COA approval.
Step 7. Orders production.

2-16. Parallel planning is a routine procedure within the MDMP, facilitated by issuing warning orders (WARNOs). Parallel planning relies on accurate and timely WARNOs and the full sharing of information between echelons as it becomes available. The collection, analysis, and distribution of information is a continuous staff requirement. Information that the engineer staff section analyzes is exchanged with other staff sections and used to update the situation. To execute the mission successfully, the engineer staff must focus on the information that the brigade and subordinate engineer commanders need.

2-17. The brigade engineer integrates into the SBCT MDMP and develops the engineer estimate as the method for supporting the brigade MDMP.

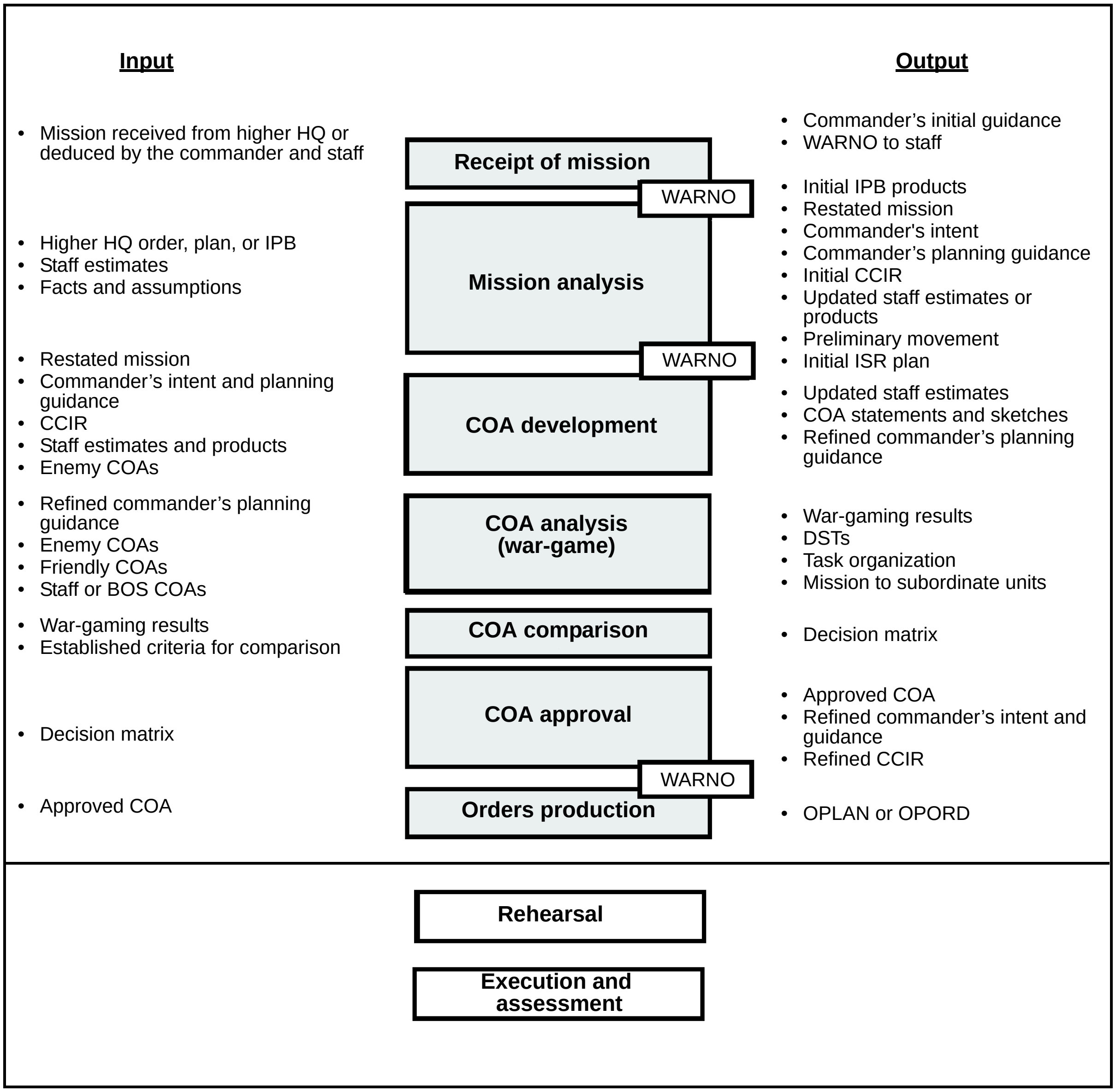


Figure 2-1. MDMP

ENGINEER ESTIMATE

2-18. The engineer estimate is a logical thought process that is merely an extension of the MDMP. It is conducted by the brigade engineer, concurrently with the tactical planning process of the supported maneuver force, and it is continuously refined. The engineer estimate allows for early integrating and synchronizing of the engineer plan into the combined arms planning process. It drives the coordination between the engineer, the supported commander, and other staff officers and the development of engineer plans, orders, and annexes. Additionally, the allocation of engineer assets and resources drives and determines the command and support relationships that will be used.

NOTE: For detailed information on the engineer estimate, see *Appendix B*.

2-19. One method to support the development of the engineer estimate is the use of EMSTs. An EMST is a specified or implied, BOS-specific task that is critical to mission success. Identifying the essential tasks helps develop plans, coordinate the staff effort, and allocate resources. Although EMSTs may be ultimately executed by a combined arms element, the staff members (typically the MANSPT elements—engineer, chemical, and MP staff officers) identify the EMSTs. In some situations, EMSTs may also include geospatial and general engineering tasks. Failure to achieve an EMST may require the commander to alter his tactical or operation plan (OPLAN).

2-20. The four components of an EMST include—

- **Task(s)**—one or more clearly defined and measurable task (accomplished by individuals or organizations) required to achieve the desired effects.
- **Purpose**—the desired or intended result of the task stated in terms relating to the purpose of the supported unit.
- **Method**—describes how the task and purpose will be achieved by the quantifiable use of assets or capabilities and communicates their priority.
- **Effect**—the quantitative or qualitative impact (caused by the completion of the task) desired by the higher commander on the friendly force or the adversary.

2-21. A fully developed EMST has a task, purpose, method, and effect. The task describes what objective (number of lanes; main supply route [MSR] capability; bridging capability; block, turn, fix, or disrupt; protection levels; and minimum number of survivability positions) must be achieved to support friendly formations or what it will do to an enemy formation function or capability. The purpose describes why the task contributes to the maneuver. The method describes how the task will be accomplished by assigning responsibility to maneuver units, supporting units, or delivery assets and providing amplifying information or restrictions. The effect describes the desired outcome in terms of influencing enemy mobility and enhancing friendly mobility or survivability.

2-22. Approved EMSTs are described in the concept of operations in the base order. The concept of operations includes the logical sequence of EMSTs that, when integrated with the scheme of maneuver, will accomplish the mission and achieve the commander's intent. The scheme of engineer operations (SOEO) (also in the base order) describes the detailed, logical sequence of M/CM/S; geospatial and general engineering tasks; and decontamination, smoke, and force protection tasks and their impact on friendly and enemy units. It details how engineers and other maneuver supporters expect to execute the M/CM/S plan and accomplish the commander's essential M/CM/S tasks.

2-23. The advantage of clearly identifying the EMSTs across the width and depth of the battlefield is to ensure synchronization, logical task organization, and resource allocation. This is especially important within the SBCT since engineers and other maneuver supporters are not habitually assigned to maneuver elements. Engineers execute essential tasks to support the accomplishment of SBCT missions. Engineer elements may be task-organized to a maneuver unit when an EMST dictates that engineers perform that specific EMST. If a maneuver unit does not have a specified EMST that requires engineer support, the engineer element will generally operate as a unit under the control of its higher headquarters and be massed to accomplish EMSTs elsewhere in the brigade AO.

2-24. Engineer input into the brigade MDMP is primarily through the engineer estimate. The engineer estimate begins at higher echelons (division and above) and progresses down to supporting engineer companies. Its effectiveness requires continuous interaction and bottom-up feedback.

2-25. Each step of the engineer estimate corresponds to a step of the MDMP. Like the MDMP, the engineer estimate is continuously refined and its effectiveness requires continuous interaction and bottom-up feedback. *Table 2-1*, page 2-8, illustrates the relationship between the MDMP and the engineer estimate, and *Appendix B* describes the engineer estimate in detail.

FACILITIES AND FUNCTIONS

2-26. The SBCT is controlled by C2 organizations containing more than one echelon. Staff participation varies at each echelon. METT-TC considerations may vary the composition and locations of these traditional CPs. In linear operations, these organizations typically include tactical, main, and rear CPs and a command group (this may change in noncontiguous operations).

2-27. The key to establishing an effective engineer C2 organization is to complement the existing structure of the brigade. The brigade engineer and the supporting company commander and platoon leaders must have a thorough understanding of the brigade C2 structure and the responsibilities of each CP. More importantly, to complement the C2 structure, they must recognize the engineer functions required at each CP. These functions become the driving force behind the engineer C2 structure and system.

Tactical Command Post

2-28. When active, the tactical CP controls decisive operations and is established in the main battle area (MBA) near the forward battalions. This allows the commander to be close to subordinate commanders so that he can directly influence operations. The tactical CP is structured to synchronize and coordinate maneuver, fire support, and engineer operations in support of the brigade close battle.

2-29. When fully active and staffed, the tactical CP serves as the net control station (NCS) for brigade and battalion reports. It receives, posts, and analyzes reports from the maneuver battalions and responds to immediate tactical requirements. The tactical CP analyzes and disseminates combat intelligence for decisive operations. It also provides centralized synchronization of fires to committed forces within the brigade. When the tactical CP is not active, the main CP assumes all C2 responsibilities.

Table 2-1. Relationship Between the MDMP and the Engineer Estimate

MDMP	Engineer Estimate
Receipt of mission	Receipt of mission
Mission analysis • Analyze the higher HQ order. • Conduct an IPB. • Determine specified, implied, and essential tasks. • Review available assets. • Determine constraints. • Identify critical facts and assumptions. • Conduct a risk assessment. • Determine the CCIR. • Determine the reconnaissance annex. • Plan 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 WARNO. • Review the facts and assumptions.	Mission analysis • Analyze the higher HQ orders. ▪ Commander's intent. ▪ Mission. ▪ Concept of operation. ▪ Timeline. ▪ AO. • Conduct an IPB or EBA. ▪ Terrain and weather analysis. ▪ Enemy mission and M/CM/S capabilities. ▪ Friendly mission and M/CM/S capabilities. • Analyze the engineer mission. ▪ Specified M/CM/S tasks. ▪ Implied M/CM/S tasks. ▪ Assets available. ▪ Limitations. ▪ Risk as applied to engineer capabilities. ▪ Time analysis. ▪ EMSTs. ▪ Restated mission. • Conduct a risk assessment. ▪ Safety. ▪ Environment. • Determine the CCIR (terrain and mobility restraints, OBSTINTEL, threat engineer capabilities). • Integrate the reconnaissance effort.
COA development	SOEO development • Relative combat power. • EMSTs. • Engineer missions and allocation of forces and assets. • Engineer priority of effort and support. • Commander's intent for M/CM/S. • Engineer employment considerations. • Integration of the SOEO into the maneuver COA.
COA analysis	War gaming and refinement of the engineer plan
COA comparison	COA recommendation
COA approval	Engineer plan finalization
Orders production	Basic OPORD input • SOEO. • EMSTs. • Subunit instructions. • Coordinating instructions. • Engineer annex and appendixes.

Main Command Post

2-30. The main CP is designed to provide the brigade with the ability to see the total battlefield in the current operation and simultaneously plan future operations. While conducting the current operation, the main CP—

- Prepares and issues fragmentary orders (FRAGOs).
- Tracks operations.
- Coordinates the allocation of resources.
- Establishes priorities.

2-31. The main CP monitors the operations of higher and adjacent units and provides this information to the tactical and rear CPs and subordinate units. It assumes C2 of decisive operations if the tactical CP is moving, destroyed, or inactive. The role of the main CP in decisive operations is to respond to requests for immediate support by the tactical and rear CPs. The main CP also ensures that decisions made by the tactical and rear CPs are rapidly coordinated and effectively conducted.

Rear Command Post

2-32. The rear CP focuses on the C2 of all units located within the brigade rear area. It synchronizes sustaining operations for the brigade battle. The rear CP is only an extension of the main CP, because it is not manned or equipped to conduct current operations and simultaneously plan future sustaining operations. The rear CP is located in the brigade support area (BSA) and is manned by the brigade Adjutant (US Army) (S1), Supply Officer (US Army) (S4), and the coordinating elements of the BSB.

2-33. The primary C2 role of the rear CP is to ensure that rear-area operations are synchronized and integrated with decisive and shaping operations. Units operating in the rear area provide operation and unit status reports to the rear CP. The rear CP controls movement within the brigade rear area. It also forwards the status of sustaining operations and units to the main CP.

Command Group

2-34. The command group consists of the brigade commander and selected staff members. It is not a fixed organization, but is tailored to meet the C2 needs of the mission and the current tactical situation. The commander identifies the critical events requiring personal influence, anticipates the rapid decisions and orders that are required, and tailors the command group to provide the necessary expertise. The command group normally moves forward from the tactical CP and initially positions itself with the main effort. This forward position allows the brigade commander and selected staffs to see the battle, directly influence the action, and make face-to-face contact with battalion commanders as required. When the brigade commander needs to make critical engineer decisions, he may require the brigade engineer to be part of the command group.

ORGANIZATION AND RESPONSIBILITIES

2-35. The essence of effective engineer C2 is the uninterrupted integration of engineer planning for and the functional control of engineer assets supporting the SBCT. Engineer staff presence at each of the brigade CPs serves two primary functions—

- Expertise at the brigade staff level to integrate engineers into all facets of brigade planning and execution.
- Functional control for engineer units to execute engineer missions in support of decisive, shaping, and sustaining operations.

2-36. The staff engineer works with the CP staff to set priorities for these responsibilities based on the situation, determining the ones on which to focus available resources. Engineer C2 within the brigade must be responsive to changes in engineer capabilities, limitations, augmentation, and sustainment requirements caused by changing engineer task organizations. It must also be capable of expanding or reducing its control capabilities to remain proactive to a changing engineer force size and organization in the brigade AO.

2-37. In operations with the SBCT, the brigade engineer is responsible for engineer support throughout the brigade AO. When no EAB engineer units (augmentation) are allocated, the brigade engineer must consider the risk involved, prioritizing engineer missions accordingly based on the limited capabilities organic to the SBCT. The brigade engineer, in collaborative planning with the engineer company commander, determines the task organization that bests supports the operations.

BRIGADE ENGINEER

2-38. The brigade engineer is the principal engineer advisor to the brigade commander and staff. He may also serve as the MANSPT coordinator. In this capacity, the brigade engineer is responsible for integrating and synchronizing all MANSPT assets into the planning process. The brigade engineer is responsible to the brigade commander for—

- Providing organizational focus.
- Synchronizing cohesive engineer support for the entire brigade.
- Coordinating the actions of the MANSPT cell when functioning as the MANSPT coordinator.

2-39. The brigade engineer integrates specified and implied engineer tasks into the brigade plan and ensures that supporting engineer units are completely integrated into the brigade mission planning, preparation, and execution. This task is usually one of the most challenging and is only successful with the full support of the supporting company commander(s).

Staff Responsibilities

2-40. The brigade engineer is normally located in the SBCT main. However, if the SBCT is located in some type of sanctuary and the tactical CP is deployed forward, the brigade engineer may be located in the tactical CP. The brigade engineer's primary duty is to plan, coordinate, and facilitate the execution of engineer missions in support of the commander's scheme of maneuver. In this role, he must—

- Integrate the engineer battlespace functions of combat (M/CM/S), geospatial, and general engineering into future brigade plans.
- Develop the necessary input to brigade orders, annexes, and engineer unit orders (as required).
- Make time-sensitive engineer decisions on requests for immediate tactical support received from the SBCT engineers.
- Train the brigade engineer cell located at the brigade main CP.
- Formulate ideas for engineer support to meet the brigade commander's intent.
- Visualize the future state of engineer operations in the brigade.
- Recommend the engineer priorities of effort, support, EMSTs, and acceptable mission risks to the brigade commander.
- Determine and evaluate critical aspects of the engineer situation.
- Decide what engineer missions must be accomplished to support current and future fights.
- Prioritize and recommend allocating engineer personnel, equipment, logistics, and units (survivability and force protection priorities).
- Develop an SOEO concurrent with the brigade maneuver COAs.
- Integrate the necessary orders and instructions into division plans and orders.
- Issue timely instructions and orders to subordinate engineer units through the brigade base order to simplify preparation and integration.
- Monitor the execution of engineer orders and instructions by tracking the current fight.
- Alter the engineer plan using the feedback received from maneuver battalions, the engineer company, and any augmented engineer units as required.
- Coordinate with the division or ARFOR on the—
  - Division or ARFOR plans.
  - Status of brigade engineer and MANSPT missions.
  - Identification of any brigade requirements for EAB engineer and other MANSPT assets to support the brigade.
- Make the brigade commander aware of the capabilities, limitations, and employment considerations of supporting engineers and MANSPT assets.
- Recommend engineer organization for combat.
- Plan and coordinate with the fire support coordinator on the integration of obstacles and fires.
- Advise the commander on the use of organic and nonorganic engineer assets.
- Advise the commander on employing and reducing obstacles.
- Advise the commander on environmental issues, coordinate with other staff officers to determine the impact of operations on the environment, and help the commander integrate environmental considerations into the MDMP.

- Provide a terrain visualization mission folder to determine the terrain effect on friendly and enemy operations (see *Training Circular [TC] 5-230*).
- Produce maps and terrain products and coordinate with the terrain section for planning and distribution.
- Plan and supervise construction, maintenance, and repair of camps and facilities for friendly forces, enemy prisoners of war (EPWs), and civilian internees.
- Plan, request approval, and coordinate for the use of SCATMINEs. (May delegate planning down to a specific TF based on the mission and the SCATMINE allocation.)
- Plan and coordinate for environmental protection, critical areas, and protection levels.
- Assist the S2 with the IPB, including the preparation of the engineer estimate with the engineer battlefield assessment (EBA).
- Participate in the targeting process.
- Provide information on the status of engineer assets on hand.
- Track all templated and known obstacles, SCATMINEs, the survivability status, the route status, engineer missions, and any other engineer-specific information.
- Recommend MSRs and logistics areas to the S4 based on technical information.
- Recommend intelligence requirements (IR) to the S2 through the Operations and Training Officer (US Army) (S3).

Functional Control Responsibilities

2-41. Regardless of the task organization, the brigade engineer is responsible for the functional control (through the brigade commander) of all engineer units in support of the brigade. The brigade engineer exercises functional control by—

- Regulating the functions of the engineer organization and identifying the engineer missions necessary to support the brigade plan.
- Establishing and maintaining a continuous, open link among all engineer cells, TF engineers (when applicable), and supporting engineer CPs.
- Using the engineer estimate and the continuous link with the supporting company commander(s) to compute resource and force requirements and recommend engineer task organization.
- Developing specific engineer missions and conveying them to subordinates through the brigade order and the engineer annex.
- Using the brigade engineer cell and supporting engineer unit C2 organizations to hear, see, and understand all engineer battlefield functions within the brigade.
- Using supporting engineer unit CPs to measure, report, and analyze engineer performance and anticipating change and unforeseen requirements.

ENGINEER

2-42. In support of the brigade, the engineer C2 function is to plan, direct, coordinate, and control the battle. It is initiated through the brigade commander's intent, the concept of operations, and mission plans. The process depends on assigning tasks to subordinate and supporting engineer units to accomplish assigned missions. The cycle of acquiring information, making decisions, and issuing instructions must allow the brigade to seize the initiative and maintain momentum over the enemy. The brigade engineer and the company commander, through the support of the engineer CPs, must be able to decipher the flood of information and determine what information is necessary for the brigade commander's decision making.

2-43. Together, the brigade engineer and the company commander must establish a synchronized, continuous procedure of information exchange and management. They must also establish a proactive C2 function to ensure C2 for engineer assets supporting the brigade. Engineer C2 cannot exist within the brigade without this joint effort that employs all available assets to help the common C2 goal.

COMMUNICATIONS

2-44. Communications between the brigade engineer and the company commander must be open and direct. The brigade engineer exercises functional control over the engineer assets in the brigade area, following the brigade commander's intent and input from the company commander. Functional control means that the brigade engineer plans, manages, directs, and tracks engineer activities and assets in the brigade area. However, the brigade engineer does not execute command over these assets.

2-45. Communications and information management are key to the C2 function. The engineer section receives the engineer mission and status reports directly from the maneuver battalions and cavalry squadron (or the TF engineer if one is present), the engineer company operations, and the engineer commander.

2-46. The engineer section also receives battlefield information from within the brigade main CP through spot reports. The brigade engineer section organizes, updates, and manages all engineer, mission-related information within the brigade sector. It must have the most current update of engineer operations within the brigade sector. The brigade engineer is responsible for submitting all operational reports to the next higher engineer headquarters. The company CP is responsible for submitting all noncritical administrative and logistics reports to the next higher engineer headquarters.

2-47. Communication between all engineers enables the brigade engineer and engineer unit commanders to influence the battle. Influencing the battle is the effect of C2. Journals are maintained at each engineer cell to record the events that portray the battle. By receiving and managing the engineer mission and status reports, the engineer unit commander is able to make informed decisions that influence the battle.

NOTE: The SBCT engineer section must have the most current status of the engineer mission(s) within the brigade sector. This is

maintained through accurate reporting from maneuver and engineer channels.

2-48. While the brigade engineer establishes the base for the engineer C2 function at the brigade, the company commander provides the brigade engineer with an assessment of the current fight. The brigade engineer's vision of the battlefield is limited to the accuracy and frequency of situation reports coming to the brigade main CP. The company commander provides quality control to all planning figures that the brigade engineer has integrated into the brigade plan. The company commander also makes recommendations on the task organization and the employment of augmentation engineers in the brigade sector. Engineer units augmenting the brigade must provide an engineer liaison officer (LNO) to the brigade engineer section (regardless of task organization) for developing and communicating the COP. LNOs also enable communications with nondigital engineer units.

ENGINEER COMPANY

2-49. The engineer company C2 system must be reliable, responsive, and durable. It must withstand crises, even the loss of the commander, and continue to function and provide support to the brigade. The engineer company C2 system is the most complex system in the brigade. However, its output must be clear, concise instructions that focus the entire unit toward the goals and objectives of the company and the brigade commanders. One of the challenges facing the engineer company and its commander is achieving the proper mix of C2. While this mix is situation-dependent, the commander must strive to emphasize command and reduce control measures that restrict his subordinates' freedom of action. The limitations inherent in rapidly switching FBCB2 alignments may cause problems as engineers change task organization through various phases of an operation.

2-50. Due to the limited digital communications equipment organic to the company and the capabilities and limitations of frequency-modulated (FM) communications, units must develop detailed TTP for establishing effective communications. For instance, when a platoon is task-organized in a command relationship to a maneuver unit, the platoon leader should have one FM radio on his internal net and one on the higher maneuver force net. If the parent unit needs to contact the platoon leader, it contacts him on his internal net and updates information or meets on the company frequency. If the platoon leader needs to contact the parent unit, he has to switch to his parent company frequency. Due to the limited MCS-Light assets, task-organized units (platoons) will have to coordinate with the maneuver S3 to submit engineer information through the maneuver MCS-Light and have him distribute it to engineer channels.

KEY PERSONNEL DUTIES AND RESPONSIBILITIES

2-51. The engineer company must be able to accomplish a number of tactical, logistical, and administrative tasks. To accomplish these, the duties and responsibilities of key personnel in the company must be defined and understood.

ENGINEER COMPANY COMMANDER

2-52. The company commander is responsible for everything the company does or fails to do. This includes the tactical employment, training, administration, personnel management, and sustainment of the company. The company commander must fully understand the capabilities of the soldiers and know the best method of employing them. He must also completely understand the capabilities of the SBCT, infantry battalions, and cavalry squadron, including how they fight.

Company Responsibilities

2-53. The company commander is the engineer executor on the brigade battlefield, and he has unit C2 responsibilities over the organic engineer company. One of the commander's greatest challenges is maintaining an execution focus for the brigade commander while sustaining staff level input to the brigade engineer. The company commander—

- Writes the company operation order (OPORD) that supports the brigade commander's intent and concept of the operation and the brigade engineer annex.
- Provides mission-oriented C2 to the engineer company.
- Supervises the execution of unit engineer support within the brigade area.
- Achieves integration with the supported brigade through a link with the brigade engineer and the brigade commander's C2 organization. (C2 assets from the company are key in facilitating this function.)
- Divides duties among the key leaders of the company. Subordinates must know their jobs and how the company functions while executing its missions. The decentralized nature of SBCT operations dictates that the company and its subordinate units must be able to function in any mission or situation with minimal guidance and control from higher headquarters. Although every situation is different, the company SOP standardizes the way tasks are accomplished and simplifies the execution of decentralized operations.
- Remains focused on engineer missions rather than the method of subordinate execution. He must not give subordinates missions and guidance that conflict with those of the maneuver brigade and the supported battalion commander.
- Assumes the duties of the brigade engineer as required. He is also an advisor on unit capabilities, limitations, and current operational status; however, he normally passes this information through the brigade engineer. In the absence of the brigade engineer, the company commander focuses more on brigade planning and less on unit command.
- Provides mission and status reports to the brigade commander and the engineer. These reports should be current and accurate so that the brigade commander and engineer can make decisions that influence the battle.

2-54. The company commander must often delegate authority to subordinates. This process reinforces and strengthens the entire chain of command. Commanders must ensure that they do not abuse this delegation of authority. Responsibility can never be delegated.

Brigade Responsibilities

2-55. The company commander supporting the brigade is the primary executor of engineer missions that the brigade develops. The brigade engineer (with brigade staff assistance) ultimately develops the engineer missions. The company commander plays a vital role in mission identification and development and in establishing engineer mission priorities. When the commander meets with the brigade engineer during the MDMP, he is also executing troop-leading procedures (TLPs) to facilitate company actions. This ensures that fundamental considerations about mission execution are synchronized with the brigade plan and the supporting engineer annex. The early, continuous involvement ensures that the company commander and his subordinates remain proactive during mission planning, preparation, and execution.

2-56. When the tactical situation allows the company commander to conduct TLPs parallel to the MDMP, it helps synchronize key activities and provides mission support to the brigade as a whole. When the brigade order is issued, the engineer company commander is generally present and will already know the task organization and missions for his company.

EXECUTIVE OFFICER

2-57. The XO is second in command in an engineer company. His primary role is to help the company commander direct the fight of the company and ensure its seamless integration into the brigade combat, combat support (CS), and CSS structure. The XO—

- Receives and consolidates unit and mission reports from the platoons and submits them to the brigade engineer and rear CP.
- Assumes command of the engineer company as required.
- Establishes and operates the company CP, which has two primary tasks—
  - Facilitating the C2 function of the company.
  - Augmenting and synchronizing the engineer C2 organization in support of the brigade.
- Plans and supervises the engineer company CSS.
- Ensures that precombat inspections (PCIs) are completed throughout the company.
- Plans and coordinates all logistics support with the BSB and other agencies outside the company.
- Prepares or assists in preparing the company OPORD, specifically focusing on paragraph 4.
- Coordinates with higher, adjacent, and supporting units for logistics support for the company and for elements augmenting the engineer company.
- May have a secondary role as the brigade rear engineer if colocated at the rear CP for communications considerations. In this role, the XO

accomplishes the tasks required to integrate and synchronize engineer support for rear-area operations. These tasks include—

- Monitoring rear-area engineer operations.
- Anticipating unit-specific future engineer requirements.
- Executing engineer unit sustainment and coordinating future unit sustainment needs with the brigade rear CP and BSB.
- Providing engineer expertise in the brigade rear area and coordinating directly with all brigade rear-area CS and CSS elements.
- Working closely with the brigade engineer to facilitate brigade level engineer C2.

- Operates as a TF engineer if METT-TC and the task organization of the company within the SBCT require it.

FIRST SERGEANT

2-58. The 1SG is the senior NCO and is usually the most experienced soldier in the company. He is the commander's primary tactical advisor and expert on individual and NCO skills. He assists the commander in planning, coordinating, and supervising all activities that support the unit mission. The 1SG operates where the commander directs or where duty requires. The 1SG—

- Is involved early in the planning process to provide quality control in executing engineer missions and logistics operations.
- Checks on the welfare of the soldier as a second set of eyes for the commander. He may be colocated with the company commander.
- Enforces the tactical standing operating procedures (TSOPs).
- Plans and coordinates training.
- Coordinates and reports personnel and administrative actions.
- Supervises supply, maintenance, communications, field hygiene, and MEDEVAC operations.
- Ensures that CSS priorities are requisitioned and replenished.
- Monitors the logistics status and submits reports to the company XO and the brigade rear CP as required.
- Supervises, inspects, and observes matters that the commander designates. He may observe and report on the status of obstacles and survivability within the brigade.
- Assists and coordinates with the XO. He should also be prepared to assume the XO's duties as required.

COMBAT MOBILITY OR MOBILITY SUPPORT PLATOON LEADER

2-59. The platoon leader of a combat mobility or mobility support platoon task-organized to a battalion TF may also be the staff engineer and advisor to the TF commander. The staff engineer integrates engineers into the TF planning process and coordinates with other BOSs to ensure engineer synchronization. During battle preparation, the platoon leader ensures that soldiers and equipment are in the correct location and are on time for linkups and rehearsals. The platoon leader then executes the engineer mission to support the operations. During planning and execution, the platoon leader must keep the engineer company commander, brigade engineer and, potentially, the TF commander informed on critical tasks. The command and support relationship that the platoon has with a maneuver unit determines the priority of reporting channels, given the limitation of C2 equipment. The decisions associated with C2 must be understood and made in conjunction with task organization. The platoon leader must compile accurate tactical and technical information and continuously forward it upward and laterally in the quickest, clearest, and most secure method possible. The mobility support platoon leader may be required to function as the company XO if the XO is required to operate as the TF engineer.

Task Force Responsibilities

2-60. When allocated to a TF or a cavalry squadron, the TF engineer is the primary engineer advisor to the force commander and staff on M/CM/S. The TF engineer—

- Is the primary engineer staff planner for the TF.
- Focuses the engineer effort and synchronizes engineer support for the entire TF.
- Integrates specified and implied engineer tasks into the TF plan.
- Ensures that supporting engineer units are completely integrated into TF mission planning, preparation, and execution.
- Does the following as the TF engineer staff officer:
  - Provides engineer expertise to the TF staff.
  - Informs the TF commander of the capabilities, limitations, and employment considerations of supporting engineers.
  - Prioritizes and recommends the allocation of engineer personnel, equipment, logistics, and units.
  - Integrates engineer battlefield functions into future TF plans.
  - Develops the necessary input to TF orders, annexes, and engineer unit orders as required.
  - Formulates ideas for engineer support to meet the TF commander’s intent.
  - Recommends the engineer priorities of effort, support, and acceptable risks to the TF commander.
  - Determines and accurately evaluates the critical aspects of the engineer situation.
  - Develops an SOEO concurrent with the TF maneuver COAs.
  - Issues timely instructions and orders to subordinate engineer units through the TF base order to facilitate subordinate planning, preparation, and integration.
  - Alters the engineer plan based on feedback from the maneuver companies and engineer units as required.
  - Interfaces with the brigade engineer on brigade plans, the status of TF engineer missions, and the identification of TF requirements for brigade or EAB engineer assets to support the TF.

- Receives, posts, and analyzes combat information affecting current engineer operations and provides input to the TF IPB.
- Visualizes the future state of engineer operations in the TF.
- Anticipates unit-specific, future engineer requirements.
- Decides what engineer missions must be accomplished to support TF current and future fights.
- Works with the brigade engineer to integrate the necessary orders and instructions into brigade plans and orders.

Platoon Leader Responsibilities

2-61. The leadership of the platoon leader is vital. He provides the purpose, direction, and motivation necessary for the platoon to accomplish its missions. When task-organized to an infantry battalion or a cavalry squadron, the platoon leader will likely colocate with the tactical operations center (TOC) throughout the planning and preparation phases of the operation. During the execution phase, however, the platoon leader will most likely be positioned with the engineer main effort, which may be different from the maneuver main effort. The platoon leader—

- Plans and adjusts all engineer operations within the TF and cavalry squadron AO.
- Coordinates the execution of the SOEO within the TF and cavalry squadron.
- Synchronizes the engineer effort among the maneuver companies and teams or troops.
- Ensures that all engineer assets complete their linkup with the correct maneuver unit based on the task organization.
- Monitors personnel, equipment, and supply statuses, reporting them to higher headquarters and coordinating for replacement or resupply.
- Plans and controls the execution of engineer orders and instructions by keeping track of the current fight.
- Tracks and reports the status of friendly and enemy M/CM/S operations and platoon logistics to the TF and engineer company commander.
- Plans and tracks engineer logistics requirements within the TF.
- Plans, coordinates, and controls direct fires for the breach force when designated as the breach force commander.
- Plans, coordinates, and executes casualty evacuation operations for the breach force when designated as the breach force commander.

COMBAT MOBILITY OR MOBILITY SUPPORT PLATOON SERGEANT

2-62. The platoon sergeant (PSG) is the primary platoon logistics executor. He coordinates with the supported TF, the engineer company 1SG, or the engineer company supply sergeant to ensure that the engineer platoon is logistically prepared for its next mission. In developing the platoon CSS plan, the PSG ensures that it is integrated into the engineer company, engineer battalion, TF, or squadron CSS plan. The PSG is also the platoon leader's senior enlisted advisor, the primary agent for the welfare of the soldiers, and the quality control agent. As the driving force behind prebattle preparation, the PSG directly supervises NCOs as they inspect their platoons before the platoon leader performs PCIs. He is also the key coordinator for additional medical support for the platoon. The PSG—

- Assists and coordinates with the platoon leader and should be prepared to assume the platoon leader's duties as required.
- Executes TLPs and briefs the platoon OPORD in the absence of the platoon leader.
- Is involved early in the planning process to provide quality control in executing engineer missions and logistics operations.
- Checks on the welfare of the soldiers as a second set of eyes for the platoon leader.
- Enforces standards and the TSOP.
- Supervises platoon supply, maintenance, communications, field hygiene, and MEDEVAC operations.
- Ensures that CSS priorities are requisitioned and replenished.
- Monitors the logistics status and submits reports to the appropriate TOCs as required.
- Supervises, inspects, and observes matters that the platoon leader designates. He may observe and report on the status of obstacles and survivability within the brigade.

COMBAT MOBILITY OR MOBILITY SUPPORT SQUAD LEADER

2-63. The engineer squad leader has dual responsibilities as a squad leader and, potentially, as the senior engineer advisor to the maneuver company, troop, or platoon as required by METT-TC conditions. In this rare case, the squad leader is the expert on mobility and countermobility and the primary executor of engineer missions. The squad leader—

- Executes engineer missions as directed.
- Checks on the welfare of soldiers.
- Enforces the TSOP.
- Supervises supply, maintenance, communications, and field hygiene.
- Monitors the logistics status and submits reports to the PSG as required.
- Conducts PCIs and supervises mission preparation.
- Observes and reports on the status of obstacles and survivability positions for which the squad is responsible.
- Can be involved in the supported unit planning process and can provide input on executing engineer missions.

NOTE: The location of the FBCB2 in the vehicle makes it extremely difficult to enter and transmit reports while it is moving. During movement and engagements, squad leaders and vehicle commanders send reports to the platoon leader. The platoon leader consolidates the reports and forwards them to the company commander or team commander. This is usually done via FM voice. A digital report should be forwarded as soon as time permits. In the defense, FBCB2 can be used to send reports until the enemy is in direct-fire range.

Chapter 3

Intelligence, Surveillance, and Reconnaissance

ISR refers to a combined arms enabling operation that combines the former reconnaissance and surveillance (R&S) (a maneuver task) with the production and dissemination of intelligence (a former staff task). ISR is a continuous, recursive operation focused on collecting relevant information that is analyzed to create intelligence and increase the commander's ability to visualize and support the operational cycle. The engineer role in ISR operations is an expansion of the basic roles that engineers have historically played in support of the maneuver force and as members of the staff. This role integrates the organic combat and geospatial engineering capabilities within the SBCT and leverages them to assist the tempo, quality, and ultimate success of ISR operations. The organic terrain team, with its ability to create and act as the conduit for geospatial information and services (GI&S) into the brigade, is a tremendous asset for the SBCT and its organic cavalry squadron (RSTA). Although not designed with permanent ERTs, the engineer company, if directed to do so, is prepared to provide these teams by taking risks in other areas to support the critical activities associated with ISR operations. ISR operations support, and are supported by, the use of *predict-to-prevent* linkages in the support of assured mobility for the SBCT.

MILITARY DECISION-MAKING PROCESS

3-1. ISR operations within the SBCT combine intelligence production with collecting R&S information and gathering reconnaissance. ISR operations are conducted to answer information requirements (for example, confirming or denying enemy COAs, providing target information, and supporting the application of the predict-to-prevent fundamentals of assured mobility) and enhance the SBCT COP. ISR goes a step further to facilitate SU. Where R&S answer the *what* on the battlefield, ISR has the additional requirement of answering *why*. Many of the ISR tools organic to the SBCT are also organic to the cavalry squadron.

NOTE: For more information on ISR operations within the SBCT, see *FMs 3-21.31* and *3-20.96*.

3-2. As with the MDMP, the ISR process is driven by the IPB and centers on the commander's information requirements. The ISR synchronization matrix serves as the baseline for ISR operations and as a guide for ISR plan preparation. The SBCT staff develops and monitors the ISR tasking matrix with input from commanders and other staff members. The SBCT S3 and staff, in conjunction with the cavalry squadron, develop the ISR plan and synchronize it with current and future operations.

3-3. The IPB process is integral to ISR plan development. The IPB process, the intelligence synchronization process, and ISR planning are discussed in *FMs 34-2.1, 34-80,* and *34-130*.

MANEUVER SUPPORT RESPONSIBILITIES

3-4. The SBCT commander often requires information concerning the trafficability of roads, bridges, and urban areas and other terrain assessments. The MANSPT cell must support the units conducting ISR operations and ensure that assured mobility information requirements are answered to provide the commander with the visualization he requires. The staff integrator for assured mobility lies with the senior engineer within the MANSPT cell. In this capacity, the brigade engineer is responsible for integrating and synchronizing all MANSPT assets into the planning process.

COORDINATOR

3-5. The MANSPT coordinator is the integrator of the MANSPT cell and coordinates the actions of all MANSPT branches and elements, including engineer, MP, and EOD elements if they are present in support of the SBCT. The chemical element in the S3 section is not organic to the MANSPT cell, but it requires integration into the actions of the MANSPT cell. Synchronizing MANSPT-related actions is critical to the success of the brigade and combined arms operations.

ENGINEER

3-6. As the staff integrator for assured mobility, the brigade engineer works with other members of the MANSPT cell and staff sections and cells to establish and track predict-to-prevent linkages. These linkages will be IR and, in some cases, may be CCIR.

MILITARY POLICE

3-7. The MP are represented by a staff section of two personnel in the SBCT. They help plan and integrate assured mobility in the ISR planning process. MP augmentation is required to provide on-the-ground support to ISR operations. If augmentation is available, their actions in the circulation control role make them natural participants in ISR operations. (See *FM 3-21.31* for more details.)

CHEMICAL

3-8. The chemical members of the brigade staff are currently located in the S3. However, they are key participants in MANSPT and have an important part in coordinating with the MANSPT cell. Their organic chemical reconnaissance platoon of the SBCT is part of the cavalry squadron, and these assets are integrated into ISR by the squadron and the chemical staff at brigade level.

EXPLOSIVE ORDNANCE DISPOSAL

3-9. Although not organic to the SBCT, it is highly likely that the brigade will be augmented with EOD. EOD has a key supporting role to assured mobility and a requirement to be closely linked to the MANSPT cell and the engineer section to support ISR operations.

BATTLE TRACKING AND ASSURED MOBILITY

3-10. The brigade engineer is responsible for integrating and facilitating the synchronization of assured mobility for battle tracking ISR. In this respect, the linkages of assured mobility and the ISR decision-making process are similar to the relationship between engineer action in the EBA and support of the MDMP. While the predict-to-prevent fundamentals of assured mobility appear to be a new requirement, in reality they are just a more formalized extension of what engineers and other staff officers have always been doing.

ENGINEER SUPPORT

3-11. Engineer support of ISR operations is largely a function of three pieces. First is the work of the brigade engineer to integrate the considerations of assured mobility into all planning and execution. Second is the support by the terrain team in providing GI&S to the SBCT. Both of these support the development of the ISR plan with the associated R&S overlay. The ISR plan is a continuous process; it is never finished. The third area where engineers support ISR operations is through the commitment of ERTs.

3-12. Besides ERTs, other engineer assets may be task-organized to the cavalry squadron to facilitate mobility during the performance of ISR operations. (See *Chapter 8* for additional information.)

3-13. Establishing the predict-to-prevent linkages associated with assured mobility is a critical component of ISR battle tracking and the collection management process. The focus of assured mobility is not a separate process. It is fully integrated into the ISR process as IR and is another enabler to the commander in the continuing effort to visualize the battlespace of the SBCT and its AO.

3-14. Operations are likely to be executed in some of the most varied ecologically devastated environments, against diverse opponents, and in theaters of operation known for their asymmetric view and use of mines. SBCT engineers provide threat engineer and terrain knowledge in asymmetric and symmetric environments. Geospatial and engineer reconnaissance abilities generate knowledge and products that portray the enemy and environmental features needed for developing the COP and visualizing the battlefield. Engineers embedded in the brigade and battalion planning cycles provide an analysis of information on enemy capabilities, intentions, and vulnerabilities and the environment. Geospatial and reconnaissance capabilities include collecting and analyzing environmental information (weather and terrain) and the impact the information will have on friendly and enemy operations. A lesser, but included, benefit is the linkage to environmental considerations. Engineers may be actively including specific environmental considerations into the ISR plan to support future SBCT operations.

Chapter 4

Offensive Operations

Offensive operations aim at destroying or defeating an enemy. Their purpose is to impose the will of the United States on the enemy and achieve decisive victory. A commander may conduct offensive operations to deprive the enemy of resources, seize decisive terrain, develop intelligence, hold an enemy in position, or facilitate other friendly operations. Offensive operations tend to highlight the assured mobility imperatives and attack the enemy's ability to influence operating areas and maintain mobility and momentum.

CHARACTERISTICS

4-1. The engineer company provides a significant offensive capability to the force. It is the primary agent of obstacle and fortification reduction available to the SBCT. Whatever their purpose, all offensive operations have the characteristics of surprise, concentration, tempo, and audacity.

SURPRISE

4-2. Surprise is achieved by striking at a time or place or in a way that the enemy is not physically or mentally ready for or in a manner for which the enemy is unprepared and did not expect. Increases in technology, modern surveillance and warning systems, and the availability of commercial imagery satellite products—along with global commercial news networks—make complete surprise less likely. However, surprise can be achieved by operating in a manner that the enemy does not expect. An enhanced COP and terrain visualization enable the engineer company to achieve surprise because it better understands 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

4-3. Concentration is the massing of overwhelming effects to achieve a single purpose. The massing of effects does not necessarily mean the physical massing of forces. With advancements in ground and air mobility, target acquisition, and long-range precision fires, the concentration of effects can occur more rapidly. The concentration of reduction assets, as well as the negative influence from the presence of fortifications and obstacle effects, directly impacts maneuver unit ability to concentrate the terminal effects of its fires. Concentration requires careful prior coordination within the combined arms team and with other services and coalition partners as required. Engineers begin the concentration planning by integrating geospatial products and templating threat obstacles. This allows the engineer company to concentrate reduction assets and overcome obstacles or other impediments at the point of penetration as part of the maneuver unit breaching plan.

TEMPO

4-4. Tempo is the rate of military action. Controlling or altering this rate is a necessary means of retaining the initiative. An enhanced COP and extended operational reach allow the SBCT to maintain a faster tempo than the enemy. Engineer speed and flexibility are crucial to the attack. Rapid mobility operations by engineers ensure the maneuver force tempo. The ability to quickly reduce, mark, and guide the supported maneuver unit through an obstacle is the engineer's hallmark. The imperative of maintaining mobility and momentum is highlighted as forces focus on achieving the fundamentals of avoid, neutralize, and protect.

AUDACITY

4-5. Audacity is a simple plan of action that is boldly executed. The audacious commander is quick, decisive, and willing to take prudent risks. Engineers operating in a decentralized role, who comprehend the commander's intent, can enable the commander to see the battlefield and anticipate future operations. When the commander's SU is enhanced, he can be more audacious.

TYPES

4-6. The SBCT conducts offensive operations by assessing, planning, preparing, and executing operations. The fielding of advanced technological systems enhances the knowledge of friendly and enemy forces, allowing commanders to better employ their reconnaissance forces and use their combat power more efficiently and effectively. *Figure 4-1* and *Figure 4-2*, page 4-4, show offensive operations within the battlefield organization for noncontiguous and linear operations.

DECISIVE OPERATIONS

4-7. Decisive operations are attacks that conclusively determine the outcome of major operations, battles, and engagements. The SBCT accomplishes decisive operations through close combat, resulting in the destruction of the enemy and seizing, occupying, organizing, and holding the terrain. Based on METT-TC, commanders allocate forces, decide where their forces can destroy the enemy, and determine the tempo of the fight. Engineers support the decisive fight by focusing on—

- Dedicated support to decisive operations.
- The priority of support to mobility operations (predominantly obstacle reduction).
- The priority of countermobility support to critical flank protection (primarily SCATMINEs).
- The priority of survivability support to critical C4ISR nodes.

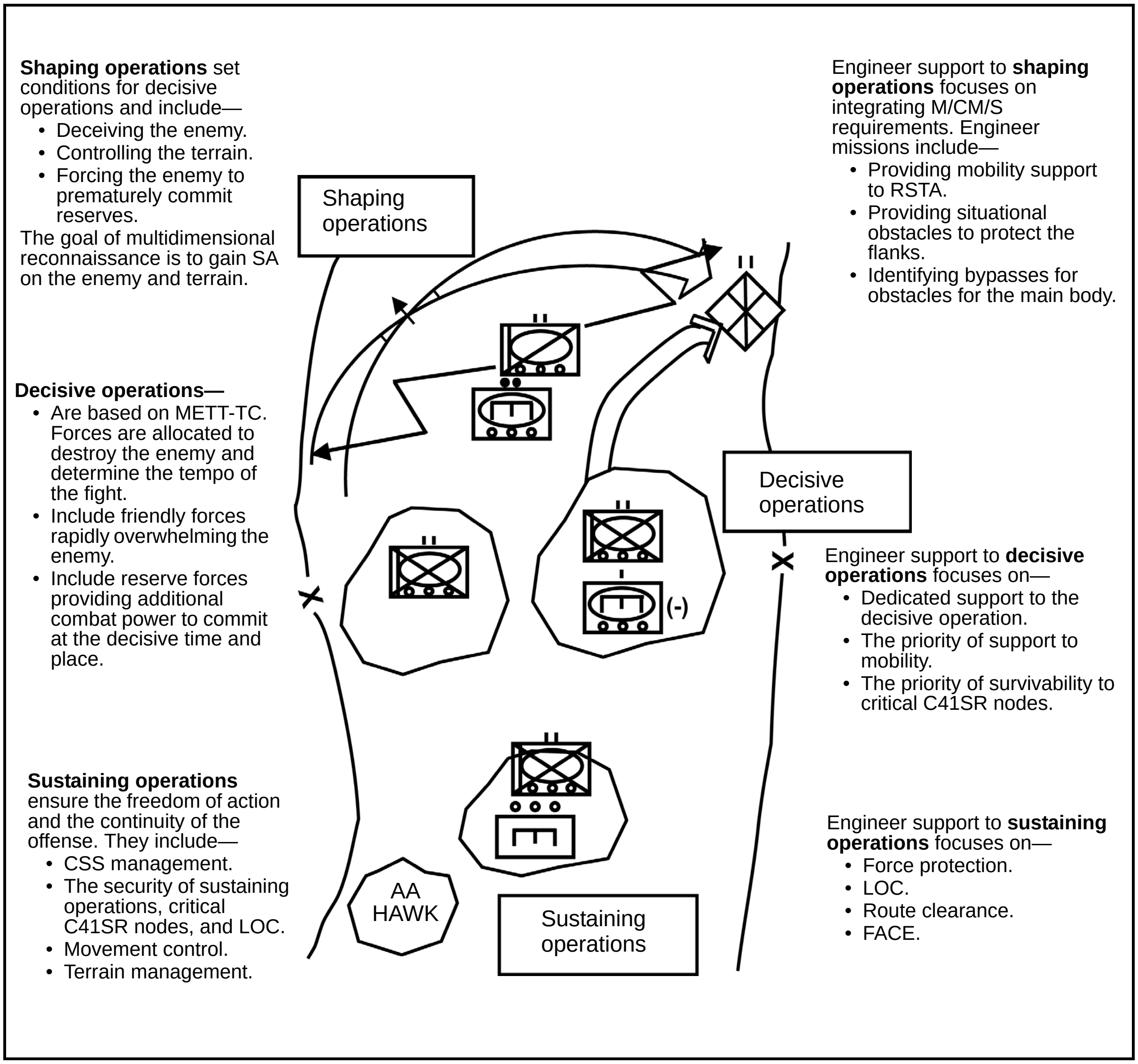


Figure 4-1. Brigade Offensive Framework

SHAPING OPERATIONS

4-8. Shaping operations set conditions for decisive operations. For the SBCT, shaping operations include shaping attacks designed to—

- Deceive the enemy.
- Destroy or fix enemy forces that could interfere with the decisive operation.
- Control terrain whose occupation by the enemy hinders the decisive operation.
- Force the enemy to commit reserves prematurely or move into an indecisive area.

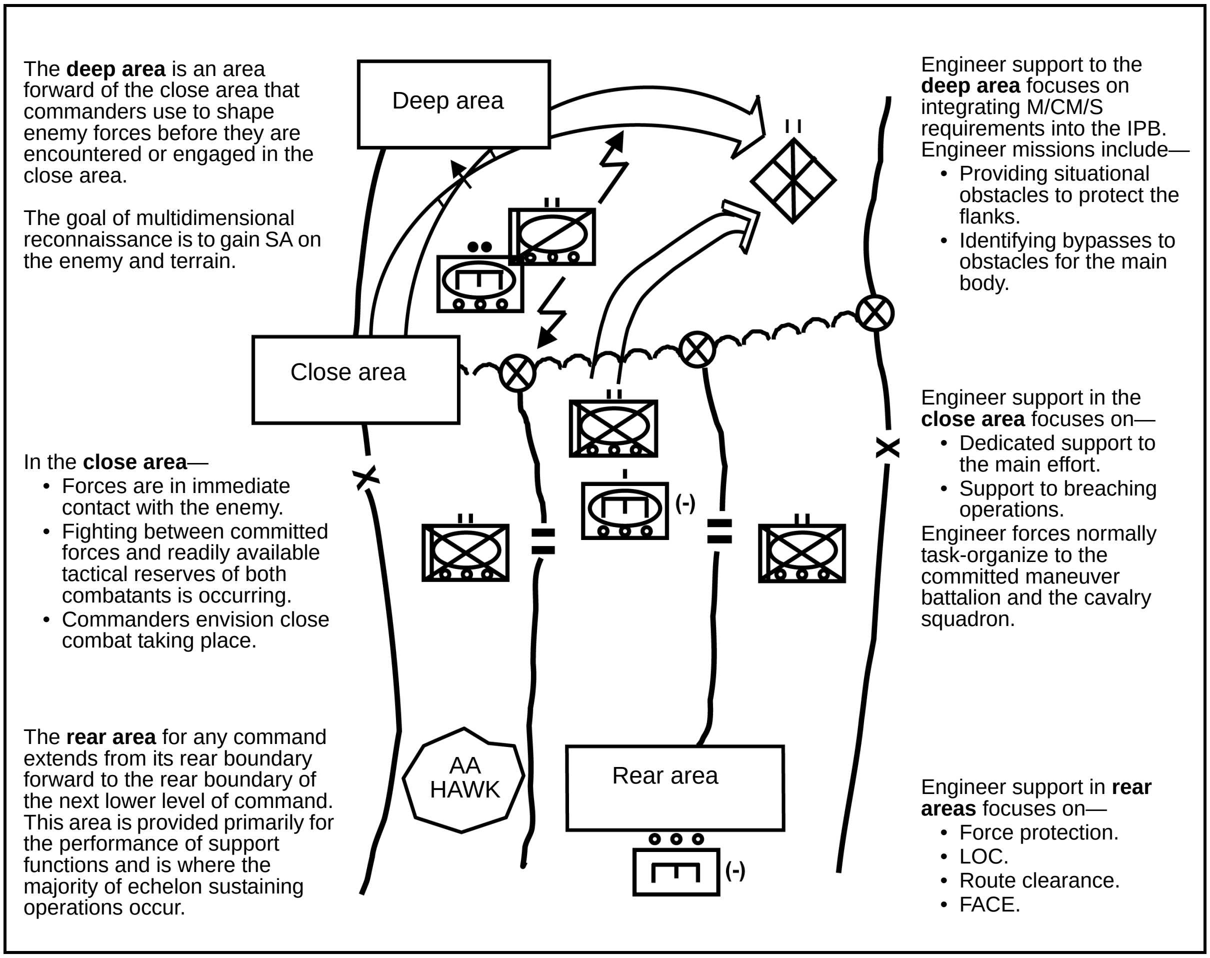


Figure 4-2. Brigade Offensive Framework in Linear Operations

4-9. In an extended, noncontiguous battlefield, the cavalry squadron conducts multidimensional reconnaissance of the gaps between the maneuver units for the development of SA. Engineers support the shaping fight with the priority of efforts to mobility and the emplacement of situational obstacles in a force protection role for maneuver unit flanks. Engineers support shaping attacks, which are designed to deny the enemy the freedom of action and to disrupt or destroy its coherence and tempo, thus creating a vulnerability that SBCT combat forces can exploit.

SUSTAINING OPERATIONS

4-10. Sustaining operations in the offense ensure the freedom of action and the continuity of operations, CSS, and C2. Sustaining operations include—

- CSS management.
- The security of sustaining operations, critical C4ISR nodes, and LOC.
- Movement control.
- Terrain management.

4-11. In a distributed operation, SBCT units may be located a great distance from the BSB, extending LOC and their security requirements. Engineers support sustaining operations by focusing on force protection, survivability to critical C4ISR nodes, route clearance, and limited LOC sustainment. When properly augmented, engineers support forward aviation combat engineering (FACE), including TUAV landing strip construction, RRR, and LZ creation in support of air assault operations.

DEEP-, CLOSE-, AND REAR-AREA OPERATIONS

4-12. Within the decisive, shaping, and sustaining framework, the SBCT may associate control measures to identify the purpose with time and space by identifying deep, close, and rear areas. In this case, the operation is generally linear, and a majority of the combat force is associated with the close fight.

4-13. In the close area, the maneuver commander's focus is to synchronize the total combined arms team. He facilitates this action by designating a main effort, a supporting effort (committed force), a follow-and-support force (if any), and a reserve. Engineers support the close-area fight by focusing on dedicated support to the main effort and breaching operations. Engineer forces may be task-organized to support the designated breaching battalion and the cavalry squadron.

4-14. The goal of reconnaissance and security operations is to gain information on the enemy and terrain to provide the brigade with reaction time, space, and protection. Engineer support to reconnaissance and security operations focuses on integrating M/CM/S requirements into the IPB. Engineer missions include providing engineer reconnaissance elements and situational obstacles as flank protection and identifying bypasses to obstacles for the main body. The capabilities of the terrain team are essential to the reconnaissance and security efforts of the brigade.

4-15. The SBCT may participate in ARFOR, corps, and division level deep-area operations. The SBCT does not normally conduct separate deep-area operations.

4-16. The purpose of rear-area operations is to retain the freedom of maneuver and the continuity of operations. This involves synchronizing and protecting the sustaining operations to support the attacking battalions. Engineers support rear-area operations by focusing on force protection, limited LOC sustainment, route clearance, and construction and repair of forward airfields.

FORMS OF MANEUVER

4-17. Maneuver is the employment of forces on the battlefield through movement, in combination with fire or fire potential, to achieve a position of advantage in respect to the enemy, and to accomplish the mission. The forms of maneuver are envelopment, turning movement, frontal attack, penetration, and infiltration. *Table 4-1*, page 4-6, describes the digital impacts of the forms of maneuver. Double envelopment and turning movements normally require large force structures, are more applicable to division level or higher operations, and are covered in *FM 71-100*.

Table 4-1. Digital Impacts of Forms of Maneuver

Form of Maneuver	Digital Impact
Envelopment	Engineers use the SITEMP and current reconnaissance information displayed on their FBCB2 to gain near-real-time SA and build a COP of known and templated enemy obstacles and to determine if there is an assailable flank.
Turning movement	The COP, provided through the FBCB2, allows the attacking force to avoid the principle enemy defensive positions and obstacles to reach objectives in the enemy rear. Known enemy movement responding to the turning movement is shared through the COP provided by the FBCB2.
Frontal attack	Digital communications and improved SA through the COP allow the engineer company commander to accurately predict breaches and task-organize to react to changing battlespace situations. FBCB2 enhances the commander's ability to concentrate forces faster and increases the tempo with which all actions can be performed.
Penetration	Digital obstacle overlays and lane locations are transmitted (via FBCB2) up the chain to the engineer company and brigade engineer section for rapid dissemination to forces throughout the SBCT AO.
Infiltration	Digital C4I systems, improved SA through the COP, and terrain visualization allow maneuver forces and engineers to infiltrate as required. Enhanced FBCB2 capabilities enable maneuver forces and engineers to conduct tactical movements over covered and concealed routes by using preselected checkpoints. The commander tracks the movement of each vehicle within the command and simultaneously maintains SA of the enemy through the COP provided by FBCB2.

ENVELOPMENT

4-18. An envelopment is the preferred form of offensive maneuver. It seeks to strike the enemy on an assailable flank or from the rear and forces the enemy to fight in a direction from which it is least prepared. Enemy defensive positions, obstacle systems, and the terrain (not the march direction) define the flank (see *Figure 4-3*).

4-19. Engineer support priorities for an envelopment are the mobility of the enveloping force and the protection of its extended flanks. Engineers plot known and templated enemy obstacles to determine if there is an assailable flank. Breaching an obstacle system can provide the maneuver commander with the flank he needs; therefore, enemy obstacles and terrain must be adequately studied.

4-20. The maneuver force that makes up the enveloping force normally organizes for breaching operations. Once committed, the enveloping force must have the capability to breach unforeseen obstacles with minimal delay and maneuver. The following are critical to this ability:

- OBSTINTEL gathered before the enveloping-force mission. The brigade engineer must ensure that engineers are totally integrated

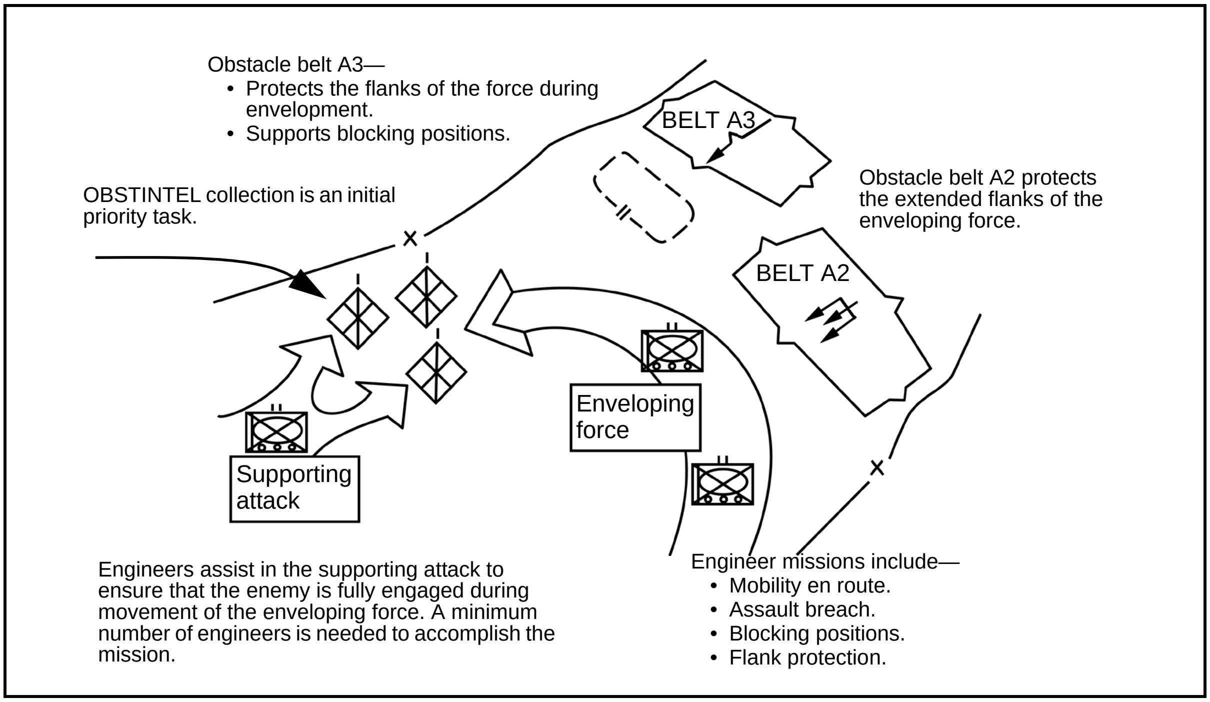


Figure 4-3. Engineer Support to an Envelopment

into the brigade RSTA plan and within the cavalry squadron and infantry battalion scouts as applicable.

- Engineers task-organized to the enveloping force. They provide responsive, rapid obstacle reduction capabilities and the ability to further task-organize forces to accomplish the mission.

4-21. Engineer task organization must provide flexibility and redundancy. The main effort cannot afford to wait for low-density equipment or units to be brought forward or replaced.

Main Effort

4-22. Engineer support to the main effort is broken into two separate areas that require dedicated engineer forces to—

- Provide en route mobility, including reduction of obstacles.
- Protect the enveloping-force flanks.

4-23. Engineer support to protect the enveloping-force flanks centers on situational obstacles, which are planned at the brigade level. SCATMINE systems are key components for this support.

4-24. A key aspect of mobility support to the main effort is maintaining the enveloping-force LOC. In an 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. SBCT engineers have limited sustainment capability and rely on EAB assets for augmentation.

Actions on the Objective

4-25. To provide engineer support to actions on the objective, the brigade engineer and staff must understand the enveloping-force mission. Fundamental to this understanding is the brigade engineer's involvement with the S2 in the IPB process. Determining the task organization of engineer units to the enveloping force centers on the IPB process and the subsequent collection of information.

4-26. The mission of the enveloping force may be to attack and roll up a defending enemy force or reserve. The main effort of engineer support is still mobility. The task organization must provide attacking battalions with the capability to breach protective obstacles. However, the mission may be to secure key terrain that cuts enemy LOC. The enveloping force may then establish blocking positions. Therefore, engineer support to actions on the objective may also require countermobility and survivability operations. The SBCT achieves most of its survivability through its organic mobility and enhanced SU unless augmented with other engineer assets. The organic engineer company can provide only limited survivability support. In these cases, the brigade engineer, through war gaming, ensures that the enveloping force has the assets to maintain its mobility during the attack and establish effective blocking positions.

Supporting Attack

4-27. Providing the necessary assets to the supporting attack is the brigade engineer's greatest challenge. While the main effort of engineer support and concentration of the engineer force is with the enveloping force, engineer requirements for the supporting attack must not be discounted. When the envelopment is successfully executed, the supporting attack 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 supporting attack to penetrate the prepared defenses and keep the enemy fully engaged during the movement of the enveloping force. This causes the enemy to fight in two directions.

4-28. The engineer's role in the supporting attack is normally limited in scope because of support priorities to the enveloping force. The brigade engineer carefully analyzes the requirements of the supporting attack. This may require focusing on the maneuver plan two levels down (infantry company) through close coordination with the engineer company commander and maneuver force commanders. The brigade engineer often recommends to the brigade commander to accept a degree of risk and allocate the minimum force necessary to accomplish the mobility requirements. However, the brigade engineer can reduce the risk by initially focusing OBSTINTEL collection to confirm or deny assumptions made about the enemy situation facing the supporting attack.

TURNING MOVEMENT

4-29. A turning movement is a form of maneuver where the attacking force seeks to avoid enemy principle defensive positions by seizing objectives to the enemy rear and causing him to move out of his current positions or divert major forces to meet the threat. This form of offensive maneuver frequently transitions from the attack into an exploitation of pursuit. A turning movement differs from an envelopment, because the force conducting a turning movement seeks to make the enemy displace from his current location, whereas an enveloping force seeks to engage the enemy in his current location from an unexpected direction.

4-30. The commander directing a turning movement task-organizes his resources into a turning force, a main body, and a reserve. Each of these forces conducts security and reconnaissance operations. The turning force or the main body can conduct the echelon decisive operation, given the appropriate factors of METT-TC. The SBCT is not likely to conduct a turning movement by itself, but it may well be one of the components of such an operation. The characteristics of the SBCT may make it more likely to be the turning force.

Main Effort

4-31. Engineer support to the main effort requires dedicated engineer forces to—

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

4-32. A key aspect of mobility support to the main effort is maintaining the enveloping-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 enemy units that have bypassed. SBCT engineers have limited sustainment capability and rely on EAB assets for augmentation.

Actions on the Objective

4-33. To provide engineer support to actions on the objective, the brigade engineer and staff must understand the SBCT role in the turning movement. Fundamental to this understanding is the brigade engineer's involvement with the S2 in the IPB process. Determining the task organization of engineer units to the enveloping force centers on the IPB process and the subsequent collection of information. Success of the turning movement implies the potential requirement to transition to the defense to support the maneuver force fight against counterattacking enemy forces.

Supporting Attack

4-34. If the SBCT is the turning force, the supporting attack may be more in the nature of the follow-and-assume or follow-and-support force within the brigade axis of attack. As such, the possibility of shifting engineer assets is more possible than in a form of maneuver like a frontal attack. Flexibility in providing the necessary assets is the brigade engineer's greatest challenge. The ability to transition from a focus on mobility to one of countermobility and then back to mobility is critical.

FRONTAL ATTACK

4-35. A frontal attack is a form of maneuver where an attacking force seeks to destroy a weaker enemy force or fix a larger enemy force in place over a broad front. The SBCT and its subordinate units may conduct a frontal attack to rapidly overrun a weak enemy force. A commander commonly uses a frontal attack as a shaping operation in conjunction with other forms of maneuver. He normally employs a frontal attack to—

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

4-36. It is also necessary to conduct a frontal attack when assailable flanks do not exist. Where a penetration is a sharp attack designed to rupture the enemy position, the commander designs a frontal attack to maintain continuous pressure along the entire front until a breach occurs or the attacking forces succeed in pushing the enemy back. Frontal attacks conducted without overwhelming combat power are seldom decisive. Consequently, the commander's choice to conduct a frontal attack in situations where he does not have overwhelming combat power is rarely justified, unless the time gained is vital to the success of the operation. Engineers will be involved with ensuring the mobility of the force, with little opportunity to shift engineer assets once committed. A commander conducting a frontal attack organizes his unit into an element for reconnaissance and security operations, a main body, and a reserve. The factors of METT-TC dictate the specific task organization.

Main Effort

4-37. Engineer requirements are associated with each of the elements of this force, but are likely to be massed to ensure success of the decisive action(s). This is generally in support of the main effort.

4-38. Engineer support to the main effort is broken into several areas that require dedicated engineer forces to—

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

Actions on the Objective

4-39. To provide engineer support to actions on the objective, the brigade engineer and staff must understand the frontal-attack mission. When a unit can no longer advance, it will adopt a defensive posture. Whether on the objective or not, the engineer must be able to rapidly transition in support of the maneuver elements. 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.

Supporting Attack

4-40. Providing the necessary assets to the supporting attack is the brigade engineer's greatest challenge. The main effort of engineer support and concentration of the engineer force may be with the elements performing the decisive operations for the SBCT. The engineer requirements for the supporting attack must not be discounted. However, given the nature of a frontal attack, engineers will be hard-pressed to simultaneously support across-the-broad frontage typically associated with frontal attacks. The supporting attack will likely have many of the same engineer requirements as the main attack, to include reducing obstacles. More importantly, the success of the main effort may depend on the ability of the supporting attack to fix the enemy and keep the majority of their force fully engaged.

PENETRATION

4-41. The purpose of a penetration is to rupture enemy defenses on a narrow front and disrupt the defensive system. Units penetrate when—

- Enemy flanks are not assailable.
- Time does not permit some other form of maneuver (see *Figure 4-4*).

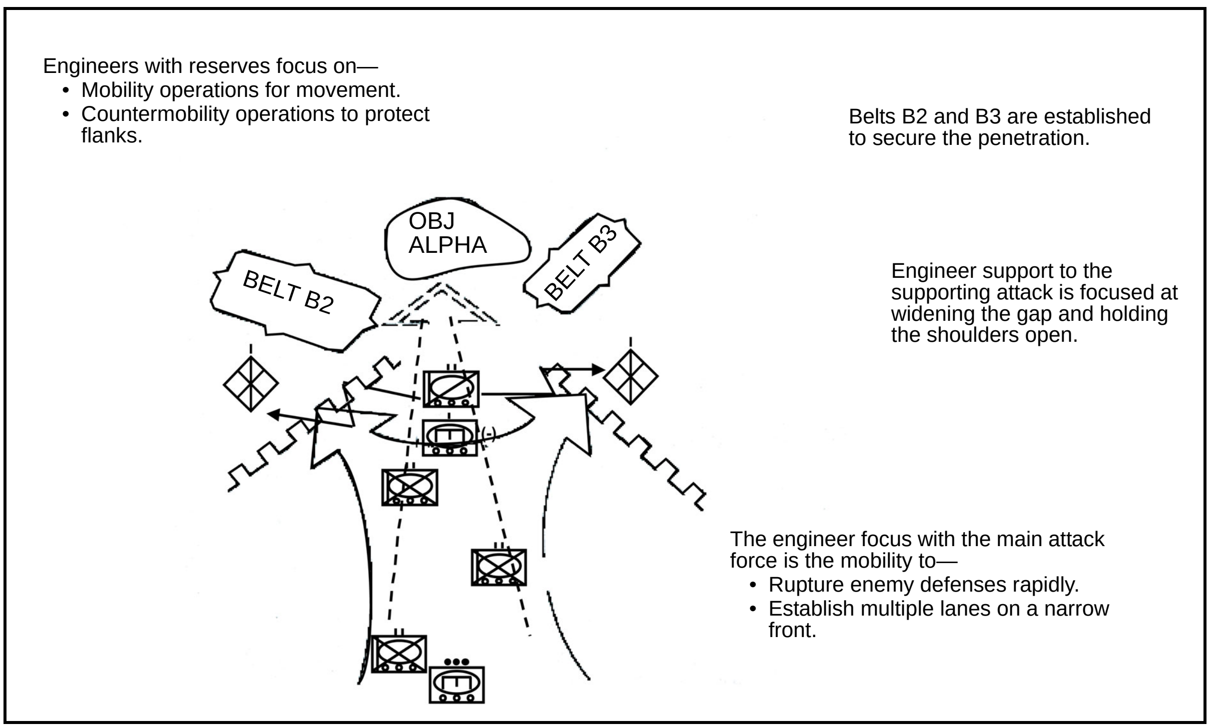


Figure 4-4. Engineer Support to a Penetration

4-42. Penetrations create assailable flanks and provide access to enemy rear areas. Because penetrations frequently attack into the front of the enemy defense, they risk significantly more friendly casualties than envelopment, turning movement, or infiltration.

4-43. A successful penetration requires the concentration of all combat multipliers, including the use of night, stealth, and covered and concealed terrain. Penetrations have three stages—

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

4-44. The brigade commander uses a penetration to—

- Attack through enemy principal defensive positions.
- Break the integrity of the defense.

4-45. The brigade uses its main attack to rupture enemy defense. Supporting attacks protect the flank of the main effort and widen the gap by defeating adjacent enemy forces. Follow-and-support forces are used to—

- Clear the zone.
- Widen the penetration.
- Secure the lodgment from counterattack.

4-46. The brigade reserve is positioned to assist the main attack and exploit success.

Main Effort

4-47. Engineers support a brigade penetration by providing the lead battalion in the main effort with the overwhelming mobility to rupture enemy obstacles. This remains the engineer main effort until a penetration is achieved. It requires the brigade engineer to mass obstacle reduction assets in the main effort. Penetration requires the rapid projection of combat power to maintain the momentum of the attack and quickly divide the enemy force. To do so requires creating more lanes along a narrower front than normally associated with breaching operations. Therefore, mass and redundancy drive engineer task organization to the main effort. Mass is commonly achieved by weighting the main effort with task-organized EAB and echelon above division (EAD) engineer augmentation, based on the generally high number of EMSTs associated with the main effort. When augmentation is unavailable, limited organic engineer assets may influence a decision to employ the entire engineer company to support the brigade main effort.

4-48. When penetration is achieved, the engineer main effort shifts to providing mobility to the forces that are widening the gap. The brigade may use supporting attacks or follow-and-support forces to widen the penetration. The brigade engineer must understand the brigade commander's intent for widening the penetration to ensure that forces have enough engineer support. When a follow-and-support force is employed to clear the zone and widen the gap simultaneously, the engineer task organization must support decentralized mobility operations. If the supporting attack is the primary mechanism for widening the gap, it may require a smaller, more centralized organization.

Countermobility

4-49. Depending on the enemy situation, countermobility may quickly become the main effort to help defeat counterattacks against the lodgment. The brigade normally uses follow-and-support forces to secure the lodgment and defeat counterattacks. Therefore, the brigade engineer and the engineer company commander—

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

4-50. Engineer planners must design obstacle belts that permit the use of tactical and situational obstacles. Normally, these obstacle belts are developed and passed to the battalions for planning, but are only active on the order of the brigade commander. Forces securing the lodgment require flexible, responsive obstacle capabilities, such as SCATMINEs (Volcanos, Gators, and Modular-Pack Mine Systems [MOPMSs]) and intelligent munitions.

Exploitation

4-51. Once the lodgment is secured, the engineer priority shifts to assisting the brigade in exploiting its success by ensuring the mobility of the exploiting battalion(s). The brigade engineer uses two mechanisms to support the exploitation. First, the SOEO must allow for the rapid development of a lane network within the penetration. The lane network must support the uninterrupted forward passage of the brigade reserve to subsequent objectives and the flow of sustainment to forces in the penetration. The brigade engineer recommends to the brigade commander that an engineer follow-and-support force (made up of corps assets) be created to establish, improve, and maintain the lane network. Second, the brigade engineer must ensure that the brigade reserve has the engineer task organization necessary to maintain its own mobility as it attacks deep into the enemy rear area.

INFILTRATION

4-52. Infiltration is a form of maneuver where the attacking force conducts covert movement through or into an area occupied by enemy forces. This is done to occupy a position of advantage in the enemy rear, while exposing only small elements to enemy defensive fires. This form of maneuver is the preferred form of infantry maneuver because it permits a smaller force to use stealth and surprise to attack a larger or fortified force. Infiltrations are normally carried out on foot or by air, but they can be executed by vehicle or watercraft. Engineers may support covert operations to breach during infiltration by the infantry. Infiltration is most feasible—

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

Intelligence Preparation of the Battlefield

4-53. Infiltrations require extensive reconnaissance to be successful. This reconnaissance—

- Identifies the enemy disposition across the area to be infiltrated.
- Identifies infiltration lanes.
- Locates assault positions for the attacking force.
- Identifies enemy weaknesses.
- Observes enemy activity.

4-54. Reconnaissance assists the commander in determining the method of infiltration, the task organization, and the size of the infiltrating units. Reconnaissance is also vital in determining actual route(s) and whether single or multiple infiltration lanes are used. Successful engineer support to an infiltration is predicated by careful, detailed terrain analysis by the brigade engineer, engineer company commander, and brigade staff.

4-55. Existing gaps in the enemy defensive system and the locations of enemy security elements must be identified. Natural obstacles and templated enemy obstacles must also be considered (see *Figure 4-5*). Engineers infiltrating with the cavalry squadron and infantry battalion scouts verify, report, mark and, as required, reduce obstacles along the infiltration lane(s).

4-56. The brigade engineer develops IR for inclusion in the S2 collection plan. In addition to the IR developed in support of the infiltration itself, others are identified specifically at the objective area. Examples are the—

- Location, type, density, and employment method of obstacles in and around the objective.
- 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.

Mobility

4-57. Mobility support is the main focus of engineer units during an infiltration. Due to the decentralized nature of the maneuver, providing task-organized engineer support to each infiltrating unit is not feasible. Maneuver units must be trained and capable of executing the mobility operations anticipated on infiltration lanes. The requirement for dedicated support during the infiltration is minimized due to the—

- Detailed templating by staff planners.
- Accurate and timely intelligence updates provided by engineers working with scouts.
- Detailed combined arms rehearsals.

This allows the brigade engineer to recommend a task organization of engineers to support the main effort along the infiltration lane.

Actions on the Objective

4-58. To provide enough support to maneuver battalions and the cavalry squadron during actions on the objective, detailed engineer planning at the

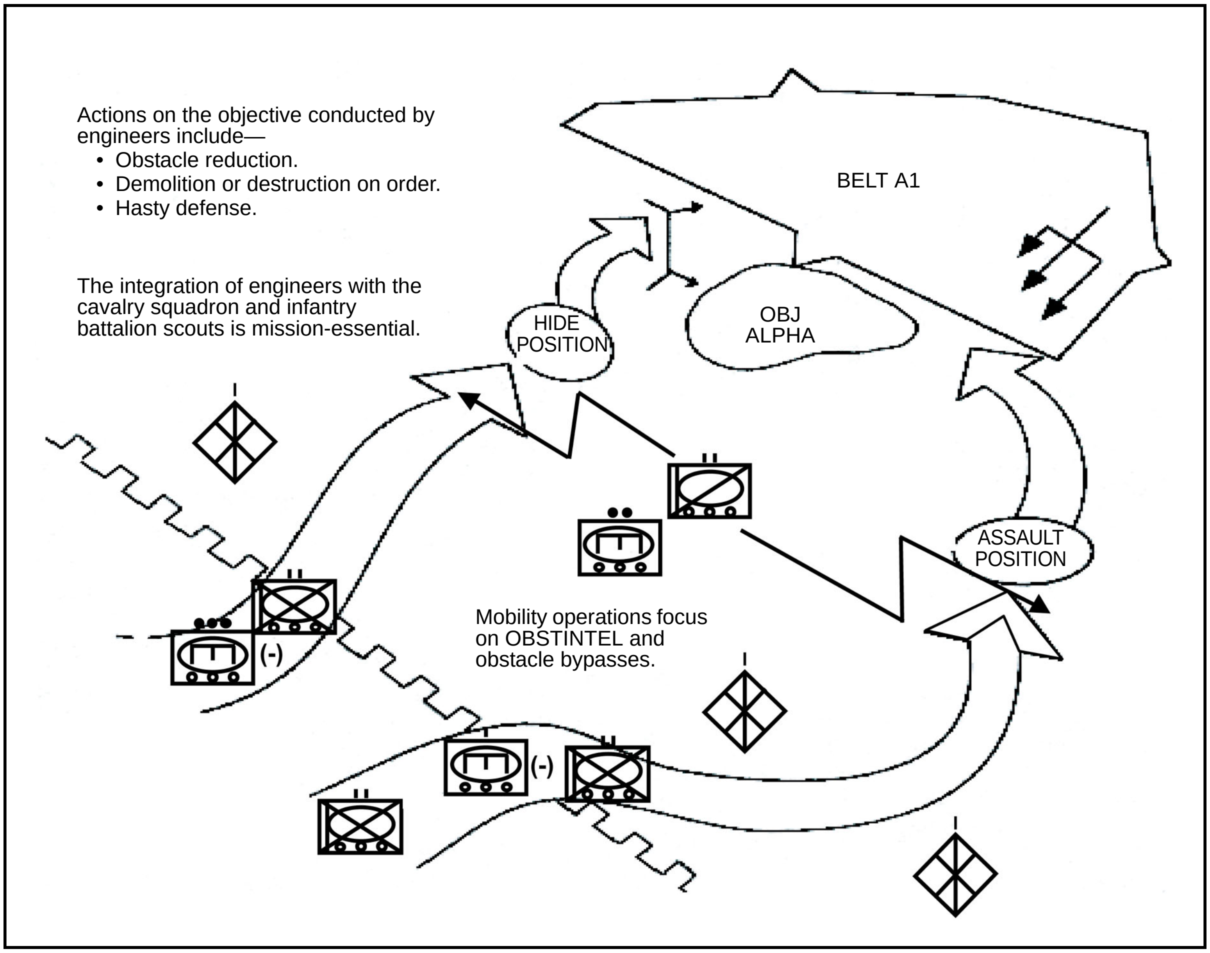


Figure 4-5. Engineer Support to an Infiltration

brigade centers on the war gaming of contingencies. Engineers may be task-organized to one or more maneuver battalions or the cavalry squadron in a command relationship during the infiltration and for subsequent actions on the objective. This ensures the maneuver commander's flexibility to further task-organize engineers and establish absolute control during breaching operations that follow actions on the objective. Subsequent, on-order missions (such as a defense) may dictate a change in the task organization of engineer units. They may need to change from a command relationship to a support relationship with maneuver battalions or the cavalry squadron. This is done to speed up the response of engineer units in support of the brigade main effort and to place the logistics support requirements directly with the BSB.

Sustainment

4-59. Infiltrations often require clearing extended MSRs from the line of departure (LD) to the attacking force. MSRs become particularly vital when the objective is secured and the attacking force requires support (such as Class V resupply, ground MEDEVAC, barrier materials, engineer equipment, or situational-obstacle material) for a hasty defense. The infiltrating force bypasses obstacles and the enemy forces focused on high-speed AAs. Therefore, the clearance of MSRs commonly resembles small-scale linkup operations and is planned and resourced accordingly. Breaching operations are common during MSR clearance. The SBCT may need to rely on EAB engineer augmentation assets to execute them.

ENGINEER OFFENSIVE PLANNING

4-60. The engineer estimate provides the planning framework for the brigade engineer to synchronize and integrate engineer company capability into the brigade and TF schemes of maneuver. (Examples of the estimate process are shown in *Appendix B*.)

4-61. The brigade begins its preparation for offensive operations by receiving a FRAGO or an OPORD from higher headquarters and then using the MDMP. The considerations discussed in the following paragraphs may be applied to all types of offensive operations, but they must be applied according to the C2 process detailed in *Chapter 2*.

4-62. Throughout the planning process for offensive operations, the supporting company commander is performing two parallel functions. He initiates TLP, and he integrates into the MDMP with the brigade engineer as outlined in *Chapter 2*.

4-63. Once the company commander issues the initial mission-planning guidance to the company, his focus is on integrating into the MDMP at the brigade main CP. During the MDMP, he remains in contact with the company CP and provides additional guidance and insight to the company leadership regarding the upcoming mission. When the brigade commander decides what COA to pursue, the company commander departs from the brigade main CP and returns to the company CP to complete and issue the plan. (The company commander's responsibilities are also discussed in *Chapter 2*.)

4-64. The nature of SBCT offensive operations may require decentralized engineer support to battalions and the cavalry squadron. Engineers may be task-organized to maneuver elements in a command relationship rather than a support relationship. This ensures responsive, dedicated support to maneuver battalions.

COMBINED ARMS BREACHING OPERATIONS

4-65. Obstacle breaching is the employment of tactics and techniques to project combat power to the far side of an obstacle. Breaching is a synchronized, combined arms operation under the control of a maneuver commander. Breaching operations begin when friendly forces employ suppressive fires and end when battle hand over has occurred between a unit conducting the breaching operation and follow-on forces. Breaching is an inherent part of maneuver. Effective breaching operations allow friendly maneuver in the face of obstacles.

4-66. Maneuver company teams and TFs normally conduct breaching operations by organizing subordinate forces into support, breach, and assault forces. They develop a scheme of maneuver specifically designed to cross an obstacle and continue the mission.

NOTE: For more information on breaching operations, see *FM 3-34.2*.

4-67. The brigade conducts combined arms breaching operations when an obstacle has been identified that the brigade cannot, or chooses not to, avoid and must neutralize. Depending on the nature of the obstacle, the entire engineer company may be required due to the limited organic assets available. Even with enhanced SU, some obstacles will not allow the brigade to bypass them.

Chapter 5

Defensive Operations

Defensive operations are a prelude to the offense. Defense plans should not be designed simply to resist enemy attack. Rather, they should aim at reverting to the offense and decisively defeating the enemy. Defensive operations defeat an enemy attack, buy time, economize forces, or develop conditions favorable for offensive operations. Engineer focus is on assured mobility imperatives of attacking the enemy's ability to influence operating areas and maintaining mobility and momentum.

CHARACTERISTICS

5-1. The defending force arrives first on the battlefield and, with the help of engineers, molds the battlefield to its advantage. Based on the higher commander's intent, maneuver commanders, along with their fire support officer (FSO) and engineer, site tactical obstacles to produce specific effects on the enemy. Engineers provide technical expertise and advice to the commander on tactical obstacle emplacement. Fortifications allow fires from positions that best disrupt and destroy the attacker. Because of defending force survivability, the defender can postpone the commitment of major forces until the attack develops and then strike the extended enemy over selected, prepared terrain.

5-2. Engineers provide essential M/CM/S support to the SBCT defense. With this support, the force can position itself and fight from terrain where it otherwise could not survive and simultaneously attack enemy freedom of maneuver.

5-3. On a nonlinear battlefield, enemy forces are bypassed, penetrated, or encircled without the overall loss of defense integrity. Providing support to defensive operations on a nonlinear battlefield is the biggest challenge facing engineers. The defender must identify the enemy main effort and attack it with sufficient force and firepower. To achieve the required level of violence, the brigade must be able to attack the enemy throughout the entire depth of its formation from mutually supporting positions in the brigade AO.

5-4. Preparation, security, disruption, massing effects, and flexibility characterize defensive operations (see *Table 5-1*, page 5-2). The mission of the brigade engineer and company commander is to plan and execute engineer missions that enhance brigade ability to combine fires, obstacles, and maneuver to destroy an attacking enemy. The defensive plan that is effective and supports the tactical plan requires sequential planning and understanding of defensive characteristics.

Table 5-1. Enhanced Technology Impacts on Defensive Characteristics

Defensive Characteristic	Impact
Preparation	Enhanced decentralized integration and execution Automated tracking and planning of engineer requirements Enhanced terrain visualization to identify survivability and obstacle requirements Improved ability to conduct complete and parallel planning and BOS integration
Security	Enhanced SA of the battlefield, enemy disposition, and friendly forces (near-real-time SA) Simultaneous coordination and synchronization of the defense Sensor munitions that disrupt enemy attack, protect flanks, and protect otherwise undefended areas
Disruption	Rapid obstacle emplacement capability to attack the enemy forward of the EA
Massing of Effects	Enhanced C4I systems that facilitate battle command and the concentration of forces, obstacles, and fires
Flexibility	Rapid adjustment and simultaneous dissemination of the engineer plan through digital FRAGOs, updated graphics, and situation updates Facilitated battle command and task organization for transition to the offense Increased flexibility with on and off sensor munitions

PREPARATION

5-5. To prepare for the defense, the brigade commander must be familiar with the capabilities and limitations of the enemy. The terrain must be analyzed in detail from all perspectives and then verified from the ground. The commander then organizes the defense with a mixture of direct- and indirect-fire weapons (directed at the enemy main threat). Capabilities of these weapons are enhanced by the terrain.

5-6. Engineers play an essential role in preparing the defense. Based on the commander's intent, engineers—

- Emplace tactical obstacles to produce specific effects on the enemy.
- Construct survivability positions that allow the brigade to sustain the fight and protect critical C4ISR nodes.

5-7. Engineer success in the preparation phase depends on the ability of the brigade engineer to conduct integrated planning with the maneuver commander's staff. The brigade engineer must analyze the full range of engineer requirements in support of decisive, shaping, and sustaining operations. The brigade engineer has to know and understand the capabilities of engineers on the battlefield, know how many Class IV and V supplies are available, and know when resupply can be expected.

5-8. The engineer focus in the preparation phase is not limited to the close area in the MBA. Each element of the defensive framework must be considered during engineer mission analysis and accounted for in the brigade SOEO.

SECURITY

5-9. Like any other combat force, the SBCT must secure its force for use elsewhere or at a later time. Security of the force is done principally through military deception and physical means. In the defense, the brigade deceives the enemy by concealing its strengths and weaknesses. Normally, a covering force positioned between the enemy and the main body secures the main body. The purpose of this measure is to provide early warning and disrupt the enemy attack. Engineers task-organized with the cavalry squadron focus on providing situation obstacles and munitions with the intent of disrupting enemy attack and providing early warning.

DISRUPTION

5-10. Disruption in the defense is achieved by—

- Defeating or misleading enemy reconnaissance forces.
- Impeding enemy maneuver.
- Disrupting enemy reserves.
- Neutralizing enemy fire support.
- Interrupting enemy C2.

5-11. Disruption counters enemy initiative and prevents it from concentrating combat power against a single part of the defense. The general goal of disruption is to—

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

5-12. The method a brigade commander chooses to achieve disruption varies with the situation, but his ultimate goal is to spoil the attacker's coordination. The brigade engineer and the engineer company commander work closely with the brigade staff and the maneuver battalion staff to ensure that combat engineering (M/CM/S) functions are integrated into brigade disruption activities, leveraging the capabilities of geospatial engineering to optimize their effects. Enemy reconnaissance efforts and probing attacks must be defeated without disclosing the defensive scheme of maneuver. Tactical obstacles are designed and emplaced to disrupt enemy formations and cause the enemy to turn to a desired area. This prevents the enemy from concentrating irresistible strength against any portion of the defense.

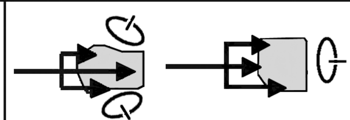
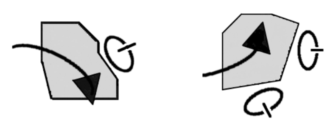
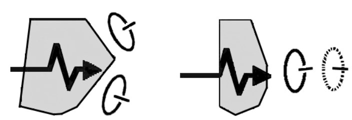
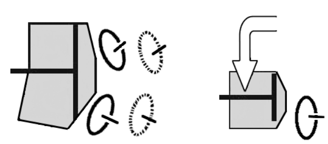
MASSING OF EFFECTS

5-13. In the defense, the brigade commander concentrates effects to exploit or create an enemy weakness. This is achieved by designating a battalion as the main effort with all other efforts and actions supporting and sustaining this effort. To concentrate effects during the battle, the brigade may—

- Economize in some areas.
- Retain a reserve.

- Maneuver repeatedly.

5-14. Engineers support the concentration of effects by employing obstacles, constructing fortifications, and providing mobility to counterattack or reserve forces. The principal role of the engineer in the concentration is to ensure that tactical obstacles are integrated with defender fires to disrupt, turn, fix, or block enemy forces (see *Figure 5-1*). This facilitates the brigade commander's concentration of effects. These efforts, combined with constructing fortifications (augmentation required) and protective obstacles, enhance the brigade defense. The defending force must be able to direct its actions at the enemy from a survivable position. Engineers also provide mobility assistance to counterattack and reserve forces, enabling the brigade commander to initiate offensive actions against a disintegrating enemy attack.

Obstacle Effect	Application	Conveying Intent
Disrupt	Short arrows indicate where the enemy is attacked by obstacles. Long arrows indicate where a bypass is allowed and attacked by fires.	
Turn	The heel of the arrow is the anchor point. The direction of the arrow indicates where enemy advance is slowed by obstacles.	
Fix	The irregular part of the arrow indicates where enemy advance is slowed by obstacles.	
Block	The vertical line indicates the limit of enemy advance and where the obstacle ties into severely restricted terrain.	

Direction of enemy attack →

Figure 5-1. Obstacle Effects

FLEXIBILITY

5-15. The brigade commander maintains flexibility through—

- Detailed planning.
- Sound preparation.

- In-depth organization.
- The use of reserves.
- C2.

5-16. Ultimately, flexibility requires that the brigade commander see the battlefield to detect the enemy scheme of maneuver in time to direct fires and maneuver against it. Commanders must be able to employ counterattack and reserve forces at any time. Engineers assist in maintaining flexibility by—

- Using situational obstacles.
- Task-organizing for rapid transition to the offense.
- Improving or maintaining routes needed to shift forces.

TYPES

5-17. The three types of defensive operations are mobile defense, area defense, and retrograde operations. The fundamental difference between the first two is their focus-and-defeat mechanism. The focus of engineer effort, unit missions, and task organization is inseparably linked to the focus-and-defeat mechanism of each type of defense.

MOBILE DEFENSE

5-18. Mobile defense destroys the attacker within the depths of the defensive sector through a decisive attack by a strike force. Mobile defense uses a combination of offensive, defensive, and delaying actions. It is characterized by relatively small forces forward and by the use of maneuver supported by obstacles to take the initiative. Mobile defense requires a large reserve, with mobility equal to or greater than that of the enemy, to counterattack and envelop. It cannot be conducted unless the temporary loss of some terrain is acceptable.

5-19. Engineer support to mobile defense focuses on using obstacles to attack enemy maneuver and providing mobility to reserve or counterattacking forces. Obstacle zone planning received from division and obstacle belt planning at the brigade level is directed at the enemy's most likely COA rather than the terrain. Belts are aimed at enemy maneuver in the brigade sector to support its destruction by counterattack. Therefore, obstacle belt planning is more restrictive. It reduces the flexibility of battalions and allows the brigade commander to concentrate the obstacle effort in key areas, ensuring the mobility of the counterattack. Mobile defense operations predominantly require turn, fix, and disrupt obstacle groups and are resourced by the brigade.

5-20. Although adherence to obstacle control measures has always been important, it is paramount in high-tempo and fluid operation environments where unit boundaries change dramatically and often as required by changes in the situation. The brigade engineer and the engineer company commander must weigh the trade-off between the counterattack, obstacle, and survivability requirements of the maneuver unit MBA when allocating engineer forces, assets, and resources.

5-21. The survivability effort is closely tailored to a force-oriented defense. To create the conditions for a counterattack, battalions must fight throughout the depth of their sector from multiple primary and subsequent battle positions (BPs). This is especially true when the brigade is participating in a mobile defense using air assault forces or when armor forces are task-organized to the brigade. Protective obstacle effort during the mobile defense covers the full spectrum of effort. Minimal protective-obstacle effort is required forward as the defense is geared toward a proactive fight. Protective obstacle effort is 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 brigade reserve freedom to maneuver. The reserve has the required engineer support to maintain its mobility during the counterattack.

AREA DEFENSE

5-22. Area defense denies enemy access to specific terrain for a specific time. It is organized to absorb the enemy into an interlocked series of positions from which it can be destroyed. Area defense differs from mobile defense in that the majority of defending forces deploys to hold specific terrain. To accomplish this, forces use a combination of defensive positions and small mobile reserves. Commanders organize the defense around the static framework provided by defensive positions, seeking to destroy enemy forces with interlocking fires or local counterattacks.

5-23. The focus of the engineer effort is on providing the maneuver commander with the ability to hold terrain while enabling the brigade to concentrate fires from static positions. During area defense, engineer involvement in terrain analysis becomes vital. Engineers identify key and decisive terrain that supports the commander's concept of the operation. During obstacle planning, brigades use obstacle control measures to give maximum flexibility to battalions, while focusing the tactical-obstacle effort on terrain retention. The brigade engineer must advise the brigade commander of the resource requirements of each battalion based on its assigned EMSTs and coordinate with the brigade S4 to ensure that the battalions are resourced to employ turn, fix, and block belts, which are the principal obstacle effects in area defense.

5-24. The survivability effort in area defense must—

- Enhance the ability of the brigade to accurately concentrate fires from static positions.
- Provide the force with an increased level of protection from the sustained effects of enemy fires.

5-25. Frequently, the enemy force is unable to bypass brigade forces and is forced to conduct assaults on static positions to suppress or defeat concentrated fires. This increases battalion requirements for survivability and protective obstacles. Supporting defensive positions and small, decentralized mobile reserves are key components of the defeat mechanism that the brigade engineer must consider during planning and preparation. The brigade engineer must ensure that the tactical-obstacle effort of adjacent brigades is coordinated and mutually supported and that it achieves an interlocking effect. The brigade engineer accomplishes this by closely monitoring the efforts of maneuver battalions. Using battalion-planned obstacle groups and the status of obstacle and survivability efforts, the brigade engineer ensures a focused effort and deconflicts potential problems.

RETROGRADE OPERATIONS

5-26. A retrograde operation (see *FM 3-90*) is an organized, orderly movement of forces away from the enemy. The movement may be forced or voluntary; however, in either case, it must be authorized by the brigade commander.

5-27. The basic types of retrograde operations are delay, withdrawal, and retirement. All three are usually combined in simultaneous or sequential action. For example, a battalion TF may conduct a delay to facilitate the withdrawal or retirement of the remaining brigade.

- **Delay.** A force that is under pressure trades space for time. The intent is to slow the enemy, cause enemy casualties, and stop the enemy (where possible) without becoming decisively engaged. A brigade accomplishes this by defending, disengaging, moving, and defending again. The concept of the operation for a delay frequently requires offensive operations (counterattacks and spoiling attacks) on the part of the delaying force.
- **Withdrawal.** A withdrawal allows a brigade to disengage from the enemy and reposition for some other mission. The mission may be to delay the enemy, defend another position, or attack at another place and time. There are two types of withdrawals—
  - Under pressure. The brigade disengages and moves to the rear while in contact with the enemy.
  - Not under pressure. The brigade disengages and moves to the rear while the enemy is not attacking.
- **Retirement.** The brigade moves to the rear in an organized manner and is not in contact with the enemy. Tactical movement techniques and foot and vehicular road marches are employed. A retirement may follow a withdrawal, or it may begin before contact is made with the enemy.

Engineer Support

5-28. The underlying purpose of engineer support to retrograde operations is twofold. First, the mobility of the brigade must be maintained, regardless of the type of retrograde operation being conducted. Mobility operations focus on maintaining the ability of the force in contact to disengage while preserving the main body freedom of maneuver. Second, SBCT maneuver forces must be protected because they are particularly vulnerable to enemy actions during retrograde operations. Consequently, retrograde operations are normally conducted under limited visibility conditions. Engineers support units left in contact and extend the time available to the brigade commander by reducing enemy mobility through obstacles, fires, and terrain optimization.

5-29. Countermobility and mobility operations are normally the focus of engineer support to retrograde operations. The actual priority of support depends on whether or not the brigade is in contact with the enemy. The planning considerations laid out in the following paragraphs apply equally to all retrograde operations. They require the application of METT-TC to determine the priority of engineer mission support.

Staff Planning

5-30. Engineer involvement in the staff-planning process for a retrograde operation is critical. 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 under way. Engineer involvement is of special importance during the IPB process. The level of detail developed by the staff and the engineer planner affects resourcing, task organization, and execution.

5-31. During retrograde operations, the brigade engineer coordinates with the S2 on engineer-specific IR. The IR are aimed at facilitating and maximizing the efforts of engineer units conducting the counterreconnaissance fight and retrograde operation. Considerations include templating enemy reconnaissance and main-body attack routes into the brigade sector. These considerations aid in planning and executing brigade obstacle belts that support the retrograde operation.

5-32. The identification of routes that the brigade will use is vital to all retrograde operations. While conducting terrain analysis during the IPB process, the brigade engineer works closely with the S2 to determine feasible routes. Once completed, the routes are coordinated with the brigade S3 and commander to determine which routes meet operational requirements. Once routes are identified, engineers and elements of the RSTA squadron conduct route reconnaissance to verify their trafficability and suitability for the brigade. Information gained on the reconnaissance is critical to the brigade staff during COA development and analysis.

5-33. Brigade engineer involvement in the IPB process is vital to the retrograde operation. His input into the MCOO determines the effects that the terrain imparts on the attacking enemy. Once determined, this product of the terrain analysis impacts the—

- Position of obstacle belts.
- Position of decision points to assist in lane closure.
- Execution time of situational and reserve obstacles.

Countermobility

5-34. Countermobility planning for retrograde operations is normally conducted centrally by the brigade engineer. However, execution is normally decentralized; it is conducted only with a clear understanding of the commander’s intent and concept of the operation. A major component in countermobility planning and execution during a retrograde operation is the synchronization of all battlefield effects.

5-35. Situational obstacles provide a key combat multiplier to the commander. SCATMINE obstacles are the predominant type, providing the commander with maximum flexibility. Situational obstacles are planned predominantly against the most likely or most dangerous AAs (where executed obstacles are not feasible). Situational obstacles, like other engineer operations in retrograde operations, are normally controlled centrally.

Lane Closure

5-36. C2 of lane closure is vital to brigade retrograde operations. Normally, lane closure is centrally resourced, planned, and executed by the brigade to ensure that mission execution is in line with the commander's intent. Frequently, obstacles identified for closing lanes become brigade reserve obstacles. Lane closure depends on the—

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

5-37. Lane closure parties (engineers if METT-TC allows) close lanes upon notification from the commander to whom execution authority was delegated (the maneuver force overwatching the obstacle). Synchronization is critical to prevent the trapping of friendly forces between the obstacle and the enemy. Target turnover becomes important when reserve targets are prepared by engineers and turned over to the infantry for execution. Target turnover and its execution must be detailed so that an infantry unit (platoon or squad leader) can execute the mission according to the brigade commander's intent. All lane closure operations must be rehearsed.

Mobility

5-38. The brigade usually has a mobility advantage within its sector on an interior LOC. This advantage must be capitalized on and maintained through the proper and timely use of engineer assets during the operation. One of the steps required during retrograde-operation planning is identifying routes. The size, location, and type of routes selected have a significant impact on engineer support. Route selection impacts countermobility planning and execution and mobility operations. Once the routes are finalized, the company commander ensures that they are upgraded and maintained as directed. LOC maintenance requires EAB augmentation. Lanes through friendly obstacles must be established and marked. Every soldier in the brigade must clearly understand the brigade lane marking system. Guides are frequently left at obstacle lane locations to ensure safe passage. Because of the critical nature of the mission, commanders must assume the responsibility of providing guides if METT-TC allows.

Aviation

5-39. Army aviation units use retrograde operations to reposition units and attack enemy forces, providing additional time for the maneuver force to disengage. If the SBCT has aviation augmentation, engineers support them through FACE operations and obstacle emplacement. Detailed planning between aviation units supporting the brigade and brigade engineer is critical to synchronizing this effort.

Battlefield Deception

5-40. Deception operations target the enemy's ability to be decisive and prevent it from concentrating combat power at a friendly force weakness. The brigade engineer coordinates with the S2 and S3 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 the friendly force is defending instead of conducting a retrograde operation. At the engineer company level, not only can countermobility operations shape the battlefield, but they can also deceive the enemy as to what mission the brigade is actually conducting. For example, using engineer equipment forward gives the appearance of preparing for a hasty defense while covering the withdrawal of a force.

Logistics and Combat Service Support

5-41. Even though the unit is conducting a retrograde operation, some engineer assets and supplies may be moving forward. The brigade engineer is responsible for deconflicting these movements. This is accomplished by coordinating with the brigade S4 on the following issues:

- Some engineer equipment found in EAB units cannot keep up with the brigade trains and must be hauled with transportation assets. To meet this requirement, transportation assets may have to come from higher headquarters.
- Engineer Class V supplies need to be brought forward and rearward. Mines need to be positioned at obstacle lanes so that they can be closed.
- Fuel requirements for forward engineer equipment increase if the equipment is supporting the retrograde operation. This fuel must be identified, like all other classes of supply, before it is moved to the rear.

ENGINEER PLANNING

5-42. The engineer (brigade engineer, engineer company commander, TF engineer) role is to identify missions, allocate resources, and synchronize and command engineer functions. Countermobility and survivability are the primary missions of the engineer company. Therefore, planning for these missions is the engineer initial essential task.

5-43. The focus of defensive planning is to integrate and synchronize obstacles and fortifications into brigade and maneuver battalion direct- and indirect-fire plans. This planning is directive and detailed in nature and focuses on the determination of obstacle groups and the type and amount of prepared positions. Actual obstacle siting and emplacement and position locations are the purview of the company or team commander and the supporting engineer platoons. TF level defensive planning is part of the tactical decision-making process.

5-44. The engineer estimate provides the planning framework for engineer planners and executors supporting a brigade defensive operation. As presented in *Chapter 2*, the engineer estimate is an extension of the MDMP.

The MDMP is molded to fit the situation, whereas the engineer estimate focuses on considerations that are peculiar to engineers supporting a defensive mission. *Table 5-2* shows some examples of engineer estimate considerations in the defense, principally focusing on obstacles and survivability.

Table 5-2. Engineer Estimate Considerations

Receive the Mission	
Sources of Information	Enemy situation Mission paragraph Task organization Logistics paragraph or annex Fires annex
Information Determined	Type of operation Current intelligence picture Time available (initial estimate) Possible EMSTs
Analyze the Mission	
Actions to be Taken	Analyze the higher HQ orders. Conduct an IPB or EBA. Analyze the engineer mission. Conduct a risk assessment. Determine the recommended CCIR. Integrate into the reconnaissance effort.
Sources of Information	Staff estimates Higher commander's intent Geospatial information
Higher Engineer Cell	Determines the— • Engineer task organization. • Higher commander's guidance on obstacles. • SCATMINE systems available. • Obstacle control from higher HQ.
Intelligence Estimate	Determines the— • Terrain analysis (where the enemy can go and where friendly forces can go). • Probable enemy COA. • NAIs, TAIs, and decision points. Identifies enemy vulnerabilities. • Are there any vulnerable points? • Where and when is it necessary for the enemy to make a decision? • What are the enemy breaching capabilities?

Table 5-2. Engineer Estimate Considerations (Continued)

Analyze the Mission (Continued)	
Logistics Estimate	Determines— • Who moves the material. • What material is available. • Where the material is located. • How the material is moved. • When the material is moved.
Engineer Estimate	Determines the— • Terrain and weather analysis. • Enemy mission and M/CM/S capabilities. • Friendly mission and M/CM/S capabilities. • Specified and implied tasks. • Limitations. • Assets available. • Risk and control measures. • Time analysis. • Restated mission. • Recommended PIR (terrain and mobility restraints, OBSTINTEL, and threat engineer capabilities). • Integration of engineer assets into the reconnaissance effort.
Develop the SOEO	
Actions to Be Taken	Analyze the relative combat power. Determine engineer missions and the allocation of forces and assets. Determine the engineer priority of effort and support. Review the commander's intent for M/CM/S. Determine the employment considerations of engineers. Integrate the engineer scheme of operations into the maneuver COA.
Source of Information	Commander
Information Determined	Authority to emplace different types of obstacles Situational-obstacle planning (employment of ADAM and RAAMS versus artillery on firing targets of opportunity) Intelligent munition integration into obstacles The use of blade assets (dozer, ACE, DEUCE) (survivability versus countermobility) The use of maneuver forces in the obstacle effort closure Deception operations
War-Game and Refine the Engineer Plan	
Sources of Information	Commander Staff
Information Determined	The use of obstacles to support the scheme of maneuver Requirements for reserve obstacles The priority of obstacle emplacement The priorities for deception operations

Table 5-2. Engineer Estimate Considerations (Continued)

Recommend a COA	
Sources of Information	COA Estimates
Information Determined	The requirements of obstacle restrictions The requirements for lanes and gaps The use of situational obstacles The use of reserve obstacles Resource requirements

OBSTACLE FRAMEWORK

5-45. To understand obstacle integration, engineer planners and executors must understand obstacle definitions and concepts. The combined arms integration of fires and tactical obstacles is crucial to achieving success in the defense. Obstacle control, intent, and resourcing are top-down-driven (initiated by the brigade engineer), whereas the process of integrating the actual obstacle location with fires is bottom-up-driven (initiated by the company commander and TF engineers). Comprehending and applying the doctrine is a prerequisite to planning engineer support for the brigade in the defense.

OBSTACLE PRINCIPLES

5-46. Commanders use obstacles to attack enemy maneuver and to multiply the effects and capabilities of firepower. Obstacles alone cannot shape the brigade battlefield. They are used to reinforce existing obstacles, shape an engagement area (EA), or enhance fires. Fires cannot be massed everywhere; therefore, the battlefield must be shaped to ensure that the enemy is at the decisive point of the scheme of maneuver. It is the combination of fires and obstacles that shapes the brigade battlefield to mass combat power at the decisive point.

5-47. To assist in focusing the engineer estimate toward defensive operations, the following critical obstacle and survivability principles must be reviewed:

- Obstacle integration.
- Obstacle control.
- Obstacle planning.
- Survivability planning.

NOTE: See *FMs 20-32* and *90-7* for detailed information on TTP for obstacle integration, planning, and principles.

Chapter 6

Stability Operations

The SBCT conducts stability operations in support of full-spectrum operations. The brigade engineer and the company commander must have a fundamental understanding of the missions and the special engineer requirements associated with stability operations. The engineer missions and EMSTs involved in supporting stability operations include those outlined in *Chapters 4* and *5*. Additionally, other EMSTs may be included to cover the breadth of potential missions associated with stability operations. The principles of engineer C2 outlined in *Chapter 2* still apply during planning and execution.

CHARACTERISTICS

6-1. Stability operations are part of full-spectrum operations. They are intended to promote and protect US interests by influencing the threat, political, and information dimensions of the operational environment through a combination of peacetime developmental, cooperative activities and coercive actions in response to crisis. Stability operations are not necessarily sequential. They may occur independently of, concurrently with, or at the conclusion of combat operations. The focus is on sustaining the outcome achieved from combat operations to prevent the threat or the conditions for a threat to return and realize strategic results. Stability operations, unlike combat operations, may have an unambiguous threat. The engineer must be aware of the impact this will have on supporting stability operations.

6-2. ARFORs may conduct stability operations simultaneously or in combination with offensive, defensive, and support operations while performing joint, multinational, and interagency operations. Similarly, while engineers may be focused on one or more of the engineer battlespace functions, all three functions operate simultaneously in support of stability operations.

6-3. The missions performed by the engineer company in stability operations are directly linked to the SBCT mission. While force protection, the rules of engagement (ROE), and the rules of interaction (ROI) are important in any operation, they take on an increased level of importance in planning and conducting stability operations.

TYPES

6-4. There are ten types of stability operations, and each is unique in its execution (see *FM 3-07*). The SBCT engineer company is unlikely to support any of these operations except as a member of the SBCT. Stability operations include—

- Peace operations.
- Foreign internal defense (FID).
- Security assistance.
- Humanitarian and civic assistance (HCA).
- Support of insurgencies.
- Support of counterdrug operations.
- Combat of terrorism.
- Noncombatant evacuation operations (NEO).
- Arms control.
- Show of force.

PEACE OPERATIONS

6-5. The broadest type of stability operation is peace operations. They are performed unilaterally or as part of a United Nations (UN), North Atlantic Treaty Organization (NATO), or multinational force. Peace operations encompass three basic forms—peacekeeping operations (PKO), peace enforcement operations (PEO), and support of diplomatic efforts.

Peacekeeping Operations

6-6. PKO are military operations undertaken with the consent of all major parties to a dispute. They are designed to monitor and facilitate the implementation of an agreement (cease-fire, truce, or another such agreement) and support diplomatic efforts to reach a long-term political settlement. Before PKO begin, a credible truce or cease-fire is in effect and the disputing parties must consent to the operation. Peacekeeping takes place following diplomatic negotiation and agreement among the parties to a dispute, the sponsoring organization, and the potential force-contributing nations. Engineers participate as part of a combined arms force and may execute construction and maintenance of roads, airfields, LZs, ports, pipelines, and other associated missions (such as land mine detection and removal).

NOTE: The removal of mines by engineers during PKO is based on tactical necessity. Humanitarian mine action (HMA) organizations provide the preponderance of mine clearance.

6-7. High-frequency missions related to PKO include—

- Constructing CPs, bunkers, and observation posts (OPs).
- Constructing force protection structures, such as earth revetments, wire obstacles, and defensive positions.
- Clearing fields of observation.
- Demolishing fortifications.
- Clearing or marking minefields (including minefield fence maintenance).
- Clearing mines and booby traps, but not demining.
- Providing backup support for identifying, marking, removing, and destroying explosive ordnance.

Peace Enforcement Operations

6-8. Peace enforcement is the application of military force or the threat of its use, normally pursuant to international authorization, to compel compliance with resolutions or sanctions designed to maintain or restore peace and order. PEO are coercive in nature and rely on the threat or use of force. However, the impartiality with which the peace force treats all parties and the nature of its objectives separate PEO from war. The purpose of PEO is not to destroy or defeat an enemy, but to use force or the threat of force to establish a safe and secure environment so that peace building can succeed. The engineer company may participate in disarming, to include seizing ammunition, collecting and destroying weapons and supplies, closing weapons and ammunition factories, and preventing resupply.

6-9. Humanitarian demining operations are a part of HMA (see *Chairman of the Joint Chiefs of Staff Instruction [CJCSI] 3207.1*). Because of the threat to peace and safety posed by land mines, HMA has become a significant activity in stability operations. HMA and demining are ultimately a host nation (HN) responsibility. US Army participation in HMA focuses on training HN personnel to conduct all aspects of HMA, including demining training, the establishment of national mine action centers, and mine risk education. US military personnel may assist and train others in demining techniques and procedures, but they are prohibited by federal statue from detecting, lifting, or destroying land mines unless done for the concurrent purpose of supporting a US military operation. HMA training missions are normally conducted by special operations forces (SOF) and assisted by EOD. SOF and EOD serve as primary trainers for demining and unexploded ordnance (UXO) clearance operations. Civil affairs (CA) personnel help establish national mine action centers, and psychological operations (PSYOP) personnel provide mine risk education. CA teams, PSYOP teams, and other specialists are specially trained to execute HMA programs.

Support of Diplomatic Efforts

6-10. Military support of diplomatic efforts improves the chances for success in the peace process by lending credibility to diplomatic actions and demonstrating a resolve to achieve viable political settlements. In addition to (or as an integral part of) peace operations, ARFORs may conduct operations in support of diplomatic efforts to establish order before, during, and after conflict. While these activities are primarily the responsibility of civilian agencies, the military can support these efforts within its capabilities. ARFORs may support diplomatic initiatives, such as preventive diplomacy, peacemaking, and peace building. Engineers may support the execution of peace operations with geospatial engineering support, lodgment, and theater infrastructure developments (including the construction and repair of protective facilities, roads, airfields, ports, and troop life support facilities).

FOREIGN INTERNAL DEFENSE

6-11. FID is a program that supports friendly nations operating in or threatened with potential hostilities. It promotes regional stability by supporting an HN program of internal defense and development. These national programs free and protect a nation from lawlessness, subversion, and insurgency by emphasizing the building of viable institutions that respond to the needs of society. FID can include training; material, technical, and organizational assistance; advice; infrastructure development; and tactical operations. Military assistance is often necessary to provide a secure environment for efforts to become effective (see *JP 3-07.1*). Army engineer units and individuals can be tasked to provide military assistance. Typically, engineers will be subject matter experts (SMEs) when tasked to support this program; and it is unlikely that the SBCT or its engineer company will be committed to this type of operation. The engineer company may be required to support multinational training with HN engineer units when deployed in support of stability operations.

SECURITY ASSISTANCE

6-12. During security assistance, the United States provides defense articles, military training, and other defense-related services to eligible foreign governments or international organizations via grants, loans, credits, or cash sales to further US national policies and objectives. These programs include foreign military sales, international military education and training, HCA, humanitarian assistance, humanitarian demining programs, international peacekeeping, the Warsaw Initiatives Program, and the Partnership for Peace Program. Security assistance is a group of programs, not a mission assigned to Army units specifically. However, Army units and soldiers participate in security assistance programs through peacetime engagement activities and by training, advising, and assisting allied and friendly armed forces.

6-13. There are four primary methods of training—

- **Mobile training.** Teams are used when an HN element requires on-site training or needs surveys and assessments of training requirements. Engineers may deploy as part of a single-service, joint, or conventional force team. Each team is tailored for the training required.
- **Extended training.** Service specialist teams are employed on a permanent change of station to assist the HN in attaining readiness on weapons or other equipment. These teams train the HN initial instructor cadre so that the HN can assume responsibility for training.
- **Technical assistance.** Field teams are also deployed on a permanent change of station basis and train HN personnel in equipment-specific military skills.
- **International military education and training.** Mobile education teams provide HN personnel with training opportunities in the continental United States (CONUS) and the HN. This training not only meets the immediate requirement of increased training, but it also has a longer-term impact of improving US-HN relations.

HUMANITARIAN AND CIVIC ASSISTANCE

6-14. HCA provides assistance to the local populace with military operations and exercises by predominantly US forces. Such assistance must fulfill unit training requirements that incidentally create a humanitarian benefit to the local populace. The assistance that engineers may provide under HCA is limited to—

- The construction of rudimentary surface transportation systems.
- Well drilling and the construction of basic sanitation facilities.
- Rudimentary construction and repair of public facilities.
- The detection and clearance of land mines, including activities relating to furnishing education, training, and technical assistance with respect to the detection and clearance of land mines.

6-15. US forces (including engineer C2) may be tasked to provide the C2 support necessary to plan and execute the ground portion of any humanitarian assistance operation. Engineers may also be tasked to provide the logistics support necessary to relieve human suffering or provide forces to secure an area and allow the humanitarian relief efforts of other agencies to proceed. Due to the austere organization of the SBCT engineer company, engineers can only provide limited assistance by constructing and repairing rudimentary surface transportation systems, basic sanitation facilities, and public facilities and utilities. Engineer assistance may also include constructing feeding centers and disposing of human and hazardous wastes.

SUPPORT OF INSURGENCIES

6-16. Engineers may provide limited support of insurgencies. On order of the Secretary of Defense (SECDEF), ARFORs support insurgencies that oppose regimes which threaten US interests or regional stability. While any ARFOR can be tasked to support an insurgency, SOF usually receive these missions. Engineer support to insurgency forces is generally limited to providing geospatial products and constructing SOF operating bases located outside the AO. Engineer missions for counterinsurgency operations are similar to those for HCA. They include water supply and sanitation improvements; road, airfield, and port construction; and multinational training.

SUPPORT OF COUNTERDRUG OPERATIONS

6-17. Two principles guide Army support of counterdrug operations—

- Using military capabilities to benefit the supported agency and train our soldiers and units.
- Ensuring that military members do not become directly involved in law enforcement activities.

6-18. Engineers supporting domestic counterdrug operations perform missions that support local law enforcement agencies. Engineers are sensitive to the legal aspects of support to civilian authorities and abide by the Posse Comitatus Act. They are also aware of the capabilities of the threat, primarily heavily armed narcotics traffickers. Typical support tasks include—

- Constructing or rehabilitating law enforcement target ranges; helipads; and fuel storage, billet, CP, and maintenance facilities.
- Producing geospatial products.
- Constructing and upgrading access roads for drug interdiction patrols.
- Clearing observation fields for counterdrug teams.

COMBAT OF TERRORISM

6-19. Terrorism is the calculated use of unlawful violence or the threat of unlawful violence. It is intended to coerce or intimidate governments or societies in the pursuit of goals that are generally political, religious, or ideological. Combating terrorism involves opposing terrorist actions across the threat spectrum. These actions include offensive (counterterrorism) and defensive (antiterrorism) components.

6-20. Army personnel and units conduct antiterrorism everywhere in the world. Engineers may become targets for terrorists because of how and where they perform their missions, especially construction projects and other wide-area missions. For example, equipment parks and supply yards are large and difficult to defend. Soldiers operating equipment or hauling materials are vulnerable to ambush by fire, mines, and booby traps.

6-21. In support of antiterrorism, engineer leaders develop force protection measures whenever they conduct engineer missions. The engineer company combats terrorism mainly through antiterrorism. This includes active and passive measures taken to minimize vulnerabilities to terrorist attacks. Antiterrorism is a form of force protection.

6-22. Counterterrorism is the full range of offensive operations against terrorists or those who support terrorists. Generally, an engineer company participates in counterterrorism operations only if the SBCT has been committed to such an operation.

NONCOMBATANT EVACUATION OPERATIONS

6-23. NEO are conducted to evacuate noncombatants and nonessential military personnel from a foreign nation to an appropriate safe haven or the United States. These operations evacuate US citizens whose lives are endangered by war, civil unrest, or natural disaster. Such operations may also include evacuating selected HN citizens or third-country nationals. NEO usually involve a swift insertion of a force, temporary occupation of an objective, and planned withdrawal upon mission completion.

6-24. Engineers who support NEO generally operate as part of a joint force and may conduct a wide variety of tasks, such as—

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

NOTE: *JP 3-07.5* contains TTP for conducting NEO.

ARMS CONTROL

6-25. Arms control requires limited engineer support. Its overarching goal is to prevent or deter war, promote stability, reduce the potential damage of a conflict, and reduce defense expenditure. Arms control focuses on promoting strategic military stability. It encompasses any plan, arrangement, or process controlling the numbers, types, and performance characteristics of weapons, C2, logistics support, and intelligence-gathering systems. Engineers may provide geospatial products used to verify treaty compliance and construct logistics support facilities.

SHOW OF FORCE

6-26. A show of force is an operation designed to demonstrate US resolve through the deployment or use of military forces. The United States conducts a show of force for three principal reasons—

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

6-27. Army units are not usually assigned show-of-force missions. Rather, they conduct other operations for the purpose of showing force. Shows of force are normally executed as—

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

6-28. Engineer support to demonstrations and shows of force are normally joint and multinational efforts. Engineer tasks are very similar to those described in peace operations. The overt use of engineers during shows of force may aid in the political intent of the operation.

CONSIDERATIONS

6-29. Stability operations encompass potentially all of the considerations of offensive and defensive operations, but the nature of stability operations tends to include enhanced consideration for issues like force protection, the ROE, and the ROI. These and other considerations give stability operations a flavor of their own, and each particular operation has its own unique considerations.

FORCE PROTECTION

6-30. Although not a type of stability operation, force protection is a critical consideration during all such operations. Force protection consists of actions taken to prevent or mitigate hostile actions against Department of Defense (DOD) personnel (including family members), resources, facilities, and critical information. These actions conserve the fighting potential of the force so that it can be applied at the decisive time and place. The actions must also be incorporated into coordinated, synchronized offensive and defensive measures that enable the effective employment of the joint force while degrading opportunities for the enemy. Force protection does not include actions to defeat the enemy or protect against accidents, weather, or disease.

6-31. Commanders implement force protection with a force protection plan. The plan includes active and passive protective measures; and it addresses all components of protection, including fortification, deception, countermobility operations, and protective obstacles. While frequently applied in MOOTW, force protection must be addressed in all levels of war, throughout the battlefield framework, and during all types of operations. The brigade engineer and the supporting company commander are involved in brigade force protection measures from three perspectives. They—

- Provide input to the brigade force protection plan.
- Provide engineer-specific support, primarily through survivability type missions.
- Assist in the critical aspects of execution and monitor the implementation of the commander's plan.

NOTE: For more information on force protection (a subcomponent of protection), see *FMs 3-0* and *3-34*.

RULES OF ENGAGEMENT

6-32. The ROE are directives issued by competent military authority that explain the circumstances and limitations under which US forces initiate and continue combat engagement with the encountered opposition. The ROE reflect the requirements of the law of war, operational concerns, and political considerations when military force shifts from peace activities to combat operations and back to the peace phase of an operation. These requirements are the primary means the commander uses to convey legal, political, diplomatic, and military guidance to the military force for handling the crisis in peacetime.

6-33. Tactical and legal channels cooperate closely when formulating the ROE. The tacticians, usually represented by the S3, determine the desired intent of the ROE. The staff judge advocate puts that intent into legal terms.

6-34. Generally, the commander permits a wider use of military force in wartime through the ROE. The ROE restrict the use of military force to achieve political objectives. In all operations, the commander is legally responsible for the care and treatment of civilians and property in the AO until it is transferred to a proper government. The ROE assist the commander in fulfilling these responsibilities. They vary in different conflicts and often change during the respective phases from combat or crisis through peace building or nation assistance. Even during a single phase of the operation, the ROE are amended at different levels of command, which may result in confusion.

6-35. The ROE must be consistent with training and equipment capabilities; and when necessary, command guidance clarifies the ROE. While the ROE must be tailored to the situation, nothing negates a commander's obligation to take all necessary and appropriate action in unit self-defense, allowing soldiers to protect themselves from deadly threats. The ROE prohibit the use of some weapons and impose special limitations on the use of weapons. Examples include the requirements for warning shots, single-shot engagements, and efforts to wound rather than kill. An SBCT deploying for stability operations trains its soldiers to interpret and apply the ROE effectively. It is imperative for everyone to understand the ROE, since small-unit leaders and individual soldiers must make ROE decisions promptly and independently.

6-36. The ROE are normally developed with political considerations in mind and come from Joint Chiefs of Staff (JCS) level decisions. Changes to the ROE can result from immediate tactical emergencies at the local level. The SBCT commander can request changes to the ROE through the operational chain of command. The changes must be approved by the designated authority, usually a division or higher-level command. Commanders at all levels need to know the request channels for the ROE and the procedures used to obtain approval for recommended changes to the ROE. Situations requiring an immediate change to the ROE could include the introduction of combat forces from a hostile nation, attacks by sophisticated weapon systems (including NBC), or incidents resulting in the loss of life. These situations should be war-gamed, and request channels should be exercised.

6-37. The ROE are established for, disseminated down to, and understood by individual soldiers. However, the ROE cannot cover every situation. Soldiers at all levels must understand the intent of the ROE and act accordingly, despite any military disadvantage that may occur. The commander responsible for ROE formulation should consider including an intent portion that describes the desired end state of the operation and conflict termination considerations. These considerations assist commanders and leaders at all levels in situations not clearly addressed in an OPORD.

RULES OF INTERACTION

6-38. The ROI embody the human dimension of stability operations. They lay the foundation for successful relationships with the numerous factions and individuals that play critical roles in these operations. The ROI encompass an array of interpersonal communication skills, such as persuasion and negotiation. These skills are tools that the individual soldier needs in order to deal with the nontraditional threats that are prevalent in stability operations, including political friction, unfamiliar cultures, and conflicting ideologies. In turn, the ROI enhance the soldier’s survivability in such situations. The ROI are based on the applicable ROE for a certain operation. The ROI must be tailored to the specific region, culture, and population affected by the operation. Like the ROE, the ROI can be effective only if they are thoroughly rehearsed and understood by every soldier in the unit.

Chapter 7

Support Operations

The SBCT conducts support operations as a part of full-spectrum operations. The brigade engineer and the company commander must have a fundamental understanding of the missions and EMSTs typically associated with support operations and the special engineer requirements. The principles of engineer C2 outlined in *Chapter 2* still apply during planning and execution, although the assessment of the threat and the interaction with other governmental agencies cause many of the aspects to be different.

CHARACTERISTICS

7-1. Support operations provide essential services, assets, and specialized resources to help civil authorities deal with situations beyond their capabilities. Support operations usually involve actions that help civil authorities or NGOs provide DS to the affected population. ARFORs may provide relief or assistance directly when necessary; however, they normally support the overall effort that is controlled by another agency. When visualizing a support operation, commanders recognize that they will have to use a different definition of the enemy. In support operations, the adversary is often disease, hunger, or the consequences of disaster. The types of support operations are domestic support and foreign humanitarian assistance.

7-2. In support operations, ARFORs apply decisive military capabilities to set the conditions for civil authorities to achieve success. ARFORs have a functional chain of command, reliable communications, and well-trained, well-equipped forces that can operate and sustain themselves in an austere environment with organic or attached assets. These capabilities are applied in the form of relief operations, support to consequence management, support to civil law enforcement, and community assistance.

7-3. It is unlikely that the SBCT will be involved in support operations without significant EAB engineer forces and capabilities being committed to the larger AO. The brigade engineer and the engineer company commander may have a requirement to integrate the activities of several engineer capabilities within the brigade AO.

NOTE: *FMs 3-07* and *3-34* provide detailed information on domestic support operations.

RELIEF OPERATIONS

7-4. The engineer company may provide support to relief operations for disaster or humanitarian relief. Relief operations respond to and mitigate the effects of natural or man-made disasters, including chemical, biological, radiological, nuclear, and high-yield explosive (CBRNE) incidents. The SBCT engineer company can provide manpower and limited support for maintaining or restoring essential services and activities to mitigate damage, loss, hardship, or suffering. The organic terrain team within the SBCT can also support relief operations by providing geospatial products and an analysis of potential areas where life support areas can be established.

SUPPORT TO CONSEQUENCE MANAGEMENT

7-5. The likelihood is low that the SBCT will be committed to support CBRNE consequence management, although the possibility certainly exists. If committed, the engineer company may find itself performing or supporting some critical relief functions normally associated with relief operations, such as—

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

7-6. Support to domestic and foreign CBRNE consequence management is a major operation that requires engineer support. It has, by far, the most extensive support requirements for military personnel. Other US government agencies have the primary responsibility for responding to domestic terrorist incidents. Local authorities will be the first to respond to a CBRNE incident. However, ARFORs have a key supporting role and can quickly respond when authorized. In a permissive overseas environment, the national command authority (NCA) may make Army assets available to assist a foreign government after a CBRNE incident. Such assistance may be linked to concurrent relief operations.

7-7. Engineers can expect to respond to consequence management operations with mobility assets so that they can control the situation before it gets worse. Engineer equipment is best suited for the removal of rubble and debris associated with consequence management. Other contributors are public works and engineering support, including technical advice and assessment, engineering services, construction management and inspection, emergency contracting, emergency repair of wastewater and solid-waste facilities, and real estate support. Other engineering considerations include—

- Heavy equipment for camp construction and power generation.
- Emergency clearance of debris for reconnaissance and the passage of emergency personnel.
- Temporary construction or repair of emergency access routes.

- Emergency restoration of critical public services and facilities.
- Technical assistance and damage assessment.
- Emergency demolition.
- An effective maintenance program, which is vital to ensuring that required support can be provided.
- All classes of supply, particularly Class IV.

SUPPORT TO CIVIL LAW ENFORCEMENT

7-8. These operations provide temporary support to domestic civil authorities when permitted by law. They are normally taken when an emergency overwhelms the capabilities of civil authorities. Typical contingencies include support to counterterrorism, counterdrug, and civil disturbance operations. Engineer forces may also be called on to fight forest fires, remove snow and hazardous waste, and construct emergency bridges and airfields.

7-9. The Army assists civil law enforcement by providing personnel, equipment, training, and expertise within the limits of applicable law. Army National Guard units in state activation status (*Title 32, United States Code*) provide the primary source of military assistance to state and local law enforcement agencies. They may assist civil authorities in instances when federal units are precluded due to the restrictions of the Posse Comitatus Act. Engineers may have a role in law enforcement support, including geospatial products and map and manpower support. There may also be some general engineering requirements, particularly in the enforcement of counterdrug operations.

COMMUNITY ASSISTANCE

7-10. Community assistance applies the skills, capabilities, and resources of the Army to the needs and interests of the United States and local communities. Supporting and participating in events and activities that benefit the Army and the civilian community build on a long tradition of the Army helping communities. Community assistance can have a large impact, because active component, Army National Guard, and US Army Reserve units are located in thousands of towns and cities across the nation. What a command does or fails to do for the community will affect the attitudes of the American people, and the Army depends on them for its support and existence. Every commander should identify opportunities to conduct initiatives that meet specific needs; have specific start points and end states; enhance readiness; and advance the interests of the nation, the Army, and local communities. Engineers may be called on to provide everything from hometown recruiters to support for holiday events. Installations may have memorandums of agreement with neighboring towns to provide emergency snow removal or some other capability not readily available.

7-11. The forms of community assistance occur to varying degrees in domestic support and foreign humanitarian assistance. Since domestic emergencies can require ARFORs to respond with multiple capabilities and services, the different forms may be conducted simultaneously during a given operation. General engineering tasks provide the preponderance of support.

7-12. It is very likely that an engineer company will be committed to support community service. This includes a wide range of activities that provide support and maintain a strong connection between the military and civilian communities. These activities provide an effective means of projecting a positive military image, providing training opportunities, and enhancing the relationship between the Army and the American public.

PLANNING

7-13. Planning for support operations is significantly different from planning offensive, defensive, or stability operations because of threat assessment. The threat may be a natural disaster with an unpredictable behavior. Also, engineers must be aware of a number of statutes and regulations that restrict Army interaction with other government agencies and civilians. Several different federal agencies are responsible for emergency support functions as identified by Congress (see *Table 7-1*).

Table 7-1. Emergency Support Functions

Support Function	Primary Agent	Point of Contact
Transportation	Department of Transportation	US Transportation Command
Communications	National Communications System	Office of the Assistant SECDEF (Command, Control, Communications, and Intelligence)
Public works	DOD	USACE
Firefighting	US Department of Agriculture	USACE
Information and planning	Federal Emergency Management Agency	Directorate of Military Support
Mass care	American Red Cross	Defense Logistics Agency
Resource support	General Services Administration	Defense Logistics Agency
Health and medical services	Department of Health and Human Services	Office of the Surgeon General (Army)
Urban search and rescue	Federal Emergency Management Agency	Directorate of Military Support
Hazardous material	Environmental Protection Agency	Department of the Navy
Food	US Department of Agriculture	Defense Logistics Agency
Energy	Department of Energy	USACE

7-14. Engineers can expect to be involved in planning support for relief operations. They may be called upon to provide manpower or general engineering support from units with unique capabilities, such as water purification, temporary shelter, power generation, and firefighting.

7-15. Army commanders will assume a support role to the lead agency. It is important for engineer commanders and staffs to know the proponent and its responsibilities. Initial coordination and training with these agencies will facilitate the planning process.

7-16. There is usually little time to prepare for support operations. Relief operations and support to CBRNE consequence management require immediate response. It is essential for commanders to have contingency plans developed and units identified so that they may prepare for such contingencies.

EXECUTION

7-17. Engineers may provide support to all four types of support operations. In relief operations, they respond to and mitigate the effects of natural or man-made disasters (including CBRNE incidents). They maintain or restore essential services and activities to mitigate damage, loss, hardship, or suffering. Relief is primarily a state, local, or HN responsibility. To support the efforts of local authorities or the lead agency, the NCA can employ ARFORs before, during, or after an event to save lives; protect property, public health, and safety; or lessen or avert the threat of catastrophe.

Chapter 8

Enabling Operations

The SBCT conducts other tactical operations to support a combination of offensive, defensive, stability, and support operations to achieve full-spectrum dominance. The brigade engineer and the company commander must have a fundamental understanding of other tactical operations and the special engineer requirements. The engineer missions involved in supporting other tactical operations are essentially the same as those outlined in *Chapters 4* and *5*. Furthermore, the principles of engineer C2 outlined in *Chapter 2* still apply during planning and execution.

FORCE PROTECTION

8-1. Force protection consists of those actions taken to prevent or mitigate hostile actions against DOD personnel (including family members), resources, facilities, and critical information. These actions conserve the fighting potential so that it can be applied at the decisive time and place. They must also be incorporated into the coordinated and synchronized offensive and defensive measures that enable the effective employment of the joint force while degrading opportunities for the enemy. Force protection is but one of the four protection factors—force protection, field discipline, safety, and fratricide avoidance—and does not include actions to defeat the enemy or protect against accidents, weather, or disease.

NOTE: For more information on the four protection factors, see *FMs 3-0* and *3-34*.

8-2. Commanders implement force protection with a force protection plan. This plan addresses all components of protection, including fortification, deception, countermobility operations, and protective obstacles. The force protection plan also includes active and passive protective measures. While frequently applied in MOOTW, force protection must be addressed in all levels of war, throughout the battlefield framework, and during all types of operations. The brigade engineer and the supporting company commander are involved in brigade force protection measures from three perspectives. They—

- Provide input to the brigade force protection plan.
- Provide engineer-specific support, primarily through survivability type mission support.
- Assist in the critical aspects of executing and monitoring the implementation of the commander's plan.

FUNDAMENTALS

8-3. The brigade force protection plan is developed in line with the brigade MDMP outlined in *Chapter 2*. The force protection plan is—

- Developed by the combined arms brigade staff.
- Derived from the brigade commander's force protection guidance.
- Based on the combined arms execution.
- Updated and revised continuously.

8-4. While force protection planning and execution is a combined arms responsibility, engineer input and assistance are critical to its success. Specifically, planning engineer input with the S2 during the IPB process ensures that engineer intelligence needs are integrated into all reconnaissance and collection plans, IR, and priority intelligence requirements (PIR).

THE THREAT

8-5. Force protection planning is threat-based, keying on IPB and EBA and analyzing the particular threats to the SBCT given the COE. It is also balanced against available resources. The brigade plan focuses on trying to remain proactive, rather than reactive, to the potential attack. The ultimate goal of the force protection plan is to balance the consequences of inadequate protection with the cost (time and resources) of adequate protection. This is based on the risk level or the probability of attack.

8-6. Before developing the force protection plan, engineer planners and executors must fully understand the threat as it applies to force protection. Engineers can play a significant role in protecting the brigade only when the brigade engineer and company commander understand the threat. Once the threat is understood and engineer forces supporting the brigade are given time and priority, they can assist the brigade in establishing effective protective measures.

8-7. Threat tactics and methods are different, based on regional AOs, the operating tempo (OPTEMPO), and the area within the battlefield framework. Engineers must understand the threat and the process used to evaluate it.

8-8. The threat template developed during the S2 IPB is used as the foundation for the force protection planning process and must be continuously reevaluated. This reevaluation occurs at a set time (for example, every two hours) or during a critical event (for example, upon a change in threat tactics or weapons). If the reevaluation process of templating the threat does not occur, the commander's force protection plan rapidly becomes static and the brigade becomes reactive to threat attacks.

AGGRESSOR TYPES

8-9. The threat is closely evaluated in terms of force protection to provide more detailed information to the initial threat template developed by the S2. The threat is categorized into four types of aggressors—criminals, protestors, terrorists, and subversives—that engineers must understand so that they can provide input to the brigade force protection plan. *Table 8-1* details the types of aggressors.

Table 8-1. Aggressor Types

Aggressor	Description
Criminal	Unsophisticated criminals— • Are unskilled in the use of weapons and have no formal organization. • Attack targets that meet immediate needs, such as drugs, money, and pilferable items. They focus on targets that pose little risk. Sophisticated criminals— • Work alone and are organized and efficient in the use of certain weapons and tools. • Target high-value assets and frequently steal large quantities. Organized criminals— • Are sophisticated groups that rely on specialists to obtain equipment to achieve specific goals. • May target large quantities of money, equipment, arms, ammunition, and explosives.
Protestor	General protestors— • Are normally political or issue-oriented and act out of frustration, discontent, or anger. • Destroy property and seek publicity. Vandals and activists— • Are unsophisticated and superficially destructive. • Do not normally intend to hurt people. Extremists— • Are moderately sophisticated and more destructive. • Are commonly overt in their actions. • May involve individual targets.
Terrorist	Terrorists— • Are oriented on ideology, a political cause, or an issue. • Commonly work in small, well-organized groups. • Are sophisticated and possess an efficient planning capability. • Kill, destroy, steal, and seek publicity. • Are generally classified by their government affiliation.
Subversive	Saboteurs (including guerillas and commandos)— • Are very sophisticated and highly skilled. • Employ meticulous planning. • Commonly operate in small groups and have an unlimited arsenal. • Kill and destroy. • Target mission-critical personnel, equipment, and operations. Spies— • Are very sophisticated and highly skilled. • Are usually foreign agents. • Target military information. • Attempt to avoid detection. • May use the same activities as activists or other aggressors.

AGGRESSOR TACTICS

8-10. The threat employs a variety of tactics against the brigade. Any tactic or any combination of tactics may be used. The brigade may also be faced with an evolving threat that employs tactics not listed in this manual. *Table 8-2*, page 8-4, describes various aggressor tactics.

Table 8-2. Aggressor Tactics

Tactic	Description
Moving-vehicle bomb	Used when an aggressor's goal is to damage or destroy a facility (or assets within a facility) or to kill people within the blast area. This bomb is a suicide attack where an explosive-laden vehicle is driven into a facility and detonated.
Stationary-vehicle bomb	Used when an aggressor's primary objective is to damage or destroy a facility (or assets within a facility). This bomb may be detonated by a time delay or remote control. The attack has three versions— • An explosive-laden vehicle is driven to a preselected location and abandoned. • Explosives are placed in an unsuspecting person's car. He then unknowingly delivers the bomb to the targeted facility. • Someone is coerced into delivering a vehicle bomb.
Exterior attack	Used when an aggressor's goal is to damage or destroy a facility (or assets within a facility) and to kill or injure its occupants. This attack is close to a facility or exposed asset. Using clubs, rocks, improvised incendiary devices, hand grenades, or hand-placed bombs, the aggressor attempts to inflict destruction and death.
Standoff weapons attack	Used when an aggressor's goal is to damage or destroy a facility (or assets within a facility) and to kill or injure its occupants. These attacks are executed by using direct- and indirect-fire weapons, such as AT weapons or mortars.
Ballistic attack	Used when an aggressor's goal is to kill or injure occupants of a facility. The aggressor attempts to inflict death by using small arms at varying distances or by using a vehicle to carry out the attack.
Forced entry	Used when an aggressor's goal is to steal or destroy assets, compromise information, or disrupt operations. Using small arms or forced-entry tools, the aggressor enters a facility through an existing passage or creates a new opening in the facility.
Covert entry	Used when an aggressor's goal is to steal or destroy assets, compromise information, or disrupt operations. The aggressor enters a facility covertly or by using false credentials. He may attempt to carry weapons or explosives into the facility.
Insider compromise	Used when an aggressor's goal is to steal or destroy assets, compromise information, or disrupt operations. The aggressor uses an insider (one who has legitimate access to a facility) to accomplish his prescribed objectives.
Electronic eavesdropping	Used by an aggressor to monitor electronic emanations from computers, communications, and related equipment. This eavesdropping is normally done from outside a facility or restricted area.
Acoustical eavesdropping	Used by an aggressor to monitor voice communications and other audible information via a listening device.
Visual surveillance	Used by an aggressor to monitor facility, installation, and mission operations via ocular and photographic devices.
Mail bomb	Used when an aggressor's objective is to kill or injure people. Small bombs or incendiary devices are incorporated into envelopes or packages that are delivered to the targeted individual.
Supply bomb	Used when an aggressor's objective is to kill or injure people or destroy facilities. Bombs or incendiary devices (generally larger than those found in a mail bomb) are incorporated into various containers and delivered to facilities or installations.
Airborne contamination	Used when an aggressor's objective is to kill people. He uses CBR agents to contaminate the air supply of a facility or installation.
Waterborne contamination	Used when an aggressor's objective is to kill people. He uses CBR agents to contaminate the water supply of a facility or installation.

AGGRESSOR ATTACK METHODS

8-11. The attack methods used by the threat to accomplish its goals are as varied as the techniques and their application. Weapons may range from rocks and bottles to sophisticated, guided systems used to attack targets. Tools are normally used in forced-entry operations to breach protective components or barriers. Explosives are commonly used to destroy facilities and kill personnel. *Table 8-3* lists some of the attack methods and describes their potential employment.

Table 8-3. Aggressor Attack Methods

Attack Methods	Description
Rocks and clubs	Used in exterior facility attacks to damage the facility or assets or to injure personnel.
Incendiary devices	Used to damage the exterior of a facility or other assets within the brigade. Weapons include handheld torches and improvised incendiary devices, such as a Molotov cocktail.
Firearms	Used as a ballistic tactic to attack facility assets from a distance and as a forced-entry tactic to overpower security personnel. Weapons include all forms of military and civilian firearms.
AT weapons and mortars	Used in standoff attacks of assets. The Soviet RPG-7 and the US light AT weapon are the most common weapons of this type. The use of these weapons enhances the aggressor's ability to damage a facility and kill or injure personnel. Mortars include both military and improvised versions.
NBC agents	Delivered as airborne gases, liquids, aerosols, or solids. They are very powerful CBR agents that can be manufactured or secured worldwide, with relative ease, from commercially available products and waste.
IEDs	Used to destroy assets and injure or kill people. They are commonly homemade bombs made of plastic explosives or trinitrotoluene. Plastic explosives are preferred by aggressors because they are easily molded, stable, and difficult to detect.
Hand grenades	Used to injure or kill people. These include the full range of military offensive and defensive grenades.
Vehicle bombs	Used to destroy facilities and kill personnel. They contain large quantities of explosives and have the potential to cause catastrophic damage.

PLANNING PROCESS

8-12. The force protection planning process is comprised of the following steps:

Step 1. Define the threat and attack probability.

Step 2. Determine the composition of assets (personnel, equipment, and facilities).

Step 3. Determine the level of protection required for each asset (assess risk).

Step 4. Design systems and activities to counter the threat.

Step 5. Implement force protection measures that support the selected COA.

8-13. *Figure 8-1* shows how the force protection planning process parallels the MDMP.

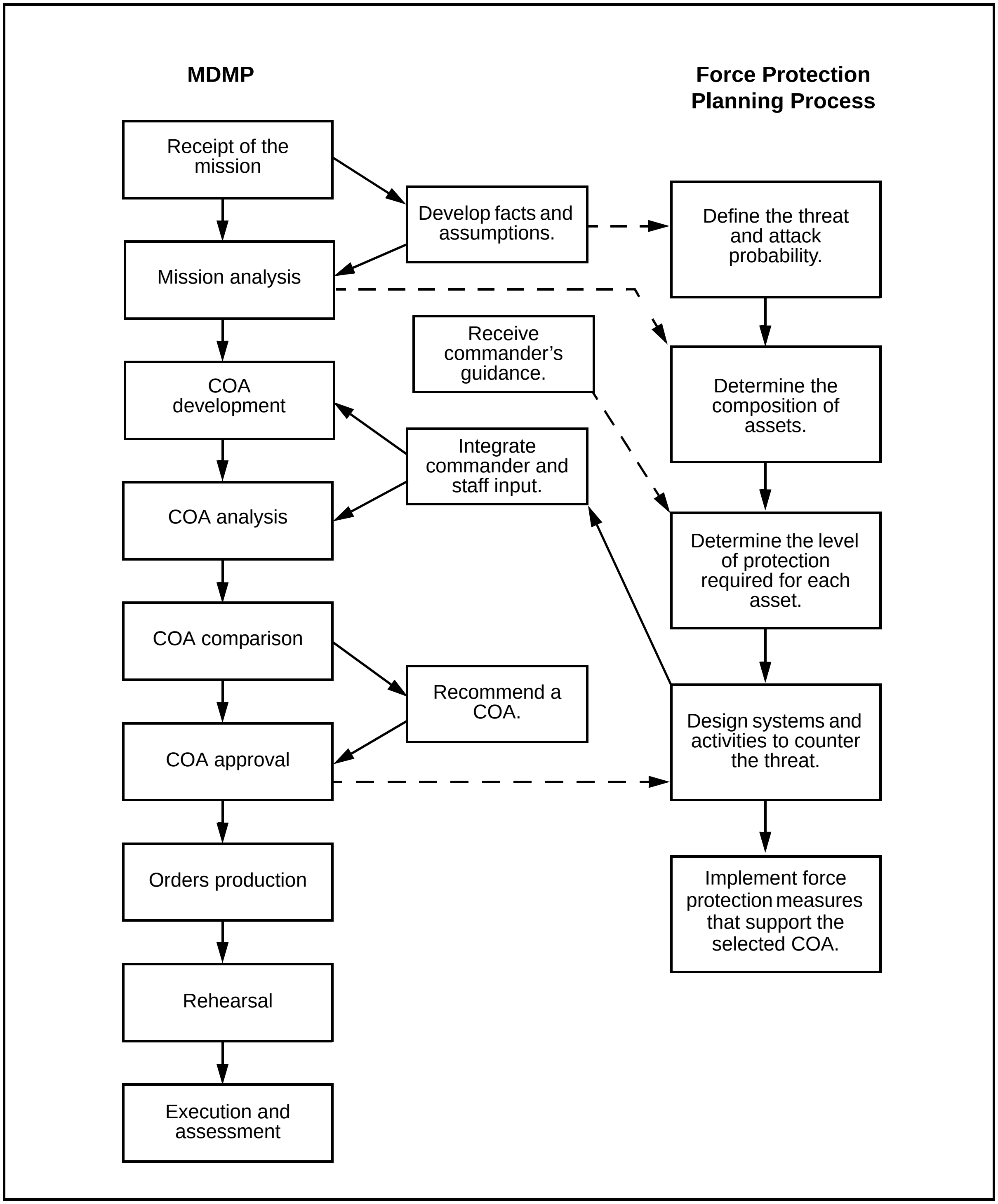


Figure 8-1. Relationship of the Force Protection Planning Process to the MDMP

Step 1. Define the Threat and Attack Probability

8-14. The results of this step are used to direct force protection planning and design in step 4. This step relies heavily on the IPB process already conducted during the MDMP. It also provides the basis for step 2 by determining and evaluating enemy and friendly capabilities and vulnerabilities and potential COAs focused on enemy assault and potential attack of brigade assets. The bulk of the information is routinely derived from the decision support template (DST) and MCOO. Step 1 is a distinct process; however, it is ultimately performed simultaneously and continuously with the IPB process. This step has five parts—

- Template the aggressor type and potential assault and attack methods. This information is focused on the threat, is an extension of the template, and is normally compiled during the IPB process. Additional requests for information or IR are routinely developed by the planning unit to fill specific information voids for protective-obstacle planning.
- Evaluate the terrain around the asset. The area surrounding the asset is evaluated against the templated aggressors and their ability to employ weapons, tools, or explosives. This evaluation helps determine the employment validity of any templated assault or attack method.
- Template potential assault and attack targets. This information is derived from the aggressor template.
- Prioritize templated assault and attack methods based on the developed situation template (SITEMP) (used in determining the protection level in step 3).
- Prioritize templated assault and attack targets based on the developed SITEMP (used in step 2). Determine which targets or assets within the brigade are going to provide the biggest benefit to the aggressor if they are damaged or destroyed.

Step 2. Determine the Composition of Assets

8-15. During this step of the force protection planning process, commanders and staffs develop a comprehensive list of all units and systems that require protection. A list is established that identifies the initial effort priority for each unit and system. Prioritizing the list helps the brigade engineer focus time and resources at critical units and systems that require engineer support. Initial effort prioritization is based on the criticality and vulnerability of the unit or system being evaluated. This prioritization is verified during step 3 of the force protection planning process when final guidance is received from the commander. Assets are normally assigned a numerical priority. Multiple assets can hold the same priority level.

Step 3. Determine the Level of Protection Required

8-16. This step focuses on taking the information collected and developed in steps 1 and 2 and applying it to determine the protective levels. Once the levels are determined, staff planners design, position, and resource protective efforts. Step 3 is divided into two parts—

- Determine the force protection level required for each position. The criticality of the asset to the brigade and the threat (the likelihood of attack and assault) determine the protection level for each asset. Two primary components of force protection for the brigade are fortification effort and protective obstacles. These two building blocks are used to achieve the commander's directed force protection level. Normally, there is a balance between the protective-obstacle effort and the fortification effort available for the position. Determining the level of protective-obstacle effort required by a position is ultimately determined through the commander's guidance and is balanced against the directed level of survivability for units, personnel, and systems within the position.
- Determine the force protection level required for the brigade to counter the threat. The staff determines the level of protection required and gives its recommendation to the commander. This is normally stated in terms of protection against a given method of attack. For example, *All Priority 1 assets* (established in step 2) *within the brigade are to be provided Level 2 threat protection* (templated threat attack methods determined in steps 1 and 2) *within 72 hours. All Priority 2 assets (within the BSA only) are to be provided Level 1 protection within 72 hours and Level 2 protection within 96 hours.*

Step 4. Design Systems and Activities

8-17. This step focuses on the final design and resourcing of the force protection plan. Once the level of protective effort is determined (step 3), protective activities are determined, positioned (as required), and subsequently resourced. The key to this step is ensuring that the planned protective efforts accomplish the following:

- Counter the templated threat.
- Do not significantly degrade observation or direct or indirect fires.
- Support the commander's force protection plan.

Step 5. Implement Force Protection Measures

8-18. Once a COA has been selected, the corresponding force protection measures are applied to the plan. The responsible or designated units implement the supporting force protection measures. The brigade staff will ensure that all force protection measures are coordinated and properly resourced. Command and staff supervision and continuous adjustment will likely be necessary due to the ever-changing operational environment.

8-19. Force protection planning and its execution are not one-time processes. They must be continually and systematically updated, depending on METT-TC, changes in the force protection status, and the commander's guidance. *Table 8-4* shows the force protection planning process. *Figure 8-2*, page 8-10, shows a sample matrix that is used to track force protection planning and execution.

8-20. To ensure brigade-wide dissemination, the results of the force protection planning process become elements of the brigade OPORD and OPLAN. A statement or paragraph outlining the commander's intent for force protection

Table 8-4. Force Protection Planning Process

Planning Step	Source of Information	Information Determined
Define the threat and attack probability.	Enemy situation from the situation paragraph and the intelligence annex Known enemy information, including recent and current enemy activities and capabilities S2 list of possible enemy COAs Terrain analysis around and into sites and positions	Potential assault and attack methods by templating Potential assault and attack targets by templating Priority of potential assaults and attack methods and targets Enemy and friendly capabilities
Determine the composition of assets.	Mission analysis Task organization Staff input on the availability of critical assets	Units and systems requiring proactive efforts (the list is compiled by all staffs and commanders) Priority of units and systems to receive protection efforts Force protection measures
Determine the level of protection required for each asset.	Higher HQ force protection plan or policy Commander's guidance Templated threat and attack probability	Level of protection for assets and the unit Commander's force protection policy and intent Priority and allocation of assets and the time required by the unit to accomplish force protection Areas where risk will be accepted
Design systems and activities to counter the threat.	Information from steps 1, 2, and 3 Commander's selected COA *FMs 3-0* and *3-34* Security engineering manual Multinational force information	Commander's force protection plan, which addresses the following: • Force protection activities (specified and implied force protection tasks included in paragraph 3 of the OPORD) • Force protection coordination (paragraph 3 of the OPORD task to subordinate units) • Commander's force protection policy and guidance • Unit force protection efforts, intent, and desired end state • Force protection priorities Final design and resourcing of force protection measures through— • Logistics resourcing • Manpower and equipment resourcing Execution guidelines to— • Counter the templated threat • Support the commander's force protection plan

Table 8-4. Force Protection Planning Process (Continued)

Planning Step	Source of Information	Information Determined
Implement force protection measures that support the selected COA.	Selected COA and commander's guidance	Force protection measures Implementing units Necessary resources

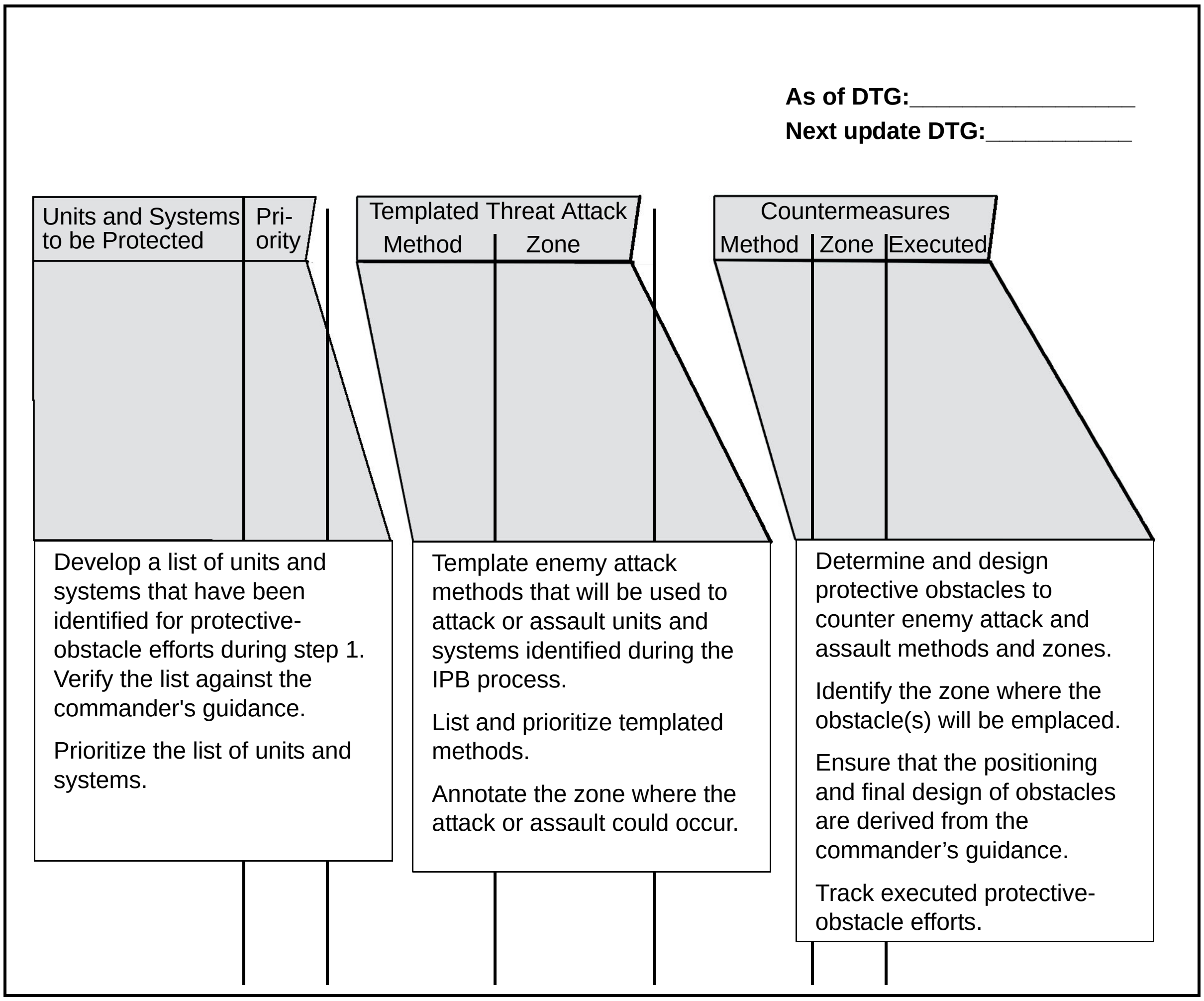


Figure 8-2. Protective-Obstacle Planning Guide

can be addressed in paragraph 3 of the OPORD. In addition, a dedicated force protection annex should provide needed supplemental information.

ROUTE CLEARANCE

8-21. Route clearance is a combined arms operation. Units must clear obstacles and enemy activity that disrupt battlefield circulation and must ensure that LOC allow safe passage of combat, CS, and CSS organizations. This is especially critical to the SBCT because of its limited resupply capabilities. SBCT logistics are based on units receiving supplies as they need them. It is essential that LOC remain open because the delay or destruction of vehicles transporting supplies could cause critical shortages.

8-22. The information gathered from IPB and the reconnaissance effort determines the method and type of route clearance to conduct. The determination is based on the situation, time available, threat level, and available assets.

8-23. During stability operations, it is recommended that former warring faction (FWF) engineer-equivalent clearance teams precede US clearance teams within the FWF AO. Commanders cannot assume that FWF clearance teams are thorough in their clearance operation. They must treat the route as unsafe until US or allied clearance teams have proofed the route to confirm that it is clear.

CLEARANCE METHODS

8-24. There are three methods of route clearance—linear, combat, and combined route. The method employed depends on the situation and the time and clearance assets available. The maneuver force should always establish static security positions at critical locations after the route clearance is complete.

NOTE: For more information on clearance methods, see *FM 20-32*.

SWEEP OPERATIONS

8-25. There are four levels of sweep operations, and each level can be modified to meet the time and equipment limitations of the unit. However, the commander assumes a greater risk when the sweep level is modified. All four sweep levels can be used with any of the three clearance methods.

NOTE: For more information on sweep operations, see *FM 20-32*. For a discussion of breaching operations, see *FM 3-34.2*.

8-26. In light and heavy units, a company team typically executes route clearance operations. In the SBCT, the size of the force, the large AO, and decentralized operations make it unlikely that a maneuver company is able to dedicate itself to a single route. Instead, a company team may be responsible for several routes and have to surge to support specific convoys and resupply efforts. *Table 8-5*, page 8-12, shows sample SBCT route clearance task organizations for a company team and a platoon-sized, medium-weight element. The task organizations for light and heavy forces are offered for comparison.

Table 8-5. Sample Task Organization for a Route Clearance

Team	Support Force	Security Force	Sweep Force
Medium platoon	Infantry squad	Two infantry squads Crew-served weapons Forward observer MP element	Engineer squad 1 DEUCE
Medium company	Infantry platoon	Infantry platoon Mortar section Medical team (two ambulances) PSYOP team Forward observer MP element	Engineer squad 1 DEUCE Infantry platoon
Heavy	Mechanized infantry platoon with dismount capability Armor platoon FIST and COLT ADA section	Mechanized infantry platoon Engineer squad Mortar section Medical team (two ambulances) PSYOP team FIST MP element	Engineer platoon with organic vehicles Armor platoon with plows and rollers
Light and heavy	Two infantry platoons (light) FIST and COLT ADA section	Bradley platoon with dismount capability Engineer squad 60-mm mortar section Medical team (two ambulances) PSYOP team FIST MP element	Engineer platoon with organic vehicles Armor platoon with plows and rollers
Light	Two infantry platoons (light) FIST and COLT ADA section	AT and MP section with M60 and MK19 mix 60-mm mortar section Medical team (two ambulances) PSYOP team Forward observer party MP element	Engineer squad (+) Infantry platoon (light) AT and MP section with M60 and MK19 mix

PASSAGE OF LINES

8-27. A passage of lines entails one or more units moving through another unit. This operation becomes necessary when the moving unit(s) cannot bypass the stationary unit and must pass through it. The primary purpose of the passage is to maintain the momentum of the moving elements. A passage of lines may be designated as forward or rearward. The controlling SBCT battalion or cavalry squadron is responsible for planning and coordinating a passage of lines involving the company. In some situations (such as when the company is using multiple passage routes with a separate route for each platoon), the company commander must plan and coordinate each phase of the operation.

NOTE: For more information on the passage of lines, see *FM 3-90*.

RELIEF-IN-PLACE AND LINKUP OPERATIONS

8-28. A relief-in-place is a tactical enabling operation in which, by direction of higher authority, all or part of a unit in an area is replaced with another unit. There are three techniques for conducting a relief—

- **Sequential.** A sequential relief-in-place occurs when each element within the relieved unit is relieved in succession from right to left or left to right depending on how it is deployed.
- **Simultaneous.** A simultaneous relief-in-place occurs when all elements are relieved at the same time.
- **Staggered.** A staggered relief-in-place occurs when the commander relieves each element in a sequence determined by the tactical situation, not the geographical orientation.

8-29. A simultaneous relief-in-place takes the least amount of time to execute, but it is more easily detected by the enemy. Sequential and staggered reliefs-in-place can take place over a significant amount of time. Engineer requirements remain essentially the same for any type of relief-in-place; however, the turnover of obstacles, particularly reserve targets, is more difficult and time-consuming during a relief-in-place operation. This is especially true if a smaller-sized unit is replacing a larger element.

8-30. A linkup is conducted to make physical contact between two ground forces. Both forces may be moving toward one another, or one may be stationary or encircled. Linkup operations may be conducted in a variety of circumstances. They are most often conducted to—

- Complete the encirclement of an enemy force.
- Assist the breakout of an encircled friendly force or an attacking force with a force inserted in the enemy rear.

ENGINEER SUPPORT

8-31. Engineers contribute most to a relief-in-place by helping the brigade achieve speed and control. Therefore, these two principles become the focus of brigade engineers in the relieved and relieving units during planning and execution. Both brigade engineers must work together to develop a unified SOEO. They must fully understand the entire scope of the mission, including the defensive plan and the concept for the relief. This helps brigade engineers identify engineer tasks that must be accomplished to maintain speed and control during the operation.

8-32. Engineers facilitate the brigade requirement for speed in two ways. They—

- Provide mobility to the relieved and relieving units.
- Expedite obstacle turnover.

8-33. Both brigade engineers must develop engineer task organizations that meet the needs of the TF mobility requirements. Brigade engineers also facilitate speed through a rapid, complete obstacle turnover. Obstacle location, configuration, and composition are consolidated and provided to the relieving unit. Reserve targets and situational-obstacle information are also included in the turnover. Additional information may include choke points, route reconnaissance, engineer estimates, the location of HN engineer assets, and engineer-specific coordination with flank units.

8-34. Brigade engineers help control a relief-in-place by—

- Providing detailed mobility planning.
- Developing a detailed obstacle turnover plan.
- Providing LNO to maintain engineer continuity during the relief.

8-35. When planning mobility operations, brigade engineers review the relieved unit defensive plan that is overlaid with the relief operation concept. Routes for entering and exiting units must be clearly identified and marked (guides may be needed). Brigade engineers determine the mobility tasks that must be accomplished on each route. The relieved unit prepares the routes through its sector for the relief operation. Depending on METT-TC, both brigades may need to plan the use of mobility teams during the operation.

8-36. When developing the obstacle turnover plan, the relieved brigade engineer must have a detailed, current status of each obstacle in the unit sector. An individual obstacle list and a complete obstacle overlay must be handed over to the relieving brigade engineer. This may also include the turnover of HN assets, barrier materials, and engineer estimates of the AO. TF engineers are responsible for the same level of coordination with the relieving TF engineers, which is then verified by the company commander. This process ensures the redundant flow of information, facilitating a difficult and detailed operation. The brigade engineers must also determine how to exchange reserve- and situational-obstacle plans.

8-37. If supported by METT-TC, the presence of engineer squad level LNOs at the infantry company can greatly enhance the speed and control of obstacle turnover. Upon linkup, engineer LNOs become familiar with the existing obstacles, terrain, and direct- and indirect-fire control measures that are integrated into the obstacle plan. Rapid, efficient turnover is critical for two reasons. It—

- Ensures that the maneuver commander is immediately capable of using the existing obstacles as a combat multiplier in defeating the enemy.

- Expedites the shifting of engineer effort from conducting an obstacle turnover to improving the unit defensive posture or preparing for a future attack.

8-38. Most relief-in-place operations occur when a unit is in a hasty or deliberate defense, but they can occur while the relieved unit is not in a defense. This usually takes place when a force is relieving another force while securing a lodgment (forced or unforced entry) on an airfield, a port facility, or a combination of the two. When one unit relieves another, it is essential that the threat level expected by the relieving unit is accurately templated and that preparations are made accordingly. An initial brigade ISR plan is prepared at the home station, and refinements are made to it from information received during the initial liaison. Relieving units that are seizing or securing a key facility have some special engineer considerations that differ from a hasty or deliberate defense.

AIRFIELD RELIEF OPERATIONS

8-39. Airfields are critical for sustainment. If the SBCT has to conduct an airfield seizure, the engineers' most important mission is to make the runway operational and to maintain it so that the air-land flow is uninterrupted. To affect this, the brigade engineer colocates with the brigade level CP that controls the airfield (normally an assault CP from the brigade assault force). Coordination is also conducted with the United States Air Force (USAF) combat control team representative on the airfield. The brigade engineer obtains the following information:

- The status of the airfield (including the minimum number of operating strips; the maximum number of on-ground aircraft that the airfield can currently and will eventually hold; any known damage to the runway, taxiway, and parking apron; work estimates to get the airfield operational; and any scheduled maintenance being conducted to keep the airfield operational).
- The status of airfield facilities (including the control tower, hangars, electrical power, runway lights, and bulk fuel locations).
- The availability and location of HN or captured support (including hauling and off-loading assets and engineer equipment).

PORT FACILITY RELIEF OPERATIONS

8-40. A port facility relief operation is similar to an airfield relief operation. However, instead of receiving aircraft, the unit receives ships. Relief of the SBCT would probably be a heavy force (USMC amphibious force or Army mechanized unit). Augmentation by port construction engineers may be required. The brigade engineer should consider the following:

- The status of the port and facilities, including an estimate of the water depth (divers may be needed), available docking sites, and off-loading equipment (cranes).
- The availability of HN equipment and personnel support to facilitate the off-loading equipment.

- The status of port damage, current port repair, and maintenance operations.

HEAVY AND LIGHT FORCE OPERATIONS

8-41. There is an overlap of situations where mixtures of engineers can operate. The integration of medium, heavy, and light engineers capitalizes on enemy force structure to attack its weakness and seize the initiative. Communication capabilities may be different when heavy or light forces augment the SBCT.

LIGHT INFANTRY COMPANY SUPPORT

8-42. The light infantry company offers the SBCT commander unique capabilities in the offense and defense. However, with these capabilities comes a corresponding set of requirements for engineer support. A light infantry company attached to the SBCT may have a squad of light engineers attached. The brigade engineer must be aware of the distinctive requirements and capabilities of the light infantry company and must also plan and allocate engineer assets to provide optimum support to the brigade as a whole.

NOTE: For more information on engineer operations in support of a light force, see *FM 5-7-30*.

Defense

8-43. In the defense, light infantry forces normally defend in restrictive terrain. Obstacles in restrictive terrain are usually point obstacles emplaced in depth to support antiarmor ambushes. In less restrictive terrain, light infantry forces are normally employed in strongpoints integrated throughout the defense. These light infantry strongpoints are ideal for providing anchor points for turning or blocking obstacle groups. Regardless of the type of terrain, obstacles must support the capabilities of the light infantry company. The light infantry company generally has fewer organic antitank (AT) weapons and may destroy enemy vehicles from within small arms ranges using flanking and rearward fires. Obstacles should be constructed so that flanking fires from the light force can stop the enemy and force it to dismount to breach.

8-44. The light infantry force also requires substantial fortification for sustained combat. The brigade engineer must plan to provide mechanical digging assets for preparing individual and crew-served weapon positions. The brigade engineer must also plan to allocate and transport hand tools, construction materials, and obstacle materials that allow the light infantry to build and improve its own fortifications and construct protective obstacles.

Offense

8-45. In the offense, light infantry forces fight best in restrictive terrain. If employed in less restrictive terrain, they should be employed during periods of limited visibility.

8-46. The light infantry can be very effective when breaching as part of a covert operation. It provides the brigade with an expanded capability for dismounted, covert operations. This capability allows it to create or prepare lanes through enemy tactical obstacles, which can be exploited by rapidly moving mounted forces. Light forces employed in this manner may require additional allocations of demolitions or hand tools. The brigade engineer must ensure that the brigade breach plan includes contingency plans.

8-47. The light infantry company is also extremely effective at providing close-in, far side security during mounted breaching operations. Light infantry forces are ideal for neutralizing enemy dismounted strongpoints that serve as anchor points for enemy obstacles. Light forces must be provided the time to properly infiltrate and establish positions to support the breaching sites. Fire control measures must also include restrictions to prevent fratricide.

LIGHT ENGINEER AUGMENTATION

8-48. In some situations, the engineer company may receive a light engineer platoon or squad attachment. If light engineers are supporting a light infantry unit, the relationship between the light infantry and light engineers should be maintained if possible. This increases the likelihood that the infantry commander has an engineer advisor familiar with light infantry operations. Normally, the light engineer platoon has limited vehicular haul capability (at best, utility trucks). Care must be taken when supplying light units with Class IV and V barrier material. The brigade engineer must ensure that the plan drops small loads to specific points within the obstacle group that the light platoon is emplacing. This facilitates obstacle construction without overtaxing the haul capability. The light platoon could also require transportation assistance if the TF is forced to move. When planning operations, the brigade engineer must be aware of the capabilities and limitations of the light platoon.

HEAVY COMPANY TEAM ATTACHED

8-49. The SBCT may receive augmentation from heavy forces as they arrive in theater. The heavy company team (typically, two armor platoons, one mechanized infantry platoon and, possibly, a mechanized engineer platoon) offers added firepower and capabilities to the SBCT commander in the offense and defense. The brigade engineer must understand the capabilities and requirements of the attached company team to determine the best way to integrate the mechanized engineer platoon into the brigade SOEO. Whenever possible, the mechanized engineer platoon should remain in support of the heavy company team. This ensures that the company team commander has an engineer advisor who the commander is familiar with and who is knowledgeable about the requirements.

NOTE: For more information on engineer operations in support of a heavy force, see *FMs 5-71-2* and *5-71-3*.

Defense

8-50. The brigade engineer supports a heavy company team in the defense by providing input to the brigade staff on what terrain is best defended by heavy forces. When developing the EBA during brigade planning, the brigade engineer must include the additional effort provided by a mechanized engineer platoon. SBCT countermobility effort is usually more protective than tactical in nature, but a mechanized engineer platoon possesses significant tactical countermobility capabilities. It may be equipped with a full Volcano system, which emplaces minefields twice the size of the SBCT Volcano (light). Mechanized engineers are skilled in constructing large tactical obstacles that can be used to help shape EAs. The brigade engineer works with the brigade S3 and the company team commander to determine where they want to kill the enemy, and the engineer focuses countermobility efforts on those EAs. By the end of the planning process, the mechanized engineer platoon should be fully integrated into the brigade defensive plan. The brigade engineer must also plan additional logistics requirements for the mechanized engineer platoon. The subordinate element can only execute effectively if the SBCT can provide the Class III, IV, and V supplies required to accomplish its countermobility missions. Working with the brigade S4 and the mechanized engineer platoon leader, the brigade engineer helps determine the best way to deliver supplies to the work sites.

Offense

8-51. The brigade engineer supports the heavy company team in the offense by providing input to the brigade staff on what terrain provides the best routes for maneuvering heavy forces. When developing the EBA, the brigade engineer must consider the mobility assets available in the mechanized engineer platoon. Having the mechanized engineer platoon allows the heavy company team to maintain its maneuver without forcing the brigade engineer to provide engineer assets that normally support the SBCT. The SBCT relies on its mobility and would have to assume great risk to provide attachments with breaching assets. Based on the mobility assets, the terrain, potential routes, and the enemy threat, the brigade engineer can determine if the heavy company team has enough breaching assets to support the brigade mission. Based on this assessment, the brigade engineer can recommend any necessary task organization changes to the brigade S3. As with any operation, a rehearsal is the key to success. The brigade engineer may deal with a variety of engineer units within the AO. Detailed engineer rehearsals incorporating the mechanized engineer platoon would help resolve any conflicts that may arise. The brigade engineer must rely on unit commanders to ensure that PCIs are conducted and that units are combat-ready.

HEAVY ENGINEER AUGMENTATION

8-52. If the heavy company team includes mechanized engineers, the brigade engineer must identify any additional dig assets and integrate them into the survivability timeline. DEUCEs and D7 dozers included with the mechanized engineers should be used to construct survivability positions and assist the M9 armored combat earthmover (ACE) in constructing hasty positions. This saves wear and tear on the ACE and saves it for offensive operations. Mechanized engineers have about the same haul capacity for Class IV and V supplies as the SBCT engineers. The brigade engineer should use the same planning factors used for the SBCT and account for any additional assets the mechanized engineers bring to the task organization to maximize, but not overload, the haul capabilities. The brigade engineer has to ensure that the attached engineer unit is sustainable between its attached or organic assets and those of the SBCT. Increased fuel consumption, the demand for repair parts not normally found in the SBCT, and qualified (track) maintenance support are all important issues considering the streamlined nature of SBCT logistics.

RIVER CROSSING OPERATIONS

8-53. The purpose of any river crossing is to project combat power across a water obstacle to accomplish a mission. A river crossing is a special operation that requires specific procedures for success because water is an obstacle that prevents normal ground maneuver. It also requires unique technical support and more detailed planning and control measures than normal tactical operations. The nature and size of the obstacle, the threat situation, and the available crossing assets limit the commander's options. Doctrinally, the SBCT will conduct river crossing operations just as any other organization. However, the only organic assets within the SBCT are four REBSs. Each REBS can span a 13-meter gap and has an MLC of 30. More than likely, augmentation will be required. As a result, the brigade engineer must coordinate for EAB augmentation well in advance.

NOTE: For more information on river crossing operations, see *FM 90-13*.

AREA DAMAGE CONTROL

8-54. The brigade engineer develops plans for—

- Assessing or estimating damage.
- Clearing a damaged area.
- Reconstructing or rehabilitating an area if it is damaged by friendly or enemy activity.

SBCT and divisional light engineers normally require external support from EAB and EAD engineer units to execute area damage control (ADC) missions.

SUSTAINING OPERATIONS

8-55. Brigade sustaining operations are designed to ensure the freedom of maneuver and the continuity of operations, including CSS and C2. Brigade sustaining operations normally have little immediate impact on decisive ground operations, but they are critical to subsequent operations. If defined by the commander, the brigade rear area is that area from the TF rear boundary to the brigade rear boundary. In noncontiguous operations, the location may vary but will generally be where sustaining operations occur.

8-56. Reserve forces and CS and CSS units are located in the rear area. The BSA, forward operating bases (FOBs), forward arming and refueling points (FARPs), artillery firebases, and TF combat and field trains may be positioned in the brigade rear area. Engineer support of sustaining operations may require additional engineer assets. These assets need to be EAB elements. Adequate engineer support of sustaining operations requires detailed planning and coordination by the brigade engineer and the company XO. The company XO may act as the BSA engineer (depending on METT-TC), but he is first and foremost the second in command of the engineer company.

8-57. Engineer support to sustaining operations, if neglected, may cause the maneuver plan to fail. Therefore, engineer operations must be planned and executed to sustain the combat power of the brigade and allow it to provide needed support to TFs.

8-58. The brigade engineer addresses sustaining operations during the IPB process. As the terrain expert, the brigade engineer determines possible rear-area unit locations from a mobility and countermobility support standpoint. Direct coordination between the brigade engineer, brigade S3, and brigade rear CP results in unit locations that are operationally sound and trafficable. The brigade engineer must also coordinate with the brigade S3 and S4 to ensure that trafficable, easily maintainable MSRs are identified in the brigade OPORD. The SBCT engineer company is optimized for combat engineering. This includes M/CM/S in support of the brigade. Although the SBCT does not have organic engineers to perform general engineering, the brigade engineer is responsible for planning and coordinating general engineering support. The organic terrain team helps optimize the performance of combat engineering within the brigade by providing near-real-time, tactical-decision aids.

COMBAT ENGINEERING

8-59. Combat engineering M/CM/S is focused on the support of combined arms maneuver. Combat engineering enhances operational movement, maneuver, and force protection by facilitating M/CM/S operations. At the brigade level, these three subordinate functions are the basis for the engineer tasks included in the M/CM/S BOS as articulated in *FM 7-15*. The principles of engineer operations still apply, regardless of the level at which they are conducted.

NOTE: For more detailed information on combat engineering, see *FM 3-34.*

Mobility

8-60. The brigade engineer also plans route reconnaissance and clearance operations and MSR maintenance. Engineers must do a reconnaissance of initial MSRs so that routes can be validated for use by brigade support vehicles. The initial reconnaissance gives the brigade engineer and the company commander an initial working estimate for the repair and maintenance of MSRs.

8-61. After the initial review of the IPB process, particularly the enemy templating process, the brigade engineer can determine how frequently route clearance operations are needed to keep the MSR open. The frequency can range from an initial route clearance to task-organizing a route clearance team with each convoy that travels on the MSRs. This frequency depends on enemy assets and capabilities and the current threat level. During engineer-intensive operations, the brigade may need additional engineer support to adequately conduct these missions.

Countermobility

8-62. All rear-area units are required to emplace protective obstacles around their perimeters to prevent enemy infiltration of their base camps. The brigade engineer plans tactical obstacles to support the commander's force protection plan. Engineers may be required to provide SMEs to individual units to construct protective obstacles; however, engineers are not responsible for obstacle construction. If significant countermobility support is required, engineer augmentation is required.

Survivability

8-63. During sustaining operations, engineers focus on force protection support to units in the rear area. The brigade rear area consists of key maneuver brigade elements and support units that need survivability positions constructed by engineer units. Some of the areas needing emphasis are the BSA, FOBs, FARPs, artillery firebases, and TF field trains. The organic engineer capabilities to support survivability are limited.

8-64. Unit operations officers have staff responsibility for their unit force protection planning from two perspectives. They—

- Prepare force protection plans (according to the brigade rear CP).
- Provide input and capability to the unit they are supporting.

8-65. As with other missions, engineer force protection planning must be well thought out, logical, and integrated with other staff planning. Force protection plans or policies are developed in line with the command estimate process, and the brigade commander is responsible for the overall force protection policy and plan. The level of threat established during the IPB is the key factor in determining the amount of force protection required for the brigade rear area. The engineer must be involved with the IPB process to ensure that engineer intelligence needs are integrated into reconnaissance and collection plans, IR, and PIR. Significant amounts of survivability support that does not directly support maneuver take on the flavor of general engineering and require engineer augmentation and other EAB assets to perform.

GEOSPATIAL ENGINEERING

8-66. The maneuver brigade uses the terrain team to provide information on specific sites in the brigade rear area. The brigade engineer and the terrain team assist the commander with visualization of this portion of the battlespace with a variety of potential GI&S. Reach capabilities should make it possible for the terrain team to leverage nonorganic assets to support the SBCT.

GENERAL ENGINEERING

8-67. The maneuver brigade relies on EAB engineers to improve base camps and for the overall sustainment of other sites in the brigade rear area. Time and materials available, the degree of support, and the specific threat in the rear AO determine the sustainment requirements. Normally, augmenting engineer capabilities will perform the necessary general engineering tasks for the SBCT.

Chapter 9

Reconnaissance

The cavalry squadron of the SBCT provides accurate and timely information over a large operating environment. The operational success of the SBCT depends on R&S to visualize and understand the entire operational environment and the multidimensional threat. Some of the biggest challenges include operating in complex environments with an asymmetric threat and the tangible efforts in information warfare. The changing threat, complex environments, regional instabilities, and proliferation of weapons of mass destruction set the conditions for our operational environment. Engineers must be familiar with *FMs 3-20.96, 3-20.98, 3-20.971,* and *5-170* to support reconnaissance operations effectively. The first assured mobility imperative—develop input to the mobility COP—is absolutely linked to reconnaissance.

CAVALRY SQUADRON

9-1. The primary source of information is the SBCT organic cavalry squadron. Its fundamental role is to perform RSTA and battle damage assessment. The cavalry squadron facilitates the brigade commander's ability to retain the freedom of maneuver, concentrate combat power, and apply assets deliberately at a decisive time and place. Successful RSTA operations are essential for achieving SU and a COP that enables the brigade to—

- Clarify enemy centers of gravity and influences.
- Move or react quicker than the threat.
- Anticipate threat actions.
- Exploit weakness with strength.
- Set winning conditions.
- Execute actions to engage the threat in terms that are favorable to the force.

9-2. The brigade engineer leverages the capabilities of the squadron through the support that the terrain team can provide. The intent and purpose of the squadron is to set conditions for achieving situational dominance by the SBCT.

CONCEPT OF THE OPERATION

9-3. The cavalry squadron is a unique organization and was formed from a developmental, analytical effort to satisfy a set of unique operational requirements. As the primary source of information for the brigade, the squadron develops information pertinent to the COP in the AOs. This allows the brigade to anticipate, forestall, and dominate threats and ensure mission accomplishment through decisive action and the freedom of maneuver. The squadron seeks to see, know, and understand the operational environment in detail instead of applying the traditional scout focus primarily on enemy forces, with the objective of creating an umbrella of understanding around and within the brigade and battalions. RSTA operations are integrated closely with activities of infantry battalion reconnaissance platoons and ISR assets managed at the brigade level. The squadron operates by stealth throughout the brigade footprint and employs imbedded tactical human intelligence comprehensively throughout the AO to complement its existing sensor capabilities.

9-4. Technologically advanced systems and synergies substantially enhance squadron operations. For example, the combined effects of air and ground reconnaissance greatly increase mission capabilities of the squadron. TUAVs can quickly reconnoiter a large area, while ground scouts conduct a more focused, detailed terrain or demographic reconnaissance. Based on information from TUAVs, ground scouts can better focus their efforts instead of conducting a complete, time-consuming zone reconnaissance.

9-5. The squadron is organized, equipped, and trained to provide information, knowledge, and assessments that empower the brigade commander with SU to dominate the environment and know the threat. Stealth remains the primary means of force protection; organic weapons are used primarily in self-defense.

9-6. The squadron develops information pertinent to the COP to provide the SBCT with the freedom of action necessary to conduct decisive and shaping operations at times and places of its choosing. The squadron performs its mission by observing and reporting enemy activities in and along assigned named areas of interest (NAIs) and by conducting reconnaissance with the intent of finding an indirect approach to the threat center(s) of gravity.

ORGANIZATION DESIGN

9-7. The cavalry squadron is designed to serve as the SBCT commander's primary eyes, ears, and sensors and as the first-line military assessment for information gathered through R&S. As such, it is designed to efficiently direct and execute information collection (reconnaissance) and provide a synchronized unity of effort. This process not only garners essential information used by the brigade to develop intelligence, knowledge, and the COP; but it also identifies enemy or threat key vulnerabilities for exploitation by brigade maneuver, fires, and nonlethal effects.

ENGINEER RECONNAISSANCE TEAM

9-8. The primary mission of the ERT is collecting engineer-focused tactical and technical information for the supported or parent unit. The team must be able to perform this mission mounted or dismounted, during the day or at night, and in various terrain conditions. Engineers participate in the SBCT reconnaissance effort to obtain information using visual observation and detection by sensors to—

- Confirm or deny terrain analysis.

- Determine trafficability on proposed routes.
- Determine soil suitability for digging.
- Conduct route reconnaissance, road reconnaissance, and bridge classification.
- Conduct reconnaissance of specific NAIs, targeted areas of interest (TAIs), and decision points that may contain obstacles or be tied into obstacles plans.
- Identify areas suitable for SCATMINE obstacles.
- Conduct limited obstacle reduction, mark obstacles and routes, and perform demolition work.
- Collect information on threat locations, capabilities, and OBSTINTEL within the AOs.
- Determine the meteorologic, hydrographic, and geographic characteristics of a particular area.

9-9. In the digital environment, the primary missions remain the same; however, the means by which the ERT collects data and retransmits it back to the maneuver TOC has changed. Information obtained about the terrain, terrain features, and obstacles can now be digitally transmitted to the maneuver TOC to facilitate SBCT force mobility. Information collected can be digitally transmitted in near-real or real time via the Digital Reconnaissance System (DRS). The ERT employs DRS to record and report breached lanes, route critical points, bypasses, logistics resources, and the locations of wounded personnel or damaged equipment.

ORGANIZATION

9-10. The engineer company has no dedicated reconnaissance assets; but with measured risk to other mission support, it has the capability to provide ERTs to augment the cavalry squadron or the infantry battalion reconnaissance scout platoons. If required, the engineer company commander forms an ERT(s) ranging in size from a three-man team to a platoon. ERTs may operate independently; however, they normally augment one of the squadron troops or other maneuver units directly involved in reconnaissance operations. If an ERT augments a squadron element, the team must be task-organized with equipment that is compatible with mission requirements and the supported maneuver reconnaissance force.

Engineer Reconnaissance Team

9-11. An ERT is the basic engineer reconnaissance element. The team normally reconnoiters one NAI or multiple NAIs within the same vicinity on the battlefield. The brigade may employ more than one reconnaissance team if multiple NAIs need to be observed in dispersed locations. In most instances, the ERT conducts its reconnaissance dismounted. However, the team may arrive in the vicinity of the reconnaissance objective in many ways, including dismounted or by air or ground transportation. If the team travels dismounted or is air-inserted, it should consist of at least three personnel. If the team uses an organic vehicle to arrive in the vicinity of its reconnaissance objective, it should consist of at least five personnel—three dismounted and two mounted.

Dismounted Element

9-12. A dismounted element generally consists of three or more personnel and is commanded by an ERT leader. Its mission is to locate and report all necessary information required by the supported commander according to the ISR plan. This information can be transmitted directly to the supported unit headquarters on the appropriate net (according to the SOP or the ISR order) or relayed through the mounted element.

Mounted Element

9-13. A mounted element consists of at least two personnel per vehicle—the vehicle operator and an assistant ERT leader. Its primary mission is to maintain communication with the dismounted element and the supported unit. The mounted element is responsible for relaying intelligence collected by the dismounted element to the appropriate C2 node and ensuring that the enemy does not discover the vehicle. (All OBSTINTEL collected by an ERT is sent to the engineer company if possible.) Its secondary mission is to be prepared to go forward and conduct the reconnaissance if the dismounted element is unsuccessful.

CHARACTERISTICS

9-14. An ERT normally conducts operations as part of a larger, combined arms force or augments the cavalry squadron effort. Even when not an active participant in the reconnaissance effort, the engineer team still has the ability to support the maneuver commander through the use of digital engineer systems and connectivity to the SBCT terrain section, which can assist in force mobility. This team has capabilities and limitations that must be considered when they are employed.

Capabilities

9-15. The ERT is normally task-organized for a specific mission, and its elements are drawn from the combat mobility platoons or the mobility support platoon. The probable high-frequency requirement for one or more reconnaissance teams to support SBCT requirements makes it appropriate to consider specialized training, resourcing, and planning for selected members of the engineer company to meet these demands. The ERT—

- Increases the supporting unit reconnaissance capabilities concerning complex mine and wire obstacle systems, enemy engineer activities, and the details of mobility along a route.
- Provides detailed technical information on any encountered obstacle.
- Conducts an analysis of assets needed to reduce any encountered obstacle.
- Marks bypasses of obstacles based on guidance from the supported commander. This guidance includes whether to mark bypasses and the direction the force should maneuver when bypassing an obstacle.
- Assists in gathering basic enemy information.
- Provides detailed technical information on routes (including classification) and specific information on bridges, tunnels, fords, and ferries along the route.

- Assists in acquiring enemy engineer equipment on the battlefield.
- Assists in guiding the breach force to the obstacle for reduction.

Limitations

9-16. An ERT has the following limitations:

- The engineer company does not have personnel and equipment listed on the table(s) of organization and equipment (TOE) and the modified table(s) of organization and equipment (MTOE) dedicated for reconnaissance activities.
- The team is extremely limited in its ability to destroy or repel enemy reconnaissance units and security forces.
- The distance the ERT can operate away from the main body is restricted by the range of communications, the range of supporting indirect fires, and the ability to perform CSS operations.
- The team has limited communications capability. Based on the radio configuration of the vehicle used during the reconnaissance and whether the ERT is working under maneuver element control, dedicated monitoring of engineer nets may be difficult. However, with the Single-Channel, Ground-to-Air Radio System (SINCGARS), the ERT should be able to scan critical engineer nets or, at the very least, easily switch to the engineer net to report OBSTINTEL. The FBCB2 is not capable of rapidly switching linkages to reflect task organization changes.
- The ERT has very limited obstacle creation and reduction ability because it normally carries a light basic load of demolitions according to the unit SOP. Obstacle reduction is normally limited to manually reducing obstacles not covered by enemy fires and observation.

PLANNING

9-17. The ERT leader must clearly understand the commander's intent and know what is expected of the team in each phase of the operation. Also, the team leader must be given the specific NAIs that the team is to observe and the exact information it is expected to gather within each NAI. The ERT must be focused on the NAIs that concern obstacles, mobility, or enemy engineer assets. However, the team should be prepared to report on non-engineer-specific information as part of the combined arms reconnaissance effort. The team must be provided with all available information concerning the type of obstacles it may encounter during the reconnaissance.

9-18. The ERT must be a part of the supported unit multidimensional R&S plan. This ensures that commanders get the information they need to fight and win the battle. A maneuver brigade and its subordinate battalions produce ISR plans. The brigade plan (the ISR plan in the SBCT) tasks subordinate battalions and brigade assets, and the tasks are incorporated into each subordinate battalion plan.

NOTES:

1. The ISR plan is developed very early in the planning process because it is critical to get reconnaissance assets into a mission as early as possible.

2. Digitization enhances the planning process by providing a rapid exchange of information to allow parallel planning at all levels. The reconnaissance team parallel planning process involves rapid information sharing during the planning process. This can be accomplished by on-line, near-real-time access to plans by subordinate units. WARNOs can be passed between lower and higher headquarters, which allows subordinate headquarters to plan simultaneously.

3. The availability of detailed DTSS terrain products from the terrain section within the SBCT MANSPT cell allows a more focused ISR effort.

4. The engineer team must be flexible to receive mission FRAGOs throughout the multidimensional ISR plan.

Intelligence Preparation of the Battlefield

9-19. IPB is a systematic approach to analyzing the enemy, the weather, and the terrain in a specific geographic area. It integrates enemy doctrine with the weather and terrain as they relate to the mission and the specific battlefield environment. This is done to determine and evaluate enemy capabilities, vulnerabilities, and probable COAs.

NOTE: For a complete discussion of IPB, see *FM 34-130*.

9-20. *Table 9-1* summarizes engineer participation in the IPB process. The S2 and the engineer staff conduct analyses by applying enemy doctrinal templates (including obstacle templates) to specific terrain. This becomes a SITEMP, which is a doctrinal template with terrain and weather constraints applied. It is a graphic description of enemy disposition should the enemy adopt a particular COA. It shows how enemy forces might deviate from doctrinal dispositions, frontages, depths, and echelon spacing to account for the effects of terrain and weather; and it focuses on specific mobility corridors. A SITEMP is a visual technique. By placing a doctrinal template over a segment of a mobility corridor, the analyst adjusts units or equipment dispositions to depict where they might actually be deployed in the situation. Time and space analysis is important in developing a SITEMP, which is used during the war-gaming process.

NOTE: For further discussion of SITEMP, see *FM 34-130*.

9-21. In a more asymmetric, noncontiguous environment, an enemy doctrinal template may not be available or accurate. Based on known enemy capabilities and an intense analysis of the terrain, the engineer staff must anticipate the most likely locations for enemy mine and countermine activity. In terms of assured mobility principles, the ability to predict enemy actions accurately enables the SBCT to allocate resources to—

- Detect enemy activity.

Table 9-1. Engineer Input to the IPB Process

Input	Available Digital Source	IPB Step	Output
Terrain data Available threat engineer assets	DTSS ASAS-RWS AFATDS MCS MCS-Engineer DRS Battle planning and visualization	Define the battlefield environment.	Available threat engineer assets
Terrain analysis (OAKOC)	DTSS ASAS-RWS	Describe the battlefield effects.	MCOO
Threat engineer doctrine Engineer HVTs Threat engineer capabilities	ASAS-RWS	Evaluate the threat.	Doctrinal templates Intelligence estimate Engineer HVTs Threat engineer capabilities
Threat engineer support to each COA	ASAS-RWS	Determine threat COAs.	SITEMP Event template HVT list NAI identification DST

- Prevent enemy activity from inhibiting the SBCT freedom of maneuver.
- Avoid the activity.
- Neutralize the threat.

9-22. IPB is an analysis of how the doctrine, weather, and terrain influence the enemy scheme of maneuver. Various overlays, templates, and matrices are constructed on digital systems and used during the IPB process to enhance the ability of the commander and staff to visualize the battlespace. The functions of the IPB process—determine the battlefield environment, describe the battlefield effects, evaluate the enemy, and determine threat COAs—are unchanged by the fielding of automated C2 systems. Automation, however, expedites the passing of IPB products from the SBCT main to the squadron or battalion TF. The squadron or battalion TF transmits (via FBCB2) the ISR plan, intelligence estimate, intelligence summaries, and limited graphics developed at the SBCT main down to the subordinate companies and teams. The ERT uses FBCB2 and DRS as its primary reporting systems to transmit combat information to the TOC.

NOTES:

1. The unit should develop a TSOP that dictates when it is appropriate to use voice reporting instead of digital communications.

2. The FBCB2 screen clutter will affect the level of detail depicted on the monitor and may reduce the use of labels or individual system icons. If this occurs, additional details can be provided by voice.

9-23. A SITEMP is the basis for event templating. An event template is a model against which enemy activity can be recorded and compared. It represents a sequential projection of events that relate to space and time on the battlefield and indicates enemy ability to adopt a particular COA. By knowing what an enemy force can do and comparing it with what the enemy is doing, a SITEMP can predict what the enemy will do next. This is an important analysis factor in determining enemy posture and movement. Knowing when and where enemy activity is likely to occur on the battlefield provides indicators of enemy intentions or verifies that projected events did or did not occur.

9-24. As the threat visualization process develops, a number of critical locations become apparent (key terrain and man-made features, such as bridges and fords). These areas are important because significant events and activities occur there, and it is within these areas that targets appear. These areas are designated as NAIs, and they must be observed to be effective. Therefore, the number and location of NAIs designated is tied to the capabilities of the cavalry squadron, infantry battalion, and ERT to enhance the number of NAIs being observed.

9-25. ABCS provides enhanced terrain visualization that allows commanders, staffs, and reconnaissance teams to view terrain digitally (in three dimension). ABCS shows the percentage of slopes, the types of vegetation, trafficability, and other man-made features (including known and templated obstacles). The terrain analysis software program, TerraBase II™, is also available at brigade and TF levels to assist with understanding the terrain.

9-26. NAIs may also be developed when the staff produces the DST. The commander and staff create a DST during the MDMP. A DST graphically represents the projected situation, identifying where a decision must be made to initiate a specific activity or event. NAIs developed during the IPB and MDMP are prioritized, and reconnaissance assets are tasked to collect information to support the commander's IR. ERTs should be used for those NAIs requiring engineer expertise.

9-27. ERTs should transmit information using the FBCB2. To report information in a timely manner, the teams must know the latest time that information is of value to facilitate tactical decision making.

9-28. The terrain information and overlays recorded and reported by the DRS are automatically integrated into the DTSS located at the SBCT main to update terrain information in the commander's AO and area of interest. Information and overlays (such as obstacle overlays) reported using FBCB2 are integrated into the ASAS-RWS database located at the brigade to update the enemy situation. The digital interoperability and tactical internet between the ABCSs allow updated reports from DTSS and ASAS-RWS to be sent to all BOS elements and units via their respective digital systems.

9-29. In the offense, a maneuver unit S2 (with engineer assistance) determines how and where the enemy fights, how enemy direct-fire systems and obstacles are arrayed, what counterattack routes the enemy is likely to take, how the enemy will employ its SCATMINE capability, and where the mines may be placed.

9-30. The primary focus in the offense should be on OBSTINTEL as discussed in *FM 3-34.2*. This includes, but is not limited to—

- Obstacle location, orientation, depth, and composition.
- The presence of protective wire.
- Gaps or bypasses.
- Minefield composition (buried or surface AT and antipersonnel [AP] mines and antihandling devices [AHDs]).
- Mine types.
- The location of enemy direct- and indirect-fire weapon systems that can influence possible breach sites.

9-31. In the defense, the maneuver unit S2 (with engineer staff assistance) conducts a terrain analysis to determine enemy AAs. The brigade engineer and the S2 work closely with TF S2s, the engineer company XO, and engineer platoon leaders to provide input on enemy engineer assets and enemy engineer COAs and to template enemy obstacle use. The ERT may focus on—

- Obtaining information about planned routes to be used during counterattacks, repositioning, or retrograde operations.
- Augmenting the cavalry squadron or TF scouts to identify enemy engineer equipment and activity.
- Observing locations where friendly forces emplace SCATMINEs to provide information on their effectiveness and to call fires on enemy formations.
- Observing NAIs where the enemy is templated to employ SCATMINEs.

Intelligence, Surveillance, and Reconnaissance

9-32. From the event template and DST, the S2 and S3 prepare a detailed ISR plan that graphically depicts where and when the reconnaissance elements should look for enemy activity. The S3 has primary staff responsibility for reconnaissance planning, allocating, and tasking resources. The ISR plan must direct specific tasks and priorities to all ISR elements—company teams, scout platoons, ERTs, combat observation and lasing teams (COLTs), ground surveillance radar (GSR) teams, and patrols. This same procedure model must happen at the SBCT main and must involve the cavalry squadron. The supported battalion S2 translates the ISR plan into operational terms and graphics. During reconnaissance operations, the S2 and S3 plan jointly and the S2 designates NAIs for the ERTs. While the S3 maintains overall OPCON of the ISR plan, the S2 focuses on monitoring it and the ERT leader further refines it (including such things as checkpoints). These serve as control measures to guide team movement to the objectives.

9-33. The supported unit S2 briefs the ERT leader on the disposition of friendly forces and the scheme of maneuver. The S2 provides the team leader with current and projected ISR plans, operational graphics, and Terrain Index Reference System points to support additional graphics and FRAGOs. If the

S3 does not brief the ERT leader, the S2 must ensure that the commander's intent is accurately portrayed to the team leader. The S2 should plan to employ the ERT throughout the entire course of the mission and provide guidance on when to report, what actions to take on enemy contact, and what CS and CSS assets are available. The engineer commander must ensure that specifics concerning obstacles, terrain, and enemy engineer assets that may be encountered are also included in this briefing. The ERT leader receives the S2 briefing before the team leader departs the battalion area for the mission. Other options, although less desirable, include receiving this information over the radio or from a messenger sent by the commander.

9-34. The brigade engineer and the engineer company commander or XO should do everything possible to assist the ERT leader by coordinating with other BOS elements. A fire support element stays abreast of what the team is doing while conducting the mission. This ensures that it provides responsive fire support to the ERT. The brigade engineer should coordinate with the FSO to discuss the ERT mission and the unique requirements the team has for fire support. The brigade engineer finds out what support is available, where supporting units are located, and what fire support restrictions exist. The team leader recommends preplanned targets and target priorities that the FSO incorporates into the reconnaissance team fire support plan. The team leader should not depart the fire support element without an approved target list or a preplanned fire overlay.

9-35. The appropriate signal officer is included in coordination efforts if the mission requires communications support. The ERT should not perform relay duties as its primary mission; however, each vehicle used by the ERT should have the capability to function as a retransmission station.

9-36. The brigade engineer also coordinates with any additional elements that may be providing support to the reconnaissance effort (such as the air defense artillery [ADA], COLT, GSR, and aero scouts). Ideally, any linkups should occur at the TOC during daylight and in sufficient time to conduct a thorough briefing and rehearsal with elements to which the ERT is attached or elements that are attached to the ERT. During a route reconnaissance, the ERT must know the number, type (track or wheeled), and load classification of vehicles to be used on the reconnoitered routes. This information determines route trafficability and helps determine COAs during the reconnaissance. The engineer coordinates with the appropriate unit S4 to ensure that a feasible CSS plan is in place and that the ERT leader understands where all logistics support comes from.

9-37. As a minimum, the ERT leader should have the following materials on hand and available to soldiers:

- Operational graphics.
- ISR graphics.
- SITEMP, event template, and notes on the current enemy situation.
- Fire support overlay.
- CSS plan (resupply, casualty evacuation, maintenance, and recovery) and CSS graphics.
- Communications plan.
- Compromise procedures.

- Disengagement criteria.
- Linkup plan
- Contingency plan for NAI coverage.
- DRS.
- FBCB2 System.
- Precision, lightweight Global Positioning System receiver.
- SINCGARS with a power amp (two if outfitted to perform the retransmission function).
- SINCGARS man-pack kit.

9-38. The Global Positioning System receiver, coupled with the FBCB2 System, provides the ERT with precision navigation capability and the ability to move rapidly and accurately, even during periods of limited visibility. These systems also improve the maneuver reconnaissance leader's ability to maneuver effectively on the battlefield. For example, the reconnaissance leader is able to develop digitized overlays, which depict designated way points to orient the scout platoons during movement. Platoons steer to these way points to maintain orientation and dispersion.

9-39. Once in the vicinity of reconnaissance objectives, the ERT—

- Confirms or denies the templated information.
- Looks for engineer-specific information about the obstacle, such as its composition and any bypasses around it.
- Considers limited stealthy obstacle reduction.
- Conducts an analysis of the terrain and soil composition to determine whether mine clearing blades or MICLICs may be successful.
- Recommends the location for obstacle reduction.

9-40. The information obtained by the ERT must be relayed to the TOC quickly so that the S2, S3, and brigade engineer can analyze the information and ensure rapid dissemination to all units. The brigade engineer must ensure that he has a system in place to track all incoming OBSTINTEL. All graphics must accurately and distinctly depict actual obstacle locations, and they must be easily distinguishable from templated obstacle graphics.

ENGINEER RECONNAISSANCE EMPLOYMENT CONCEPT

9-41. As discussed previously, engineer reconnaissance elements may be a team, squad, platoon, or larger element. Regardless of the size, highly trained personnel are required for obstacle reconnaissance operations conducted forward of friendly lines and they need to be linked to security and evacuation assets as part of the overall reconnaissance effort. Engineer training must focus on accomplishing the specific obstacle reconnaissance mission.

9-42. Current engineer force structure does not provide for personnel or equipment dedicated to reconnaissance efforts. However, engineer units that dedicate personnel, equipment, and planning time to the reconnaissance effort have achieved great success. Successful employment of engineers in a reconnaissance role is a result of effective SOPs and highly trained staffs and ERTs. When required to provide reconnaissance support, the supported maneuver unit should augment the ERT with necessary assets to accomplish the mission.

Personnel and Equipment

9-43. Because the engineer company has limited assets to draw from, the formation of ERTs can subsequently degrade the capabilities of the organization from which they are drawn. The brigade engineer and the company commander must understand the trade-offs between using engineer assets in a reconnaissance role versus using them in a MANSPT role when making recommendations to the SBCT commander.

Training

9-44. Regardless of where personnel come from to create the ERT, units have to dedicate a large amount of training time toward developing an effective ERT. This training includes—

- Training events with the cavalry squadron to develop a strong working relationship.
- Fundamentals of reconnaissance operations.
- Operation with brigade assets and the cavalry squadron scouts in a nearly habitual relationship to develop the trust and familiarity necessary to succeed on the battlefield.
- Procedures for reporting, calling for fires, first aid, land navigation, demolitions, minefield indicators, foreign mine recognition, dismounted movement techniques, vehicle and equipment maintenance, helicopter insertion, resupply, extraction, relay, and retransmission.
- Operation of the DRS and FBCB2 to facilitate passing reconnaissance information.
- Noise, light, and litter discipline and the use of night vision devices and camouflage.
- Rigorous physical training to meet mission requirements.

Obstacle and Restriction Reconnaissance

9-45. One of the high-frequency tasks associated with reconnaissance missions is locating and reconnoitering obstacles and restrictions that may affect the trafficability along a route or an axis. The purpose of the reconnaissance is to determine how best to overcome the effects of the obstacle—reduction or bypass. The following tasks may be associated with the reconnaissance:

- Estimating the reduction assets necessary to reduce the obstacle.
- Marking the best location to reduce.
- Bypassing the obstacle.

9-46. If the obstacle is bypassed, the ERT should be prepared to provide guides and mark the bypass. Obstacles and restrictions are either existing or reinforcing. Doctrine associated with the former Soviet Union emphasizes the use of man-made obstacles to reinforce natural obstacles and the use of restrictions to slow, impede, and canalize friendly forces. Obstacles and restrictions include—

- Minefields.
- Bridges.
- Log obstacles.
- AT ditches.
- Wire entanglements.
- Defiles.
- Persistent agent contamination.

9-47. Although an ERT has the capability to clear or reduce small obstacles that are not covered by fire or observation, its primary task is reconnoitering tactical and protective obstacles. The reconnaissance should include supporting enemy positions and possible reduction sites. Another important task is locating and marking bypasses around obstacles and restrictions.

Detection

9-48. During reconnaissance operations, engineers must help locate and evaluate obstacles and man-made and natural restrictions to support the supported unit movement. Detecting obstacles and restrictions begins during the operation planning phase when the S2 and the engineer conduct the IPB. Scouts combine the S2's work with the reconnaissance conducted during the troop-leading process (normally a map reconnaissance only) to identify all possible obstacles and restrictions within their AO. An ERT plans its reconnaissance based on the orders it receives, the IPB, and its own map reconnaissance. Assistance could also come from the terrain team.

9-49. While assisting in a reconnaissance mission, engineers use visual and physical means to detect mines and obstacles. They visually inspect the terrain for signs of emplaced minefields and other reinforcing obstacles. They must be alert to dangerous battlefield debris, such as bomblets from cluster bomb units or dual-purpose, improved conventional munitions and other UXOs. Minefields and other obstacles can be difficult to detect while mounted; most obstacle detection occurs dismounted. An ERT may dismount long distances from a suspected obstacle before conducting a reconnaissance, and it must carefully choose its dismount point. A dismount point should be—

- Covered and concealed.
- Easy to defend for a short period of time.
- Away from natural traffic flow.
- Easy to locate.
- Within close proximity to the objective to ease C2.
- Out of sight, sound, and direct-fire range of the objective.

9-50. An ERT should look for disturbed earth, unusual or out-of-place features, surface-laid mines, tilt rods, and trip wires. Maneuver units and scouts may assist in detecting mines by using the thermal sights in their vehicles. Reconnaissance elements should conduct additional visual inspections to ensure that the true extent of the obstacle is known.

Area Security and Reconnaissance

9-51. Enemy forces cover their obstacles with observation and fire. When scouts and ERTs encounter an obstacle, they must assume that the enemy can observe and engage the team. The scout or ERT that detects the obstacle establishes overwatch before it proceeds with the reconnaissance. The overwatching element looks for signs of enemy forces in and around the obstacle. The element visually searches the dominant terrain on the far side of the obstacle for evidence of enemy positions or ambushes. Once it confirms the enemy situation from the near side, the engineers and scouts (not in overwatch) move mounted or dismounted to find bypasses around the obstacle and to establish OPs on the far side to provide 360° security of the obstacle. If the scouts and engineers are unable to find a bypass, they conduct their reconnaissance from the near side under the security of the overwatch elements.

TACTICAL RECONNAISSANCE

9-52. Engineers are active participants in reconnaissance operations that provide maneuver and engineer commanders with information about the terrain, enemy engineer activity, obstacles, and weather effects within an AO. A tactical reconnaissance normally takes place in a high-threat environment. During reconnaissance, engineers may assist maneuver units or scouts in reconnoitering the terrain to determine its effect on maneuverability and the enemy situation. When the enemy is located, engineers help determine enemy strengths and weaknesses with a focus on enemy engineer activities and obstacles. A reconnaissance team provides the information necessary to allow combined arms forces to maneuver against the enemy force, attack where it is most vulnerable, and apply overwhelming firepower to destroy it. An ERT ensures that the combined arms forces have the freedom to maneuver and the knowledge of where they may encounter enemy obstacles.

Purpose and Fundamentals

9-53. A tactical reconnaissance is conducted to gain information outside friendly lines or to provide current, accurate information about the terrain, resources, obstacles, and the enemy within a specified AO. This information provides follow-on forces with an opportunity to rapidly maneuver to their objective. ERTs are involved in three types of tactical reconnaissance—route, zone, and area. During a tactical reconnaissance, engineers may also be involved in various technical reconnaissances, focused on such things as roads, tunnels, and bridges.

9-54. There are six fundamentals common to all successful tactical reconnaissance operations. Every engineer leader should keep the following fundamentals in mind when planning and executing reconnaissance missions:

- **Use maximum reconnaissance force forward.** During a reconnaissance, every scout, every engineer, and every pair of eyes make a difference. ERTs must not be kept in the reserve. They must be employed and executing their portion of reconnaissance tasks as soon as possible.

- **Orient on the reconnaissance objective.** The scheme of maneuver is focused toward a specific objective or a set of objectives. An ERT must know where to look for enemy obstacles and enemy engineer activity at the objective. The objective may be a terrain feature, a specific area, an enemy force, or an NAI (a checkpoint or an objective symbol may designate it). The ERT must maintain its orientation toward the objective until the mission is complete. The overall objective for the mission is located in the supported commander's PIR, the ISR plan, and the commander's intent paragraph in the OPORD. It is critical that all reconnaissance personnel understand the purpose of a reconnaissance mission.
- **Report all information rapidly and accurately.** Commanders base their decisions and plans on the battlefield information that scouts, engineers, and other reconnaissance assets find and report. Information loses value over time. Scouts and engineers must report all information exactly as they see it and as fast as possible. They must never assume, distort, or exaggerate because inaccurate information is dangerous. Information on where an enemy or an obstacle **is not** located is just as important as where an enemy or obstacle **is** located.
- **Retain the freedom of maneuver.** All reconnaissance elements must be able to maneuver on the battlefield. If the enemy fixes a reconnaissance element, the element must regain its ability to maneuver or it can no longer accomplish its mission. Reconnaissance teams must continually maintain an awareness of tactical developments. They must employ proper movement techniques and react to unexpected situations appropriately. When contact is made, the reconnaissance team leader must develop the situation and retain the initiative and the ability to continue the mission.
- **Gain and maintain enemy contact.** Reconnaissance elements employ sound tactical movement, target acquisition methods, and appropriate actions to make undetected contact with an enemy, thereby retaining the initiative and the control of the situation. Reconnaissance elements use the terrain and weather to their advantage to avoid detection. Examples include selecting covered and concealed routes, moving during rain, avoiding roads and danger areas, and selecting unlikely routes to their objectives. Once scouts find the enemy, they maintain contact using all available means (sensors, radar, sound, and visual) until the commander orders them to do otherwise or as required by their specific instructions.
- **Develop the situation rapidly.** Whether reconnaissance elements detect an obstacle or the enemy, they must analyze the situation quickly. If they detect the enemy, they determine enemy size, composition, and activity and they locate enemy flanks. Scouts and engineers find any obstacles protecting enemy position. The engineers (with scout assistance) find and mark a bypass, perform an unopposed obstacle reduction, or conduct a detailed obstacle reconnaissance. It is imperative that any reduction or marking does not jeopardize the reconnaissance effort. It is also important that the engineers gain enough detail about the obstacle for future breaching operations. This

must be done quickly with minimal guidance from higher headquarters. During a reconnaissance, time is a precious resource; it cannot be wasted if a mission is to succeed.

Techniques

9-55. Reconnaissance techniques achieve a balance between the acceptable level of risk and the security necessary to ensure mission accomplishment. This balance is often a trade-off between speed and security. The faster the reconnaissance, the more risk a reconnaissance team accepts and the less detailed reconnaissance it conducts. A reconnaissance team must use all available resources when conducting its mission. The primary tools for any ERT are its senses—particularly sight, hearing, touch, and smell. Reconnaissance equipment supplements and complements these senses. The following are some examples of how these senses are used during reconnaissance missions:

- **Sight.** The ERT looks for—
  - Evidence of digging activities, including fighting positions and tank ditches.
  - Movement or activity of enemy engineer vehicles.
  - Indications of buried mines.
  - Emplaced demolition charges on bridges, tunnels, and so forth.
  - Obstacle orientation, depth, composition, and width.
  - Enemy vehicles and aircraft.
  - Helicopter LZs.
  - Sudden or unusual movement.
  - Smoke or dust.
  - Engine exhaust fumes.
  - Unusual movement of animals.
  - Activity of the local populace.
  - Vehicle tracks.
  - Signs or evidence of enemy occupation.
  - Recently cut foliage or vegetation.
  - Lights, fires, or reflections.
  - Muzzle flashes.
- **Hearing.** The ERT listens for—
  - Vehicle sounds that indicate the construction of survivability positions.
  - Exploding demolition charges.
  - Running engines.
  - Tracked-vehicle sounds.
  - Voices.
  - Metallic sounds, especially sounds indicating wire emplacement.
  - Distinctive weapons fire.
  - Unusual calm or silence.
  - Dismounted movement through brush or woods.

  - Helicopter rotors.
- **Touch.** The ERT feels for the presence of trip wires or AHDs.
- **Smell.** The ERT smells for—
  - Cooking food.
  - Vehicle exhausts.
  - Burning petroleum, oil, and lubricants (POL).
  - Decaying food or garbage.

9-56. To reduce vulnerability on the battlefield, the ERT rehearses reconnaissance techniques in detail. The knowledge and rehearsal of these techniques, combined with an understanding of the particular METT-TC requirements, allow the ERT leader to mix and choose the methods that maximize security and mission accomplishment. There are several reconnaissance methods that have proven to be effective in most situations, and they form the foundation for tactical reconnaissance. Leaders must use common sense when analyzing a given situation and employing or modifying the reconnaissance method based on METT-TC.

ROUTE RECONNAISSANCE

9-57. Maneuver units or scouts (augmented by engineers) conduct a route reconnaissance to gain detailed information about a specific route and the terrain on both sides of the route that the enemy could use to influence movement. When the commander wants to use a specific route, a maneuver unit or scout platoon with an ERT conducts a route reconnaissance. This ensures that the route is clear of obstacles and enemy forces and that it supports vehicle movement. Engineers routinely support the cavalry squadron and its units in route reconnaissance missions.

Critical Tasks

9-58. During a route reconnaissance, a reconnaissance element must accomplish a specified number of tasks unless directed to do otherwise. Based on the time available and the commander's intent, the reconnaissance element may be directed to conduct a route reconnaissance to acquire specific information only. The reconnaissance leader must clearly understand which critical tasks must be accomplished and the appropriate documentation required to capture critical information. Although the use of digital cameras during route reconnaissance is becoming more popular, the reconnaissance element must still capture all of the critical information requirements associated with each of the following tasks:

- Determine route trafficability (see *Chapter 6*).
- Reconnoiter to the limit of the direct-fire range and terrain that dominate the route.
- Reconnoiter all built-up areas along the route (identify bypass routes, construction supplies and equipment, ambush sites, evidence of booby traps, and suitable sites for C2 and CSS facilities).
- Reconnoiter all lateral routes to the limit of the direct-fire range.
- Inspect and classify all bridges on the route. The critical information requirements for each type of bridge are different. The reconnaissance

leader must ensure that the team takes the required materials (graphic training aids, manuals, forms) that clarify the information requirements.

- Locate fords or crossing sites near all bridges on the route. Determine fordabilty and locate nearby bypasses that can support combat and CSS units, mark bridge classifications and bypass routes, and be prepared to provide guides to the bypasses.
- Inspect and classify all overpasses, underpasses, and culverts.
- Reconnoiter all defiles along the route.
- Locate obstacles along the route. Cavalry units may be required to clear routes of obstacles (see *FM 17-95*).
- Locate bypasses around built-up areas, obstacles, and contaminated areas.
- Report route information.
- Find and report all enemy forces that can influence movement along the route.

Techniques

9-59. Because of the number of critical tasks that must be accomplished, a scout platoon with an ERT can conduct a detailed reconnaissance of only one route. A scout platoon may be able to handle two routes if the reconnaissance is limited to trafficability only. The following paragraphs outline one technique of accomplishing all tasks as rapidly and securely as possible.

The scout platoon leader receives an order specifying the route that the platoon must reconnoiter and define from the start point to the release point. Additionally, the order may specify platoon boundaries, phase lines (PLs), LDs, and a limit of advance (or reconnaissance objective). These control measures specify how much terrain on both sides of a route that the platoon must reconnoiter and where the operation must begin and end. The boundaries are drawn on both sides. They include the terrain that dominates the route, usually extending out 2.5 to 3 kilometers. This ensures that the scouts reconnoiter all terrain that the enemy could use to influence movement along the route. An LD is drawn from one boundary to the other behind the start point. This allows the platoon to cross the LD and be fully deployed before reaching the route. A limit of advance or objective is placed beyond the release point on the last terrain feature dominating the route or out to about 3 kilometers.

The reconnaissance platoon leader may add additional PLs, contact points, and checkpoints to the graphics received from the commander. PLs are used to help control the platoon maneuver. The contact points ensure that the teams maintain contact at particular critical points. Checkpoints are used along a route or on specific terrain to control movement or to designate areas that must be reconnoitered. The ERT leader should obtain this information during the scout platoon OPORD briefing.

The reconnaissance platoon leader also coordinates with the FSO and plans artillery targets on known or suspected enemy positions and dominant terrain throughout the AO. The ERT leader must ensure that this information is included on the overlay.

The reconnaissance platoon leader evaluates the METT-TC factors and organizes the platoon with an ERT to meet mission needs. The reconnaissance platoon leader ensures that at least one team is responsible for reconnoitering a route. A three-team organization is usually best-suited to reconnoiter a route. Team A reconnoiters the terrain left of the route, Team B covers the terrain right of the route, and Team C and the ERT reconnoiter the route and control the movement of the other two teams. In this organization, the platoon leader's team has specific responsibility to clear the route. ERT tasks most likely include a technical reconnaissance of the route (including bridge MLC and possible locations for employing SCATMINEs).

OBSTACLE RECONNAISSANCE

9-60. Once security is established, scouts and engineers use great caution and move dismounted to the obstacle. Trip wires and other wire may indicate that the enemy is using booby traps or command-detonated mines to prevent friendly forces from determining the—

- Obstacle location and orientation.
- Types of mines in the minefield or the type of obstacle.
- Obstacle length and width.
- Existence of enemy coverage, including enemy strength, equipment, and fire support.
- Equipment necessary to reduce the obstacle.

The ERT reconnoitering the obstacle prepares an obstacle report with this information and forwards the report through the established channels to the supported unit TOC.

COURSE-OF-ACTION SELECTION

9-61. After collecting the facts, the scout platoon or ERT leader analyzes the situation and the METT-TC factors to select a COA. Once the scouts and ERTs have determined the best COA for a situation, they execute it or recommend it to higher headquarters for approval. Generally, the reconnaissance team executes a particular COA without specific approval if it is addressed in the OPORD received from higher headquarters or if it is in the unit SOP. If the situation discovered is not covered by previous guidance, the reconnaissance team determines the best COA and recommends it to the commander before execution. The four COAs are—

- Use a bypass.
- Reduce the obstacle.
- Support a breaching operation.
- Continue the mission.

Use a Bypass

9-62. Using a bypass is the preferred method when it offers a quick, easy, and tactically sound means of avoiding the obstacle. A good bypass must allow an entire force to avoid the primary obstacle without risking further exposure to enemy fire and without diverting the force from its objective. Bypassing conserves reduction assets and maintains the momentum. If a reconnaissance team locates a bypass and the commander approves its use, scouts and engineers must mark it according to the supported unit TSOP and report it to their commander. At a minimum, this report should include the grid location to the far recognition marker and information on how the obstacle is marked, even if it is just to confirm that the bypass is marked according to the TSOP. If the reconnaissance team is tasked to mark a bypass, the team must emplace markers so that they are not visible to the enemy. Engineers and scouts may be required to provide guides for the main body, especially if the bypass is difficult to locate or if visibility conditions are poor.

9-63. Bypassing is not always possible, and breaching may be the best or only solution, as in the following situations:

- The obstacle is integrated into a prepared defensive position, and the only available bypass moves friendly forces into the fire sack or an ambush.
- The reconnaissance mission specifically tasks the reconnaissance team to clear the original route for follow-on forces.
- The best available bypass route does not allow follow-on forces to maintain their desired rate of movement, or it diverts the force from the objective.
- Improvements to the bypass may require more time and assets than breaching the primary obstacles.

Reduce the Obstacle

9-64. Reducing an obstacle significantly degrades the ability to maintain the momentum of the reconnaissance or follow-on forces. Obstacles that the scout and engineer are able to reduce include small minefields, simple wire obstacles, small roadblocks, and similar obstacles. The supported commander should make the decision to have the reconnaissance team reduce an obstacle. He must consider the risk to the reconnaissance team and the potential for prematurely identifying the route. Obstacle reduction should not be attempted if the obstacle is part of an integrated defensive position.

Support a Breaching Operation

9-65. When a large obstacle is located and cannot be bypassed easily, the alternative is to support a breaching operation. Scouts and engineers perform additional reconnaissance tasks in support of the breaching operation. These tasks include determining the assets and time needed to reduce the obstacle and determining the best location for the reduction site. Scout and engineer reconnaissance efforts focus on the following:

- Trafficable routes to the reduction site and routes from the far side leading to the objective.
- Proposed locations for positioning the support force.
- Dispersed, covered, and concealed areas near the reduction site.
- The best location for the reduction effort at the obstacle. It is imperative that the reduction plan be sent to the reconnaissance teams once the scheme of maneuver is finalized. Information (such as the number of lanes required and the distance between lanes) is

needed for the reconnaissance forces to conduct the necessary reconnaissance.

- Positions on both sides of the obstacle that could provide enemy observation of the reduction site.
- Trafficability and soil conditions near the reduction site. This is especially important for minefield reduction because mine clearing blades will not work properly in all soil conditions. This is also important information in support of river crossings (see *FM 90-13*).
- Soil type (loamy, rocky, sandy, and so forth).
- The width, depth, and bottom conditions of wet and dry gaps and fords.
- The bank height and slope and the soil stability of wet and dry gaps.
- The water velocity and the direction of flow of wet gaps and fords.
- The wind direction for using smoke to obscure enemy vision.
- The location of the forward edge of the minefield to support MICLIC use.

9-66. The above information can be obtained much easier if an engineer works closely with other reconnaissance elements, especially TF scouts. The ERT must provide timely, valuable advice when large obstacles are encountered during a mission. The information is used by all elements of the breaching operation to finalize the suppression, obscuration, security, reduction, and assault (SOSRA) plans for the breaching operation. The scouts help maintain security and may call for and adjust indirect fires in support of the breaching operation as necessary.

Chapter 10

Combat Service Support

The SBCT engineer company does not have organic or DS CSS assets; it relies totally on external support. Requirements facing engineer planners range from sustaining companies and their organic platoons operating in a support role with another unit to sustaining an entire company operating by itself at brigade level. SBCT operations frequently require units to operate in restrictive terrain with little or no access to a ground LOC. This fact, coupled with the brigade mission of rapid deployment anywhere in the world, creates a very challenging CSS environment. CSS must—

- Sustain engineer company operations, including attachments from its parent headquarters and EAB units as necessary.
- Be responsive to special engineer company mission requirements in support of current and future brigade operations.

SUSTAINMENT RESPONSIBILITIES

10-1. The SBCT engineer company must rely on CSS assets that support SBCT infantry battalions. The SBCT infantry battalion headquarters and headquarters company (HHC) commander provides each maneuver company with personnel, equipment, supplies, and other support functions (including POL and transportation requirements). These internal services are provided by the HHC medical platoon, and external sustainment is received from BSB assets (combat repair team [CRT], supply and distribution platoon, and forward medical company [for the evacuation and treatment of wounded]).

10-2. During the MDMP cycle, the brigade engineer and the engineer company commander must plan, prepare, and execute their portion of the SBCT battalion CSS plan. Concurrent with other operational planning, the company develops its CSS plan during the mission analysis and refines it in the war-gaming portion of the troop-leading process. CSS rehearsals are normally conducted at the SBCT battalion and company levels to ensure a smooth, continuous flow of materiel and services.

10-3. The basic CSS responsibilities are to monitor, report, and request requirements through the correct channels and to ensure that CSS requirements are fulfilled when support elements arrive in the company area. The engineer company XO and 1SG are normally in charge of these functions, and they receive guidance and oversight from the commander. They must submit accurate personnel and logistics reports and other necessary information and requests.

SUSTAINMENT PRINCIPLES

10-4. Sustaining the engineer company in combat is one of the greatest challenges facing the engineer planner and the company commander. CSS planners assist the commander and the brigade engineer in making the best use of available resources by following the sustainment principles of modern warfare.

ANTICIPATION

10-5. The brigade engineer and the company commander forecast future requirements and accumulate assets needed to accommodate likely contingencies. Engineer operations frequently require—

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

10-6. Personnel losses and unit capabilities must also be anticipated to plan for continuous operations and future missions. Forward engineer units depend on the CSS system of their supported unit and create a large drain on an already austere system. The brigade engineer must anticipate possible task organization changes that will affect the flow of engineer sustainment. Additional missions will be created by the CSS support plan, such as clearing an LZ for aerial resupply. These missions must be anticipated and planned for during the mission analysis, including the passage of CSS units through obstacles for follow-on missions.

INTEGRATION

10-7. CSS must be integrated into the tactical plan. Too often, a COA or plan is selected that cannot be supported logistically. The brigade engineer must ensure that the engineer plan supports the maneuver commander's intent while being logistically supportable. The brigade engineer should make an accurate, timely recommendation on required logistics support.

CONTINUITY

10-8. Engineer units are always committed to the current battle or to the preparation for the next battle. They need a constant flow of supplies and services to be productive and effective. Maneuver units rely on lulls in the tempo of an operation to conduct CSS operations. Engineers usually do not have this opportunity since many of their missions occur during a lull in battle. This increases the need for engineers to plan for continuous, routine, and emergency logistics support.

RESPONSIVENESS

10-9. The sustainment system must keep pace with rapid decision cycles and mission execution to react quickly to crises or opportunities. It must continually respond to a changing situation and the shifting of engineer units on the battlefield. Interim contingency sustainment support must be planned until the task organization is modified or changed. When possible, the plan should include aerial resupply.

IMPROVISATION

10-10. CSS organizations must improvise to meet current needs and respond to unforeseen emergencies. They should plan for and use HN supply assets, facilities, and equipment when possible.

BRIGADE SUPPORT BATTALION

10-11. The BSB is the core of CSS, and it provides DS to the brigade. The structure of the BSB is austere and does not provide the same level of support as battalions in DS of other brigades. The CSS structure and concept support rapid projection of the brigade. Initial sustainment relies on a combination of unit basic loads, preconfigured flyaway packages, configured loads, and the ability of the SBCT to use regionally available sources for bulk fuel and water. By deploying with CSS packages tailored for a specific operation, the brigade can sustain itself with minimal external support for 72 hours within a 50- by 50-kilometer AO, which may expand to 100 by 100 kilometers. The brigade engineer must determine the types of engineer-specific packages that should be preconfigured for a specific mission. Engineers have extremely limited haul capacity, so the majority of their Class IV and V supplies for large demo missions and survivability or construction materials must be configured into preconfigured loads and delivered upon request. Preconfigured load and delivery is a brigade mission that affects engineers, logistics assets, and maneuver forces. Units can include a section in the brigade SOP that names all preconfigured load types and their content. This ensures that all units understand what they need to request, what they will receive, and what assets they will take.

10-12. Support in the brigade is austere because the BSB has limited distribution-forward capability. It combines SU with efficient delivery systems to form a seamless distribution pipeline. This pipeline is essentially the warehouse; the concept eliminates most stockpiles and substitutes speed for mass. Total asset visibility (including in-transit visibility, advanced distribution management, and decision support) gives CSS personnel visibility over all assets and the infrastructure capacity in the AO. The use of advanced prognostic and diagnostic devices also enhances the supportability of brigade systems. All of this information is then used to positively control the flow of follow-on sustainment. Sustainment is normally provided via direct throughput from EAB to the brigade AO. Supplies will be tailored and packaged for specific supported units based on a specific time and location.

FIX

10-13. The support structure of the BSB is austere and provides maintenance support through a two-level system at the field and support levels. While the brigade support company provides a broad range of maintenance capabilities, the depth is very shallow. The company requires augmentation to provide the full spectrum of maintenance support. Field level maintenance is generally provided to the engineer company elements through forward-position CRTs on an area support basis.

10-14. The CRTs are designed to determine equipment faults and to conduct quick turnaround repairs on site. Their primary methods for support of this mission are the on-hand prescribed load list, line replaceable units, and battle damage assessment and repair until required repair items can be pulsed forward to complete repairs and bring the platform to a fully mission-capable status.

10-15. Support level maintenance is normally conducted at the BSB in the BSA or higher echelon. This level is used when the fault is beyond CRT capabilities to repair or when the time required to repair the item calls for passing it back. (The amount of time to conduct field level maintenance is a field SOP matter.) The tactical situation may also require evacuating the platform to the BSA to ensure that it is kept in repairable condition.

10-16. The brigade has a limited ability to perform automotive, missile, armament, communications, special device, line replaceable unit, and power generation repairs. Accurate, preferably embedded, diagnostics and prognostics are critical to reducing repair cycle times and Class IX requirements. The engineer company is normally supported on an area basis by the CRT supporting the maneuver battalion and squadron in whose sector they are located.

ARM

10-17. The ammunition transfer point section is capable of receiving, storing, and issuing 138 short tons per day. The ammunition section has a limited capability to reconfigure ammunition at the ammunition transfer point. Ammunition must be received in mission-configured loads that are ready for transloading onto brigade transportation assets or directly onto combat systems. The section will account for ammunition and assist units in ammunition resupply. The ammunition transfer point acts mainly as a temporary distribution point, and it is conveniently located to facilitate rapid issues to users. It is also capable of rigging for aerial delivery operations if aviation augmentation becomes available. The resupply of MICLICs and Volcanos is a challenge for the brigade.

MOVE

10-18. The transportation platoon within the headquarters and distribution company is comprised of 14 heavy, expanded mobility tactical truck load-handling systems (11 short tons) and 14 trailers (11 short tons) that are capable of lifting and transporting 308 short tons. This system is a flat rack-based enabler that minimizes handling and reduces the amount of material-handling equipment needed to support the brigade. If the BSB is not located in the vicinity of the airfield, a logistics TF or augmentation from EAB is needed to support the transportation requirements from the airfield to the BSB. The movement of the remaining rollers and plows that are not mounted on the ESVs is a concern for the engineer company.

SUSTAIN

10-19. The BSB receives most of its sustainment (except fuel and water) from EAB-preconfigured loads for all classes of supply. A limited amount of configured loads may be built within the AOR due to the availability of personnel and time. The supply and distribution platoon transfers pallet-sized configured loads from the incoming mode of transportation to flat racks in the supply marshalling area. Therefore, it is essential that task organization information flows back to the organization that is configuring the loads. The supply and distribution platoon has very limited capability to reconfigure loads based on task organization changes.

10-20. The transportation platoon delivers the flat racks forward to a battalion resupply point. Fuel and water trucks also go forward with this logistics package (LOGPAC). The water truck fills the unit water trailers at the battalion resupply point and returns with the LOGPAC. The BSB positions fuel resupply assets in the battalion area (the location depends on the tactical situation) every 24 to 48 hours based on the unit logistics status reports. The supported maneuver battalion can request that 1,000-gallon fuel pods or 2,500-gallon tank racks be positioned in their area to conduct out-of-cycle refueling operations. These requests will be filled by the BSB support operations office based on SBCT priorities for support and the availability of pods and tank racks.

10-21. The brigade has no organic food service, mortuary affairs, or bath and laundry (field service) capabilities. These are provided as required by EAB elements.

ENGINEER LEADER SUSTAINMENT RESPONSIBILITIES

10-22. Sustainment of the engineer company in an SBCT is the combined responsibility of the engineer leadership from the brigade engineer down to the individual platoon leaders and PSGs.

BRIGADE ENGINEER

10-23. The brigade engineer is ultimately responsible for all engineer logistics estimates and plans. He also monitors engineer-related CSS execution within the brigade. The brigade engineer—

- Writes the engineer annex and associated appendixes to the brigade OPLAN or OPORD to support the brigade commander’s intent. He recommends any command-regulated classes of supply and allocates and sets the priorities for engineer units (organic and augmented) involved in all operations.
- Identifies the location of the forward supply point for the delivery of engineer-configured loads of Class IV and V supplies and provides requirements for support through the brigade S4. This request is

forwarded to the BSB support operations for mission support through associated push-package timetables.

- Advises the brigade commander on the impact of low-priority transportation support on engineer missions.
- Identifies extraordinary MEDEVAC requirements or coverage issues for engineer units and coordinates with the CSS planners to ensure that the BSB can handle these special workloads.
- Identifies critical engineer equipment and engineer mission logistics shortages.
- Provides the brigade S4 with an initial estimate of required Class IV and V supplies for the TF obstacle groups; uses the obstacle belts and group planning factors to allow the brigade logistics planners to accelerate requisitions to the BSB; adjusts the estimate based on the ground reconnaissance done by maneuver or engineer units; and plans the use of SCATMINEs with fire support and logistics units.
- Tracks the flow of mission-critical Class IV and V supplies into the BSA and forward to the TF sectors.
- Coordinates MSR clearance operations and tracks their status at the brigade main CP.
- Coordinates for EOD support and integration as necessary.

COMPANY COMMANDER

10-24. The company commander ensures that CSS operations sustain the fighting potential of the company and its ability to enhance the combat power of the supported brigade. The company commander provides critical insight during the brigade tactical planning process and provides mission guidance to CSS operators. The company commander—

- Identifies engineer-specific Class IV and V supply requirements by mission type, based on the availability of material. He updates the brigade engineer on the initial logistics estimate and adapts it according to ground reconnaissance.
- Coordinates with the brigade engineer and maneuver units for the location of the forward supply point and haul support. He ensures that coordination for Class IV and V throughput to obstacle sites is conducted to minimize time-consuming cross-loading.
- Tracks engineer equipment use, maintenance deadlines, and fuel consumption.
- Integrates EOD support as necessary.

EXECUTIVE OFFICER

10-25. The company XO is the coordinator and supervisor of the company logistics effort. During planning, he receives status reports from platoon leaders, PSGs, and the 1SG. He reviews the tactical plan with the commander to determine company CSS requirements and coordinates the requirements with the BSB. During mission execution, the XO is at the second most important place on the battlefield. He frequently focuses time on ensuring that the engineer CSS requirements are met. The company XO—

- Serves as the link between the brigade rear CP and the BSB, particularly within the realm of route clearance operations. He ensures that the brigade rear CP is informed of capabilities and limitations of engineer equipment and potential Class IX peculiarities.
- Supervises all CSS coordination between the engineer company and the CSS units of the brigade, the staff elements of the BSB, and the brigade rear CP.
- Serves as the brigade rear logistics engineer planner.
- Anticipates problems, works to avoid delays in planning and battle transition, and conducts company CSS battle tracking.
- Communicates with platoon leaders to identify the need for push packages, ensuring their construction and tracking their usage.
- Determines the location of the company resupply point based on data developed during operational planning and the war-gaming process.
- Compiles periodic maintenance updates from platoon leaders, PSGs, and the 1SG and provides updates to the commander as required.
- Ensures (along with the 1SG) that the company is executing CSS operations according to the brigade plan or SOP.
- Monitors equipment locations and maintenance status.

FIRST SERGEANT

10-26. The 1SG is the primary CSS operator for the engineer company; he executes the CSS plan and supervises the company trains. He also ensures that the XO receives current status reports from all subordinate units and assists in preparing reports and requests for the brigade and the parent battalion. The 1SG helps the XO or commanding officer prepare paragraph 4 of the company OPORD. The 1SG—

- Executes and coordinates the company CSS and unit sustainment.
- Receives, consolidates, and forwards all logistical, administrative, personnel, and casualty reports to the brigade rear CP or the TF combat trains.
- Directs and supervises the medical team, moving it forward when the situation requires.
- Supervises and monitors the evacuation of casualties, EPWs, and damaged equipment. He establishes and supervises company resupply activities.
- Monitors company maintenance activities, orients new personnel replacements, and assigns personnel to squads and platoons according to the commander's guidance.
- Maintains the company battle roster.
- Tracks platoon logistics requirements and relays and coordinates LOGPAC requirements with brigade and TF S4s.
- Assists the XO in troubleshooting logistics problems with the BSB and other units as required.
- Conducts CSS rehearsals at the company level and integrates CSS into company maneuver rehearsals.

SUPPLY SERGEANT

10-27. The supply sergeant is the company representative in the brigade and TF field trains. He assembles the LOGPAC and moves it forward to the logistics release point (LRP). The supply sergeant—

- Coordinates with the mobility support platoon leader for Class I, III, and V supplies.
- Maintains individual supply and clothing records and requisitions Class II supplies as needed.
- Requisitions Class IV and VII equipment and supplies.
- Coordinates with the CRT and provides area support coverage to turn in and pick up maintenance documents, routine Class IX supplies, and recoverable materials.
- Picks up replacement personnel and delivers them to the 1SG as necessary.
- Receives and evacuates personnel who are killed in action to the mortuary affairs point in the BSA.
- Transports, guards, and transfers EPWs as required.
- Guides the LOGPAC, EPWs, and damaged vehicles (if applicable) back to the BSA.
- Coordinates with the brigade, TF, and S1 section to turn in and pick up mail and personnel action documents.
- Collects bagged, contaminated soil and transports it to collection points as part of LOGPAC procedures.
- Maintains and provides supplies for company field sanitation activities.

PLATOON SERGEANTS

10-28. Each PSG in the company—

- Ensures that crews perform proper maintenance on all assigned equipment.
- Compiles all personnel and logistics reports for the platoon and submits them to the 1SG as directed or according to the SOP.
- Collects all *DA Forms 2404 (Equipment Inspection and Maintenance Worksheet)* within the platoon.
- Obtains mail and all classes of supplies and equipment from the supply sergeant and ensures proper distribution within the platoon.

SENIOR MEDIC

10-29. The senior medic and other medics are organic to the company. The senior medic—

- Supervises triage for injured, wounded, and ill personnel (friendly and enemy).
- Provides first aid for and stabilizes injured, wounded, and ill personnel.
- Evacuates (under the direction of the 1SG) seriously wounded personnel.

- Supervises the company field sanitation team.
- Conducts sick call as required.
- Assists in training company personnel in first aid procedures.
- Advises the company chain of command on the health status of personnel and other health concerns.
- Requisitions Class VIII supplies (including combat lifesaver bags and first aid kits) for the medical team and other company elements.
- Recommends locations for casualty collection points.
- Supervises the company combat lifesavers and field sanitation team training.

PLANNING

10-30. The efforts of the engineer company to plan and coordinate engineer CSS are essential to the full integration of engineers into the brigade sustainment structure. The brigade engineer, the engineer company commander, the brigade S4, and the BSB work closely to synchronize the planning and coordination process and to facilitate sound and timely OPLANs and OPORDs and sustainment for engineer units.

PROCESS

10-31. When the brigade receives a WARNO (directly or implied) as part of the MDMP cycle, the brigade engineer initiates the logistics estimate process. The brigade engineer focuses the logistics estimate on the sustainment of all subordinate engineer units that are organic and task-organized to the brigade. Class I, III, IV, and V supplies and personnel losses are the essential elements in the estimate process. Close integration with the BSB can simplify and accelerate this process through the use of the FBCB2-embedded logistics status report to ensure that the BSB is able to maintain an up-to-date picture of the engineer company sustainment requirements. During continuous operations, the estimate process may need to be abbreviated because of time constraints. This is feasible as long as accurate engineer unit status reporting is maintained at the company CP.

10-32. After conducting the estimate process to determine the supply requirements for unit and mission sustainment, the brigade engineer compares the requirements with the reported status of subordinate units to determine the specific amount of supplies needed to support the operation. These requirements are then coordinated with the BSB to ensure that the needed supplies are identified and resourced through brigade or division stocks.

10-33. The brigade engineer then translates the estimate into specific plans that are used to determine the supportability of brigade COAs. After a COA is determined, the specific CSS input to the brigade base OPORD and paragraph 4 of the engineer annex is developed and incorporated.

10-34. The brigade engineer, working with the engineer company commander, tracks essential CSS tasks involving all engineer units supporting the brigade. Accurate and timely status reporting assists the brigade engineer in providing the overall engineer status to the brigade commander and allows the brigade engineer to intercede in critical sustainment problems when necessary. The brigade engineer also ensures that supplies needed by EAB engineer units to execute missions for the brigade are integrated into the brigade CSS plans. For the brigade engineer to execute these missions properly, accurate and timely reporting and close coordination between the brigade engineer, the engineer company commander, and supporting EAB engineers are essential. Supporting EAB engineer units must effect linkup with the existing engineer CSS to ensure their synchronization of effort.

FOCUS

10-35. CSS planning ensures that support is provided during all phases of an operation. The CSS plan is developed along with the tactical plan. SOPs established to support CSS operations help the brigade engineer and the engineer company commander with planning. Brigade and engineer company OPORDs can then focus on deviations from the routine planning priorities established in SOPs.

Offensive Operations

10-36. In support of the offense, CSS operations maintain the momentum of the attack. If these operations are not successful, the enemy might recover from the initial assault, gain the initiative, and mount a successful counterattack. Units must operate solely on their basic load and stockage objective. Shortages of sufficient haul assets and potential operations in support of dismounted infantry will challenge the ability of engineers to organically haul or stockpile supplies. Due to the speed of the battle, the push-package concept is the desired resupply method.

10-37. When preparing for offensive operations, engineer planners must consider several situations. For example, when a maneuver battalion changes from a search and attack to an approach march or a hasty attack, great shifts in engineer CSS plans are not normally required. This change in operation may cause a change in CSS focus or emphasis. Because of this, engineer planners must ensure that brigade S4 logistics plans are organized to help the CSS executor be proactive regarding the change of the mission without interrupting engineer-related CSS. In planning offensive operations, it is important to—

- Position vital, engineer-related CSS supplies (explosives, Class III) well forward within the company combat trains or, if appropriate, in the supported battalion combat trains.
- Use air resupply when possible.
- Use previously planned and configured engineer LOGPACs of supplies when possible.
- Plan for the resupply of MICLICs and Volcanos.
- Plan for increased engineer equipment maintenance needs.
- Use HN or captured enemy engineer supplies (especially haul assets for bulky Class IV and V supplies) when possible.
- Increase LOC (air and ground) through mobility operations to support the expansion of the AO, the increase of logistics traffic, and the

evacuation of casualties. Operations include engineer reconnaissance, route clearance, FACE, and others.

- Plan and prepare for replacement operations based on known and projected engineer losses.

Defensive Operations

10-38. In contrast to offensive operations, defense operations break the momentum of the enemy attack. The engineer company will not likely have the requisite haul assets to transport Class IV and V supplies to the obstacle site. Mission-critical materials must be planned for and throughput to the obstacle site considered. Engineers may not allow barrier material to be stockpiled at any forward location. Only the barrier material required to conduct engineer mission support will be requested to be brought forward. Stockpiled unit sustainment supplies (rations, water, fuel) for subunits are acceptable. Both the push and pull methods are available. The time available before enemy contact dictates which method is used. In planning defensive operations, it is important to—

- Maintain a brigade level or, if possible, a division or JTF level focus in Class IV and V obstacle material handling in the brigade sector. Maneuver battalions have no capability to move or transport these materials. Their focus is on the battalion and infantry-peculiar mission sustainment.
- Maintain a low signature of Class IV and V supply points. Enemy intelligence collection assets key on these sites during reconnaissance operations.
- Conduct resupply during limited visibility conditions when possible. This reduces the signature of the obstacle material moving on the battlefield and the potential of enemy interference.
- Plan for lost, damaged, and destroyed obstacle materials and engineer equipment. Maintain an emergency stockpile of Class IV and V supplies when possible.
- Develop and use preconfigured obstacle packages or kits to push logistics to the obstacle. These kits facilitate obstacle planning, delivery, and execution for the brigade.
- Plan for additional protection of engineer units, equipment, and logistics during defensive operations. These assets may be a high-value target (HVT) for the enemy.
- Plan for additional maintenance of engineer equipment and its rapid evacuation as required. Fuel consumption and the expenditure of engineer-peculiar Class IX supplies are also high for engineer equipment.

MISSION LOAD

10-39. Mission loads consist of materials required for a specific mission and are formed into engineer Class IV and V packages or combat-configured loads. Standardized engineer Class IV and V packages are configured and dictated by the unit SOP to provide commanders with the flexibility to achieve their unique operational and mission support requirements. The brigade, TF, or squadron is responsible for mission loads, regardless of the command and support relationships specified for engineers.

10-40. Logistics planners within the engineer and maneuver force structure must understand the requirement for integrating the maneuver commander's intent, obstacle resourcing requirements, and controlled supply rates at the brigade and division levels when developing Class IV and V packages. Class IV and V planning requires a degree of crosswalk and coordination between the division or JTF engineer cell, the maneuver brigade S4, the engineer company XO, and the BSB support operations officer. Corps assets normally push the quantity of Class IV and V packages if they are available. The delivery of these packages residing with the BSB may stretch or exceed the transportation assets organic to the SBCT if proper and timely forecasting is not accomplished by the engineer.

10-41. Providing Class IV and V packages for the defense is potentially one of the most demanding logistics operations for the brigade. It requires all of the assets that can be made available and a total cooperative effort by the TF, including engineers. Time planning for these packages is generally conducted on 12- or 18-hour increments, but it varies depending on SOPs and the peculiarities of the AO.

10-42. The concept of Class IV and V packages is preconfigured loads (standard fixed minefields, MICLIC and Volcano reloads, demolitions, wire packages) that are pushed to the user at the obstacle emplacement site. Thorough planning includes the quantity and type of packages, the location of the maneuver TF LRP, and the time of linkup. Because corps and JTF packages run in 12- or 18-hour cycles, logistics planners must coordinate with operations planners on the type of operations they are supporting at that time. Logistics planners at the brigade level must focus on future operations at least 72 hours out. Changing a corps or JTF package may require at least 9 hours of lead time. In the offense, TF planners may anticipate Class IV and V mission loads for a defense on the objective and may send a digital status or request through the FBCB2 to the engineer company XO. Information copies are sent to the maneuver TF or squadron S4 and the SBCT S4.

BASIC LOAD

10-43. Basic loads are supplies that are kept by the unit for self-protection. The quantity of each item of supply in a basic load is based on the number of days the combat unit may have to sustain itself without resupply and on available transportation assets. The basic load is demand-supported and is replenished from the mission load.

10-44. For ammunition, the basic load is the quantity of ammunition required to be on hand to meet combat needs until resupply can be accomplished. The basic ammunition load is specified by the theater Army and is expressed in rounds, units, or weight as appropriate.

Chapter 11

Support to Urban Operations

Combat in urbanized terrain is planned, prepared, and executed in the same basic fashion as combat in other environments. However, urbanized terrain does require some additional considerations. Critical references for this chapter include *FMs 3-06* and *3-06.11*.

CONSIDERATIONS

11-1. Urban operations are military actions that are planned and conducted on terrain where man-made construction and the density of noncombatants affect the tactical options available to the commander. The increasing world population and the accelerated growth of cities mean that urban operations in future conflicts are very likely. Units are primarily task-organized around the infantry brigade headquarters to perform urban operations, which is one of the likely missions identified for the SBCT. The urban area is key (or decisive) in setting and shaping the conditions for current and future operations. Urban operations usually occur when—

- An urban area is between two natural obstacles and there is no bypass.
- The seizure or retention of an urban area contributes to the attainment of an overall objective.
- The urban area is in the path of a general advance and cannot be surrounded or bypassed.
- Political or humanitarian concerns require the control of an urban area or necessitate operations within it.
- The objective lies within an urban area.
- Defense from an urban area supports a more effective overall defense or it cannot be avoided.
- Occupying an urban area and seizing or controlling key terrain is necessary to prevent the enemy from occupying the urban area and establishing a presence, thus avoiding more difficult operations in the future.

11-2. Urban operations are often conducted against enemy forces that may include noncombatants. Therefore, ROE and the use of combat power can often be more restrictive than in other combat conditions.

RESPONSIBILITIES

11-3. Engineer support is essential in urban operations. Engineers provide a wide array of digital terrain products as well as M/CM/S and general engineer support. The primary source for support and coordination for engineer assets is the brigade engineer and the company commander.

BRIGADE ENGINEER AND COMPANY COMMANDER

11-4. The brigade engineer and the company commander—

- Assess three-dimensional urban terrain products from the terrain team.
- Secure blueprints of buildings; sewer, electrical, and water systems; and other information sources.
- Determine the location of utilities (power, water, telephone system, mass transit hubs, and mass fuel).
- Determine the availability of HN equipment, construction materials, fortification resources, civilian workforce assets, and civilian SMEs (guides, electricians, and so forth). Materials and resources may also come from other sources, such as NGOs.
- Determine UXO characteristics in the AO (type, number, density, and location).
- Consider centralized planning and decentralized execution.
- Determine how the ROE affect engineer capabilities and missions.
- War-game engineer support during the following phases:
  - Phase 1: Reconnoiter the objective.
  - Phase 2: Move to the objective.
  - Phase 3: Isolate the objective.
  - Phase 4: Secure a foothold.
  - Phase 5: Clear the objective.
  - Phase 6: Consolidate and reorganize.
  - Phase 7: Prepare for future missions.
- Establish the following common obstacle control measures:
  - Marking.
  - Lane marking.
  - Emplacement authority.
  - Restrictions.
- Establish demolition blast signals (visual and audio).
- Establish common route markings.
- Plan security requirements to protect Class IV and V supplies and engineer equipment.
- Ensure that engineers breach and reduce tactical obstacles and that the infantry breaches and reduces protective obstacles (in most cases).
- War-game SOSRA in urban operations and ensure rehearsals.
- Plan for mobility teams (task-organized based on METT-TC). SMEs educate the infantry on obstacle reduction techniques.
- Plan in three dimensions (aboveground, ground level, and belowground).
- Plan an engineer contingency mission for EOD.
- Plan a hasty defense.

- Plan follow-on engineer requirements.
- Plan and resource route and area clearance operations.
- Address special obstacle reduction requirements.
- Address and request additional engineers to support brigade general engineering tasks.
- Address and resource the increase of demolition and Class V requirements in urban operations.
- Plan additional *bunker-busting* capabilities (AT-4 weapon system; shoulder-launched, multipurpose assault weapon).
- Request special, mission-essential equipment (120-foot rope, grapnels, ladders).
- Procure the following materials (locally fabricated if required):
  - Satchel charges (field-expedient if not available).
  - Rope ladders or other ladders.
  - Marking materials (paint, chalk, engineer tape, chemical lights).
  - Bangalore torpedoes.
  - Fragmentation and concussion grenades, grenade rifle entry munitions, and rapid wall breacher kits.
- Disseminate booby trap neutralization equipment and techniques (special requests for information) to the higher or sister brigade.
- Plan integration and training related to newly fielded equipment.

COMPANY COMMANDER

11-5. In addition to the above actions, the company commander also—

- Identifies special equipment needs for engineer platoons.
- Plans the continuous resupply of engineer-specific logistics, especially demolitions.
- Participates in all combined arms rehearsals.
- Coordinates the teaching of demolition and reduction techniques.
- Plans decentralized operations (team leader level).
- Ensures that every soldier understands the ROE and how the ROE affect engineer support of the operation.
- Works closely with the brigade engineer during the planning process.

PLATOON LEADER

11-6. The engineer platoon leader—

- Identifies special equipment needs for the platoon.
- Plans the continuous resupply of engineer-specific logistics, especially demolitions.
- Ensures that combined arms rehearsals are conducted for all operations.
- Provides instruction on demolition and reduction techniques.
- Plans decentralized operations (team leader level).
- Ensures that every soldier understands the ROE and how the ROE affect engineer support of the operation.

MISSION ANALYSIS

11-7. Mission analysis sets the conditions for the planning and ultimate success of urban operations. All planners must identify specified, implied, and essential tasks as well as constraints and limitations. Well-prepared engineer estimates and terrain analysis products are essential to successful planning. Addressing the following topics helps engineer planners and the brigade battle staff develop an effective urban operations offensive mission analysis:

- Ensure that proper geospatial (map) products are available.
- Determine the current ISR plan.
- Locate key and decisive terrain.
- Perform line-of-sight (LOS) analysis along routes.
- Identify the most likely sites for sniper and observer positions.
- Recommend positions for deliberate reconnaissance to confirm or deny enemy presence.
- Plan obscuration and suppression to facilitate friendly movement.
- Determine the best obstacle reduction sites and support-by-fire positions for securing a foothold. Consider the terrain, enemy force, and massing fires.
- Apply the fundamentals of assured mobility.
- Predict the location of obstacles and impediments. Prevent and detect them so that they can be avoided before committing to neutralization.
- Decide how to best integrate smoke operations with breaching operations.
- Determine how subordinate units execute breaching operations.
- Conduct reverse planning before resourcing for the mission.
- Decide where to employ engineer equipment and manual breaching techniques.
- Consider the collateral damage if employing MICLICs.
- Plan the resupply of Class V items.
- Recommend how reconnaissance forces link up, guide, or mark obstacles for bypass and breaching operations.
- Determine possible counterattack routes. Consider the terrain and weather.
- Determine possible counterattack routes that can be used to move friendly CSS assets.
- Determine what situational obstacles (rapid mining, SCATMINEs, existing material, terrain) that the enemy counterattack force has available.
- Determine the safety zone and trigger for using SCATMINEs.
- Determine if SCATMINES can be used within the urban environment due to the impact on civilians.
- Determine the composition of the building to be attacked.
- Determine the weapon effects on structures.
- Determine the three-dimensional layout of the town.
- Determine the protected areas (churches, hospitals, museums).

SUPPORT PRODUCTS

11-8. The brigade engineer uses the following products to support the MDMP. All of them must be developed in cooperation with the S2 and updated based on the results of R&S.

ENGINEER BATTLEFIELD ASSESSMENT

11-9. The EBA—

- Feeds many subsequent products.
- Articulates the enemy engineer capability based on the most likely and most dangerous COAs.
- Identifies and describes the threat by functions (fixing, shaping, or sustaining).
- Includes past experience with the enemy, current enemy strength, anticipated barrier material basic loads, expected resupply rates, and locally available materials that can be used to prepare a defense.
- Includes an analysis of other agencies and civilians who are not enemies but may effect operations.
- Supports the development of the SITEMP.
- Identifies friendly engineer capabilities for M/CM/S, general engineering, and geospatial engineering operations.
- Explicitly states the number and types of breaches that each engineer unit is capable of executing based on its personnel, equipment, and logistics status. This information determines the task organization for engineers.
- Estimates the impact of terrain and weather on friendly and enemy engineer capabilities. LOS, hydrology, cross-country movement, and LOC overlays are helpful and can be provided by the terrain team or quickly approximated from maps. Other tactical decision aids and geospatial products may also prove useful.

SITUATION TEMPLATE

11-10. The SITEMP includes the enemy capability based on an estimated unit basic load of Class IV and V materials and the anticipated resupply. Knowing the amount of time the enemy has available to prepare the defense is essential in preparing the SITEMP. Reconnaissance assets should be positioned to observe the delivery and emplacement of barrier materials. The S2 and the engineer template enemy obstacles and counterattack routes based on terrain and weather conditions. The SITEMP also includes what resources are available in the urban operations area (ammonium nitrate, acetylene, propane, lumber yards, jersey barriers, vehicles, construction equipment) that can contribute to enemy defensive preparation.

11-11. Based on this analysis, the brigade engineer and the S2 template the enemy engineer M/CM/S capability on the SITEMP. They include minefields, tactical and protective wire obstacles, improvised explosive devices (IEDs), UXO, booby traps, vehicles, and other barriers. The full spectrum of countermine considerations is also included.

11-12. The amount of time and materials available impacts the enemy defensive capability. The force array in the security zone and main defensive belt impacts the amount of defensive preparation. Indirect-fire systems can service only one priority target and must shift to cover other targets, which may help refine the obstacle template. The locations and movement of mounted weapons may indicate usable lanes for friendly infiltration of vehicles. METT-TC impacts the likelihood and placement of booby traps, offensive mines, and other explosive devices.

EVENT TEMPLATE

11-13. The event template predicts what triggers the commitment of enemy forces based on past observation and intelligence. The engineer planner can help the S2 determine what situational-obstacle capabilities the enemy has, where and why the capabilities would likely be committed, potential ambush locations, and triggers. The event template also indicates the structures likely to be destroyed (such as petroleum and natural gas storage facilities).

FRIENDLY FORCES SURVIVABILITY TIMELINE

11-14. The engineer planner and the S4 plan to construct positions to support the forward displacement of CS and CSS assets and limited C2 nodes. Deception should be considered an essential part of the survivability plan.

BREACH EXECUTION MATRIX

11-15. This matrix helps the TF allocate engineer assets and determine when breach techniques are required. It specifies the assets (such as MICLICs, hand-emplaced explosives, DEUCEs, IHMEEs, ACEs, armored vehicle-launched bridges, REBSs, and tank-mounted countermine equipment) that are allocated to reduce enemy obstacles. Oftentimes, rubble can be a more significant obstacle than conventional mines and wire. While building and using the matrix, be alert to the possibility of booby traps, offensive mines, and other explosive devices being linked to rubble and potential breach sites. This matrix should also identify when and where EOD teams will be integrated.

TROOP-LEADING PROCEDURES TIMELINE

11-16. Leaders must ensure that adequate time is available for engineers to prepare the TF rehearsal site and conduct their own internal rehearsals.

PLANNING

11-17. *Table 11-1* is a sample engineer staff planning checklist for brigade and below.

11-18. Integrate ERTs into the brigade ISR plan. Focus them on engineer targets, such as LZ denial, obstacles in the reduction area, enemy survivability on the objective, cache sites, ambush sites, and obstacles on approach routes. The NAIs assigned to engineers should have IR that determine the best reduction sites in the urban area and confirm enemy

Table 11-1. Planning Checklist

Plan the Operation
❐ Identify and resource all combat (M/CM/S) essential tasks with necessary redundancy factors. If essential tasks exceed organic capabilities, coordinate for augmentation early.
❐ Address all the breach tenets during planning and rehearsals.
❐ Request terrain products, urban operations layout diagrams, and data on the building composition from higher HQ.
❐ Study available terrain products to determine which subsurface routes to use and how to defend against the enemy's use of these systems.
❐ Use available terrain analysis software programs. Study available maps and photographs to determine the best routes to use when approaching and within urban areas. Determine where to establish casualty collection points, aid stations, and ammunition and water supply points.
❐ Use SCATMINEs to support EAs that block mounted counterattack routes. Disseminate this plan to all maneuver and CSS leaders.
❐ Establish essential engineer friendly force information requirements and report times.
❐ Nominate engineer-specific IR and associated NAIs to support the reconnaissance plan. Ensure that the S2 understands the latest time that information is of value, and decide what actions to take if the IR are not answered before this time.
❐ Disseminate the enemy obstacle template to all leaders.
❐ Task-organize engineers to support essential M/CM/S reconnaissance missions, and identify inherent risks when essential tasks exceed organic engineer capabilities.
❐ Determine the likely focus for EOD support.
❐ Determine how much and what types of obscuration is available. Determine the wind direction and speed, which impact the effects of obscurants. Due to the nature of urban areas, multiple wind directions at various altitudes may occur. Coordinate with the FSO for the recommended uses of white phosphorus (mortar- and artillery-delivered) and handheld smoke. Coordinate with the smoke platoon leader for the duration of smoke and the level of obscuration.
❐ Identify and clear routes for mounted and reserve forces.
❐ Identify the conditions and a decision point for initiating breaching operations during each critical event of the operation.
❐ Consider recommending a critical friendly zone in support of breaching operations.
Plan the Approach March
❐ Identify routes for ground convoys, and allocate engineers to clear them.
❐ Identify staging or safe areas, and allocate engineers to clear them.
❐ Determine the clearance method and the acceptable risk.
❐ Ensure that all vehicles (not just engineer vehicles) have lane and bypass marking materials on board.
❐ Identify ground casualty evacuation routes in cooperation with logistics planners.
❐ Recommend decision points for using alternate routes.
❐ Identify when to establish traffic control points and guides at critical obstacles on the route.
❐ Recommend NAIs along the ground route to confirm or deny the enemy obstacle template.
Secure the Foothold
❐ Identify the best reduction site and technique based on the enemy force array, terrain, and trafficability.
❐ Designate one or more lanes for each simultaneously assaulting platoon and the engineers needed to reduce it.
❐ Standardize and explain the lane marking system in advance.
❐ Establish a traffic control plan for mounted and dismounted traffic.

Table 11-1. Planning Checklist (Continued)

Secure the Foothold (Continued)
❒ Confirm a mounted route and a dismounted route from the foothold to the casualty evacuation collection points.
❒ Identify locations for blocking positions to keep counterattacks from interfering with breaching operations.
❒ Resource blocking positions with MOPMS and expedient barrier capability (such as abatis). Depict the planned locations of SCATMINEs (include the safety zone) on maneuver and CSS graphics to reduce fratricide.
Seize Key Facilities
❒ Identify buildings to enter and a reduction site that support maneuver to the point of penetration.
❒ Recommend where the support force enters buildings.
❒ Resource TFs and their task-organized engineers with sufficient explosives and hand-emplaced smoke.
❒ Standardize and explain the cleared building and cleared lane marking systems.
Prepare and Execute the Plan
❒ Construct appropriate rehearsal sites to support maneuver and CSS operations.
❒ Provide enough detail in the TLP timeline to encourage engineer and combined arms rehearsals.
❒ Issue sketch maps and terrain products to engineers.
❒ Standardize and construct lane and bypass marking systems that all vehicle drivers must go through en route to the objective area.
❒ Provide enough detail in the maneuver and engineer execution checklists to use the decision support matrix effectively.
❒ Specify times for platoon leaders, company commanders, and 1SGs to conduct engineer-specific TLPs.

hardening of key sites. Ensure that ERTs are briefed and resourced to deal with the full range of likely countermine considerations.

11-19. After conducting precombat checks, inspect materials used to mark obstacle bypass lanes. Conduct FM radio communications and exercises using the operations schedule and reports specific to the current operation. Inspect all maps for operations security considerations. Sterile maps are not required, but information provided on overlays should not compromise the attack plan. Overlays should portray only NAIs. Target, pickup, LZ, and linkup locations should not be on overlays taken into the objective area. All soldiers must clearly understand the NAI priority and associated IR; casualty evacuation, exfiltration, and linkup plans; abort criteria; and communications windows.

Appendix A

Metric Conversion Chart

This appendix complies with current Army directives which state that the metric system will be incorporated into all new publications. *Table A-1* is a metric conversion chart.

Table A-1. Metric Conversion Chart

US Units	Multiplied By	Metric Units
Degrees Fahrenheit - 32	0.5556	Degrees Celsius
Feet	0.3048	Meters
Gallons	3.7854	Liters
Inches	0.0254	Meters
Inches	25.4001	Millimeters
Miles per hour (statute)	0.8684	Knots
Miles, statute	1.6093	Kilometers
Pounds	0.4540	Kilograms
Tons, short	0.9072	Tons, metric
Metric Units	**Multiplied By**	**US Units**
Degrees Celsius + 17.8	1.8000	Degrees Fahrenheit
Kilograms	2.2050	Pounds
Kilometers	0.6214	Miles, statute
Knots	1.6880	Statute miles per hour
Liters	0.2640	Gallons
Meters	3.2808	Feet
Meters	39.3700	Inches
Millimeters	0.0394	Inches
Tons, metric	1.1023	Tons, short

Appendix B

Engineer Estimate

The engineer estimate is a logical thought process that is merely an extension of the MDMP (see *Figure 2-1*, page 2-5). It is conducted by the brigade engineer, concurrently with the tactical planning process of the supported maneuver force, and it is continuously refined. The engineer estimate allows for early integrating and synchronizing of the engineer plan into the combined arms planning process. It drives the coordination between the engineer, the supported commander, and other staff officers and the development of engineer plans, orders, and annexes. Additionally, the allocation of engineer assets and resources drives and determines the command and support relationships that will be used.

MISSION RECEIPT

B-1. The MDMP begins with the receipt or anticipation of a new mission. The commander receives or deduces the mission based on an analysis of the current operation and situation. Upon receipt of the mission, the commander and staff perform a quick initial assessment. The commander provides guidance to subordinate units in the form of a WARNO. As a general rule, he allocates at least two-thirds of the available time for subordinate unit planning and preparation, leaving one-third of the time for commander and staff planning. The minimum requirements for WARNO 1 are—

- The type of operation.
- The general location of the operation.
- The initial timeline.
- Any movement or reconnaissance to be initiated.

Issuing a WARNO facilitates parallel planning and allows subordinates the maximum amount of time to conduct their own planning.

B-2. The brigade engineer and the staff section focus on the essential components of the basic order and engineer annex. Quickly conducting an initial assessment optimizes the commander's time for planning, and it preserves time for subordinate commanders. The focus is on the—

- Time available.
- Enemy situation.
- Mission.
- Commander's intent (two levels up).
- Scheme of maneuver.
- SOEO and associated EMSTs.
- Service support.
- Engineer annex and appendixes.

B-3. As the brigade engineer and the staff section begin their engineer estimate, they have an understanding of the—

- Estimated time available.
- Type of operation.
- Type of survivability tasks necessary and how these tasks interface with mobility, countermobility, and other tasks.
- Maneuver commander's mission, intent, and scheme of maneuver.
- Current intelligence picture for enemy and friendly situations.
- Assets available, including additional survivability or general engineering support.

MISSION ANALYSIS

B-4. Mission analysis enables the commander to visualize the battlespace. Using the situational factors of METT-TC (*Table B-1*) to analyze the situation and discern what is important results in the definition of the tactical problem and the beginning of the process to determine a feasible solution. Mission analysis is crucial to the engineer estimate and, ultimately, to the MDMP.

HIGHER HEADQUARTERS ORDER

B-5. The brigade engineer and the staff section thoroughly analyze the higher headquarters order. Understanding the mission, intent, and concept of the operation is the foundation to mission analysis; misinterpreting them can result in wasted time and confusion. An analysis is as follows:

- Headquarters (two levels up).
  - Commander's intent.
  - Mission, including tasks, constraints, risk, available assets, and AO.
  - Concept of the operation, including the deception plan.
  - Timeline for mission execution.
- Missions of adjacent units and their relation to the higher headquarters plan, including front and rear.
- Assigned AOs.

INTELLIGENCE PREPARATION OF THE BATTLEFIELD

B-6. The IPB and the EBA create a systematic, continuous process of analyzing the threat and the effects of the environment on the unit. This process identifies facts and assumptions that determine likely threat COAs. The engineer commander and staff support the maneuver IPB in developing facts and assumptions through the use of the EBA. The EBA acts as the framework for developing facts and assumptions that are engineer-focused.

Table B-1. METT-TC

Mission	The mission establishes the purpose of the operation and clearly defines what the unit must accomplish. Consideration is given to the essence of the operation, such as *who, what, when, where*, and *why* for specified and implied tasks. Commanders must know what survivability tasks are necessary for completing the mission. In addition, given depleted engineer resources in the SBCT, commanders implementing survivability tasks must know if any additional survivability support is available.
Enemy and Threat	The enemy and threat factor includes the dispositions, equipment, doctrine, capabilities, and probable intentions of the enemy (actual and potential). Focusing on the types of weapons, the probable number of weapons and rounds, and the types of attacks expected becomes critical in survivability planning. When these factors are known, appropriate fighting and protective positions are designed and constructed.
Terrain and Weather	The terrain and weather affect mobility, concealment, observation, cover, AAs, and the effectiveness of military operating systems. One of the most important sources of information provided by the topographic engineer function is a detailed terrain analysis of the area. Terrain information allows a visualization of the battlefield environment by providing information on the types of terrain, soil, and weather in the AO. Weather information includes the effects of seasonal changes.
Troops	Troops are a commander's military capabilities. Troop characteristics (such as numbers, mobility, protection, training, and morale) influence plans for their employment. Labor constraints are identified through an analysis of the three sources of labor—maneuver unit troops, engineer troops, and indigenous (HN/local area) personnel. A reduction in engineer resources at the brigade means that any additional US engineer support needed must come from EAB engineer forces. Supply and equipment constraints are identified through an analysis of on-hand supplies, naturally available materials, and supplies available through military and indigenous channels. Careful procurement consideration is given to available civilian engineer equipment to supplement military equipment.
Time Available	The time available for preparation and execution of the mission is critical and can dramatically influence the scope and nature of the plan. A deadline for reaching a predetermined level of protection is planned for each survivability mission. Hardening activities continue past the deadline and are done as long as the force remains in position. Survivability time constraints are integrated with mobility and countermobility time constraints. If the level of protection required cannot be achieved in the time allotted, resources are then committed to mobility or countermobility operations or as designated by the maneuver commander.
Civilian Considerations	Civilian considerations are key across the entire range of operations. Attitudes and activities of the civilian population in the AO influence the outcome of military operations. Refugees and humanitarian assistance requirements are frequent concerns, not only in stability operations, but also in conventional combat. Survivability operations may involve the resources of DOD civilian, non-DOD components of the government, and volunteer and NGOs, thereby increasing operational requirements. Significant requirements require general engineering augmentation or support to the SBCT.

B-7. The IPB centers on templating the enemy, anticipating his capabilities, and predicting his intentions based on threat doctrinal norms and the order of battle. Defining the battlefield or operational environment identifies the characteristics of the environment that influence friendly and threat operations. The engineer must understand the brigade S2 doctrinal template and SITEMP to analyze enemy engineer capabilities and the order of battle. The SITEMP becomes the foundation for the maneuver S2/engineer, brigade S2/S3, and brigade engineer coordinator. The four steps of the IPB are as follows:

Step 1. Define the battlefield environment. Defining the battlefield environment involves assessing the AO and the area of interest. It is also the basis for analyzing terrain, weather, and threat forces. Defining the COE is critical. This step allows engineers to use the IPB and EBA as they focus their analysis effort on a particular area.

Step 2. Describe the battlefield effects. Describing the battlefield effects involves evaluating the effects of the environment with which both sides must contend and always includes an examination of terrain and weather. It also includes an engineer-specific study of area infrastructure, the facilities, the equipment, and the framework needed for functioning systems, cities, or regions.

Step 3. Evaluate the threat. Threat evaluation is a detailed study of enemy forces, their composition and organization, tactical doctrine, weapons and equipment, and supporting systems. Threat evaluation determines enemy capabilities and limitations and how the enemy would fight if not constrained by weather and terrain. It also defines enemy tendencies to find asymmetric counters to our strengths. Doctrinal templates are the primary products of threat evaluation.

Step 4. Integrate threat COAs. Threat integration involves determining possible threat COAs. When the threat evaluation is complete, the information is integrated with the terrain and weather analysis. This function is continuous, and it combines the enemy doctrine analysis with the terrain and weather analysis to determine how the enemy might actually fight within the specific AO. This determines possible threat COAs.

ENGINEER BATTLEFIELD ASSESSMENT

B-8. The IPB is a tool that is used to see the terrain and the enemy. The first two parts of the EBA do the same, but with an engineer focus. For example, the EBA details how enemy engineers modify terrain and develop EAs. The EBA is used as the framework for developing facts and assumptions. It consists of analyzing the—

- Terrain and weather.
- Enemy mission and capabilities.
- Friendly mission and capabilities.

Terrain and Weather

B-9. The engineer develops facts and assumptions and supports the IPB process through the EBA. The engineer analyzes the terrain and weather and assesses their impact on military and engineer operations. When equipped or supported with FXXI enablers, the engineer provides better terrain visualization through the use of DTSS in the organic terrain team. TerraBase II is also available to assist in visualizing the terrain. Terrain products are viewed while developing facts and assumptions about the terrain, which ultimately enhances the brigade commander's ability to make informed battlefield decisions.

B-10. Terrain analysis is a major component of the IPB and EBA. The object of terrain analysis is to determine the impact that the terrain (including weather) has on mission accomplishment. The engineer supports the S2 in this process. Using the observation and fields of fire, avenues of approach, key terrain, obstacles and movement, cover and concealment (OAKOC) framework, the engineer determines what advantages or disadvantages the terrain and anticipated weather offer to enemy and friendly forces.

B-11. **Observation and Fields of Fire.** Terrain and vegetation affect the capabilities of friendly and enemy forces to observe one another and engage each other with direct-fire weapons. Indirect fire or sensors usually cover dead space. Observation and fields of fire are used to identify potential EAs, defensible terrain, specific system positions, and the locations where maneuvering forces are most vulnerable to observation and fires. In the defense, a potential mission for the engineer company is to improve fields of fire by cutting down trees, power lines, and vegetation. Intervisibility and an unobstructed view from one point to another are other factors. The analysis of both is critical to the emplacement of direct-fire weapon survivability positions, obstacle siting, and EA development.

B-12. **AAs.** Built-up areas, rivers, steep elevation, and old friendly or enemy obstacle systems are usually analyzed for their effect on AAs. A technique used to display the cumulative effects of obstacles is a graphical product that depicts areas of terrain as unrestricted, restricted, and severely restricted in terms of their effects on mobility.

B-13. **Key Terrain.** The designation of key terrain is identified during mission analysis and the IPB and is typically defined in the commander's guidance. Key terrain is defined by *JP 1-02* as "any locality, or area, the seizure or retention of which affords a marked advantage to either combatant."

B-14. **Obstacles and Movement.** Obstacles are classified as existing or reinforcing. Existing obstacles are further broken down into natural and cultural classes. Reinforcing obstacles include tactical and protective obstacles emplaced by soldiers to multiply combat power through terrain reinforcement. Offensive mines and explosive hazards, including UXO and booby traps, should also be considered.

B-15. **Cover and Concealment.** Cover is protection from enemy fire; concealment is protection from enemy observation. Both describe the viability of key terrain and AAs. Advances in technology (such as thermal sights) have affected the availability of concealment. The evaluation of cover and concealment aids in identifying defensible terrain, possible approach routes for breaching, assembly areas, and deployment and dispersal areas.

B-16. The obstacles analyzed during the IPB and EBA processes include existing and reinforcing obstacles, but the focus is on existing obstacles. Any reinforcing obstacles in the battlefield environment are included in the analysis. Obstacles define the AAs; create cross compartments in AAs; and can turn, fix, block, or disrupt a maneuver. Some examples of obstacles are—

- Natural.
  - Swamps.
  - Dense forests.
  - Deep, steep-sloped ravines.
  - Rivers.
  - Streams.
  - Hills or mountains with excessive slopes.
- Cultural.
  - Urban areas.
  - Quarries.
  - Railroad beds.
  - Built-up or elevated roads.
  - Potentially explosive hazards (such as gas storage sites).

B-17. Reinforcing obstacles are those constructed, emplaced, or detonated to enhance existing obstacles or the terrain. Some examples of reinforcing obstacles are—

- Minefields.
- Tank ditches.
- Abatis.
- Tank walls.
- Road craters.
- Wire entanglements.

B-18. *Table B-2* shows how the components of OAKOC can impact engineer survivability planning and also shows terrain that is considered to be unrestricted (favorable). Unrestricted terrain is fairly open and presents no hindrance to ground movement; nothing needs to be done to enhance force mobility. Unrestricted terrain depends on the type of unit moving on the terrain.

B-19. A weather analysis determines the effect of weather on the mission (*Table B-3*, page B-8). Snow, dust, humidity, and temperature extremes have an impact on soldier efficiency and limit the potential of weapons and equipment. Poor visibility affects the integration of obstacle emplacement with survivability positions in EA development. Inclement weather usually favors an attacker because defenders are less alert; however, it degrades mobility and C2 and weapons are less effective. The attacker can close with the defender with greater ease in limited visibility conditions.

Table B-2. OAKOC Effects

Component	Terrain Information	Engineer Survivability Support
Observation and fields of fire	Battlefield environmental effects on the terrain Surface configuration Urban areas Vegetation (summer and winter)	Horizontal LOS for direct-fire weapons and radar Emplacement suitability for direct-fire weapons survivability positions (limited fields of fire and distances might limit certain obstacle effects) Identification of terrain that — • Provides the best observation of critical areas or AAs for day and night and when smoke or fog obscures visibility • Provides the best fields of fire for the size of the force • Offers an effective range of friendly and enemy weapon systems
AAs	Drainage characteristics LOC Surface configuration Surface materials (wet and dry) Urban areas Vegetation (summer and winter)	Identification of areas where movement of friendly and enemy forces may occur Speed prediction The impact of AA size on required countermobility and survivability efforts
Key terrain	Drainage characteristics LOC Surface configuration Urban areas	The targeting of indirect-fire suppression and obscuration for enemy and friendly forces Direct-fire survivability positions tied to valuable key terrain for retention Force protection within urban areas
Obstacles and movement	Drainage characteristics Natural and man-made obstacles Surface configuration Surface materials (wet and dry) Urban areas Vegetation (summer and winter)	The integration of direct-fire survivability positions to existing natural and man-made obstacles The integration of natural, man-made, and existing obstacles with reinforcing obstacles (may free up blade resources for additional survivability support) Existing and reinforcing obstacles (such as water, power lines, bridges, defiles, slopes, towns, embankments, railroads, wooded areas, minefields, AT ditches, wire, road craters, and UXO)

Table B-2. OAKOC Effects (Continued)

Component	Terrain Information	Engineer Survivability Support
Cover and concealment	Battlefield environmental effects on terrain Natural obstacles (relief features) Surface configuration Urban areas Vegetation (summer and winter)	Cover potential from direct and indirect fire (good, fair, or poor) Concealment potential from horizontal and vertical observations (good, fair, or poor) Required effort for survivability and deception operations Optimum use of concealed routes (preselect and improve concealed routes to provide defensive forces with a maneuver advantage) Smoke operations to provide additional concealment for maneuvering forces Terrain that affords the best cover and concealment to enemy and friendly forces The locations of likely hide positions that support potential enemy and friendly BPs The identification of routes that a force could use to move from hide positions to BPs

Table B-3. Weather Effects

Weather Condition	Element Affected
Temperature	Soldiers, gunnery, equipment, and civil disorder
Humidity	Soldiers and equipment
Precipitation	Soldiers, trafficability, and equipment
Visibility	Observation and integration of obstacles and survivability
Light data	Observation and survivability construction rate
High winds (>35 knots)	Damage to material and structures; reduced visibility by blowing sand, dust, and other battlefield debris; vehicle movement; improved trafficability by causing soil to dry faster; temperatures below 40°F (makes windchill a critical consideration)
Cloud cover	Reduced friendly close air support (2,500-foot ceiling); threat close air support (300-foot ceiling); visibility; smoke or chemical agent employment; temperature

Enemy Mission and Capabilities

B-20. Threat analysis and integration are also major components of the IPB. Enemy mission and M/CM/S capabilities are subcomponents of the threat analysis and integration process. The brigade engineer supports the S2 during the threat evaluation by focusing on the enemy mission as it relates to the enemy engineer capability. When executing this component of the EBA, the brigade engineer must first understand the anticipated mission (attack or defend) of the enemy and consider how enemy engineers are doctrinally employed. The brigade engineer then develops an estimate of the enemy engineer capabilities. To do this, the brigade engineer uses the S2 order of battle and the knowledge of the enemy engineer force and other assets (such as combat vehicle reconnaissance effort or self-entrenching capabilities) that may impact engineer operations. The brigade engineer must also consider hard intelligence pertaining to recent enemy engineer activities.

B-21. The brigade engineer uses the S2 SITEMP and the enemy capability estimate to plot the enemy engineer effort and its location. Coordinating with the S2, the brigade engineer recommends the PIR and the denial of the SITEMP. Enemy engineer activities must be organic to the total combined arms ISR plan. A summary of the enemy mission and M/CM/S capabilities are as follows:

- Anticipate enemy engineer operations and their impact on the battle.
- Look at threat patterns and capabilities in an asymmetric environment.
- Consider the enemy mission and the doctrinal employment of engineers in battle.
- Estimate enemy engineer capabilities based on the—
  - S2 order of battle.
  - Threat engineer organizations.
  - Personnel and equipment capabilities.
  - Recent activities.
- Plot enemy engineer effort based on the—
  - S2 SITEMP.
  - Doctrinal enemy engineer employment.
  - Enemy patterns.

B-22. In the defense, the brigade engineer plots enemy—

- Mobility assets, capabilities, and location in its formation.
- SCATMINE use.
- Offensive mine and explosive device use.
- Engineers that support the reconnaissance effort.
- HVTs (bridging assets, breaching assets, SCATMINE delivery systems).
- Countermobility and survivability capabilities in a transition to the defense.

B-23. In the offense, the staff engineer plots enemy—

- Tactical and protective obstacle efforts.
- SCATMINE use.
- Offensive mine and explosive device use.
- Survivability and fortification effort.

Friendly Mission and Capabilities

B-24. The third component of the EBA is to estimate the friendly engineer capability and its impact on mission accomplishment. Knowing the operation, the brigade engineer quickly prioritizes the development of capability estimates. The brigade engineer considers engineer forces task-organized to the supported unit and assets that other members of the combined arms team have (such as mine plows) to determine the assets that are available. Assets under the control of the higher engineer headquarters (including HN and civilian contractor support) and adjacent engineer units should be noted for future reference in the event that a lack of assets is identified during COA development.

B-25. Having determined the assets available and estimated and refined the time available with the S3, the brigade engineer uses standard planning factors or known unit work rates to determine the total engineer capability. For example, in the offense, the brigade engineer focuses on the total amount of breaching equipment (MICLICs, vehicle-launched bridges, engineer platoons, and any engineer augmentation) and translates that into breach lanes. In the defense, the staff engineer determines the number of minefield, hull or turret defilade positions, and tank ditches that engineers could construct with available resources (although little of this will be done by the SBCT with only organic engineer capabilities). The staff engineer uses the results of capability estimates developed during the COA development. To estimate the friendly mission and M/CM/S capabilities—

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

B-26. The staff engineer combines the analysis of the terrain and enemy and the analysis of friendly capabilities to form facts and assumptions about the—

- Likely enemy engineer effort.
- Most probable enemy COA.
- Potential enemy vulnerabilities.
- Critical friendly requirements.
- Impact of these factors on the mission.

ENGINEER MISSION

B-27. The staff engineer participates in the mission analysis by identifying engineer tasks that are mission-critical and have an impact on the overall mission. The brigade engineer identifies engineer tasks from the entire OPORD of the higher unit, not just the engineer annex and associated appendixes. The brigade engineer must look in numerous places to fully understand the total scheme of maneuver, the commander's intent, and instructions from the higher unit staff engineer. The brigade engineer should concentrate on the following portions of the OPORD when receiving and identifying the engineer mission:

- Mission.

- Commander's intent (two levels up).
- Scheme of maneuver.
- SOEO.
- Subunit instructions.
- Coordinating instructions.
- Service support.
- Command and signal.
- Engineer annex and associated appendixes.

B-28. There are several components of mission analysis. The brigade engineer focuses on the engineer capabilities of each component as follows:

- **Specified tasks.** Specified tasks are derived directly from the WARNO, OPORD, or commander's intent. Examples include obstacle zones, obstacle belts with intents, the required number of breach lanes, and the type of breach designated by the higher commander.
- **Implied tasks.** Implied tasks are developed by analyzing the mission in conjunction with the facts and assumptions developed earlier. For example, obstacle hand-over coordination during a relief-in-place mission (if not specified) is an implied task. UXO removal or assisting EOD with removal may also be a task for engineers. A classic example of an implied task is identifying and planning a river crossing operation if a river crossing is necessary to accomplish the mission, but it is not specified in the higher OPORD.
- **Assets available.** The brigade engineer should have already identified the available engineer assets in the EBA. The brigade engineer should also examine the total force structure of the combined arms team for participation in COA development. For instance, the amount of firepower available may help to determine how the force should conduct a breach.
- **Limitations (constraints and restrictions).** Constraints are those specified tasks that limit the freedom of action. Designated reserve targets, obstacle belts (with intents), and breach lane requirements are examples of constraints that the staff engineer must consider in mission analysis. Restrictions are limitations placed on the commander that prohibit the command from doing something to potentially include ROE. Therefore, they greatly impact COA development. Obstacle zones and belts are examples of restrictions because they limit the area in which tactical obstacles can be placed.
- **Risk.** A commander may specify an acceptable risk to accomplish the mission. For instance, the priority obstacle effort in a defense may be employed on the most likely enemy AA, while situational obstacles are to be planned on the most dangerous AA as an economy-of-force measure. The brigade engineer must understand how a risk involving an engineer capability specifically impacts combined arms operations and must advise the commander accordingly.
- **Time analysis.** The brigade engineer must ensure that engineer operations are included in the combined arms time analysis. The time analysis has several steps. The first step is to determine the actual time available. The staff engineer establishes an assumption of the

time available while preparing the friendly capabilities portion of the EBA. Then, the engineer refines the time analysis. A good tool to use in this process is a basic timeline sketch that includes the—

- Supported unit OPORD.
- Engineer unit OPORD.
- Movement times.
- Line-of-departure or prepare-to-defend times.
- Rehearsals.
- Hours of darkness or limited visibility.

This technique assists the brigade engineer in accurately refining the estimate of time actually available and adjusting the friendly engineer capability accordingly.

- **Essential tasks.** Specified and implied tasks that are critical to mission success are identified as essential tasks. The brigade engineer focuses plan development, staff coordination, and resource allocation on the essential tasks. The brigade engineer does not ignore other specified and implied tasks, but his planning centers on the essential tasks.
- **Restated mission.** The restated mission follows the same format as any mission statement. The *who, what, where,* and *why* are based on the mission analysis. The brigade engineer uses the restated mission statement.

RISK MANAGEMENT

B-29. As part of the planning process, the brigade engineer uses the risk management process for soldier safety and environmental impact. Risk management is the process of identifying, assessing, and controlling risk that arises from operational factors and balancing that risk with mission benefits. *FM 3-100.12* outlines the risk management process and provides the framework for making risk management a routine part of planning, preparing, and executing operational missions and everyday tasks. *FM 3-100.4* highlights the environmental considerations. The five steps in the risk management process are as follows:

Step 1. Identify the hazards.

Step 2. Assess the risk of each hazard.

Step 3. Make a risk decision by—

- Developing controls to reduce risk.
- Reassessing the risk with control measures.
- Making a risk decision based on the residual risk.

Step 4. Implement controls to reduce the level of risk.

Step 5. Supervise and enforce control measures.

SCHEME OF ENGINEER OPERATIONS

B-30. The brigade engineer needs to receive planning guidance to tailor the SOEO developed during COA development. The amount of guidance required is based on the experience of the brigade engineer and brigade commander, the time available, and SOPs. Some areas in which the brigade engineer might require guidance are—

- EMST approval.
- Situational-obstacle planning.
- The prioritization of digging assets (survivability versus countermobility).
- The use of maneuver forces in the obstacle effort.
- The risk acceptance of M/CM/S tasks.
- The interpretations of the higher commander's intent pertaining to M/CM/S.

B-31. The next step of the MDMP is developing the maneuver COAs. COA development centers on employing maneuver forces. The brigade engineer assists in this process by considering the impact that engineer operations have on a maneuver. The brigade engineer must participate to tailor the SOEO for each COA, and he develops a SOEO for each maneuver COA. This concept is developed using the same steps as the maneuver COA, but without the detailed force allocation. If time permits, the brigade engineer may begin working on the details for each plan as follows:

- **Analyze relative combat power.** The brigade engineer compares the anticipated enemy engineer capability with the friendly engineer capability needed to defeat it. For example, in the offense, the staff engineer considers the enemy doctrinal norms, hard intelligence, recent activities, and the time the enemy has to prepare. The brigade engineer then determines if the friendly engineer capability is sufficient to overcome the enemy capability. Likewise, in the defense, the brigade engineer looks at enemy capability and when and where that capability may be employed. The brigade engineer then determines what can defeat it and what assets are available to ensure success.
- **Identify and refine EMSTs.** The staff (primarily those focused on MANSPT) identifies initial EMSTs during mission analysis. During COA development, additional EMSTs may be identified and existing ones refined to support the maneuver COA.
- **Identify engineer missions and allocate forces.** The brigade engineer assesses engineer requirements (focusing on the EMSTs identified) based on the support of the maneuver COA, situation analysis, mission analysis, and the commander's intent. This is the most important step in developing a SOEO.
- **Develop a tentative SOEO.** The SOEO focuses on how engineer efforts integrate into and support the maneuver COA. Like the maneuver COA, the SOEO is generic without a specific engineer force allocation or unit designation. It must address all phases of the operation, particularly when engineer priorities must change to support the maneuver.
- **Balance assets against support requirements.** The brigade engineer reviews the SOEO in light of the assets available (using the EBA product). Hasty estimate tools (belt planning factors, blade hour estimates, breach lane requirements) are used to quickly assess

whether adequate assets are available to support the plan. All shortfalls are noted, and the SOEO is refined, if necessary, by—

- Shifting assets to support approved EMSTs.
- Shifting priorities with the phases of the operation.
- Recommending risk acceptance to the commander.
- Requesting additional assets.

- **Integrate into the maneuver COA.** The brigade engineer prepares the EMSTs and a statement describing the SOEO. This statement addresses how engineer efforts support the maneuver COA and integrates the necessary graphics to illustrate the tentative engineer plan (breach control measures and obstacle graphics and intent).

COURSE OF ACTION REFINEMENT

B-32. Staff analysis identifies the best COA to recommend to the commander. War-gaming techniques (*Table B-4*) are used to analyze the COAs. War gaming is a systematic visualization of enemy actions and reactions to each friendly COA. The brigade engineer participates in war gaming to—

- Ensure that the SOEO supports the maneuver plan and is integrated with the other staff elements.
- Verify that the EMSTs are essential and confirm who will have responsibility for each of them.
- Identify further weaknesses in the plan and make adjustments if necessary.
- Ensure that the S2 integrates enemy engineer assets and enemy force actions.

Table B-4. War-Gaming Techniques

Technique	Description
Avenue in depth	This technique concentrates on one AA from start to finish. It is equally applicable to offensive and defensive operations. It allows the engineer to war-game the analyzed impact of enemy obstacles on the plan of attack and the effects of sequential obstacle belts or groups for the defensive plan.
Belt	This technique divides the battlefield into areas that run the width of the sector, war-gaming across the front and multiple avenues at once. This is the preferred technique. It allows the engineer to war-game the mutual support between obstacle belts and groups. It is the best method for analyzing mutual support and adjacent engineer support.
Box	This technique focuses solely on critical enemy or friendly events in a designated area (box). The advantage of this method is that it is not time-consuming. It allows the engineer to focus on a particular breach site or EA.

B-33. The next step after each COA is independently war-gamed, is to compare the results. The objective of comparing COAs is to analyze their advantages and disadvantages relative to the other plans. Each COA is compared to the others using specific evaluation criteria. The criteria may be developed by the staff or may be directed to the staff by the commander during the planning guidance.

B-34. The brigade engineer compares COAs in terms of which SOEO best supports mission accomplishment. This comparison is only part of the total comparison by the staff.

COURSE OF ACTION RECOMMENDATION

B-35. The objective of COA comparison is to make a unified recommendation to the commander on which COA is best. The brigade engineer may have to give greater consideration to a COA that the unit can least support if it looks like it is the best selection from the other staff perspectives. The brigade engineer must be prepared to inform the maneuver commander of—

- Which risks to accept.
- What additional assets are needed to avoid risks.
- Where to obtain the assets.
- How influential the commander must be to obtain the assets.

B-36. Knowledge of the higher and adjacent unit engineer assets becomes important in this step. Based on staff recommendations, the commander makes a decision on which COA to adopt for final planning. The commander may select a specific COA, modify a COA, or combine parts of several COAs. Regardless, the commander decides on a COA and issues additional guidance to the staff for developing the plan. This guidance concentrates on synchronizing the fight and focuses on bringing the combat multipliers together.

ORDERS PRODUCTION

B-37. The brigade engineer focuses planning efforts on the SOEO (and the related EMSTs) for the selected maneuver COA. The brigade engineer determines the C2 necessary to accomplish engineer missions (see *Chapter 2* for additional information). The SOEO is fine-tuned based on the war-gaming process, the commander's guidance, and situation updates. The brigade engineer fills in the details of the plan, referring back to the initial mission analysis to ensure that all missions have been considered. The brigade engineer ensures that all M/CM/S tasks are assigned to maneuver and engineer units as part of the subunit instructions. Final coordination is made with other staff members to ensure that there is total integration and mutual support.

B-38. The brigade engineer conveys the written plan through input in the basic OPORD (SOEO, EMSTs, subunit instructions, and coordinating instructions), the engineer annex, and the appendixes. As part of the combined arms staff, the brigade engineer also participates in the OPORD brief to the assembled command group. As with the other primary staff officers, the brigade engineer gets only one chance to brief the command group on the SOEO. This is the first step in a properly executed and well-coordinated engineer plan. The focus of the brigade engineer is briefing the subordinate commanders. The brigade commander and staff should already know the plan. It helps to develop standard briefs as a guide. Time is always critical; repeating information covered by other staff members should be avoided, and only critical items should be covered (to include SOP items).

Above all, the brigade engineer should be thoroughly familiar with the total plan to be comfortable answering questions.

Appendix C

Orders and Annexes

Orders and annexes are critical components to engineer C2. The use of digital battle command information systems greatly speed the battle command process. This appendix highlights techniques and battle command products (digital and conventional) that the brigade engineer and the engineer company commander need to produce. When METT-TC requires a TF engineer, he (through the TF commander) exercises functional control over engineer operations within the TF sector by including critical instructions in the TF order and engineer annex. The supporting engineer company commander also issues orders to exercise unit control over engineer forces under his command. The TF engineer synchronizes and coordinates engineer support within the TF.

BRIGADE OPERATION ORDER

C-1. *Figure C-1* is a sample brigade OPORD (see *FM 101-5* for complete format guidance).

(Classification)

Copy___ of ___ copies
Issuing HQ
Place (coordinates) of issue
DTG of signature
Message reference number

OPLAN/ORDER (number) (code name) (issuing HQ).

References (maps and other references required).

Time zone used throughout the order.

Task Organization.

- Accurately reflect the engineer task organization of the units supporting the maneuver battalions, including the command support relationship.
- List units under the brigade commander's control.

1. SITUATION.

a. Enemy Forces. Include recent enemy engineer activities or capabilities critical to maneuver battalion commanders or essential to understanding the supporting engineer plan.

(Classification)

Figure C-1. Sample Brigade OPORD

(Classification)

b. Friendly Forces. Include the mission, the commander's intent, and the concept of operations for HQ one and two levels up. Subparagraphs state the missions of flank units and other units whose actions would have a significant bearing on the issuing HQ.

c. Attachments and Detachments.

- State the effective time for engineer task organization if it differs from other units.
- Clarify or highlight changes in engineer task organization that occur during a phase of the operation.

2. MISSION. State the mission derived from the planning process, to include and cover on-order missions.

3. EXECUTION.

a. Concept of Operations. The concept of operations describes how the commander sees the actions of subordinate units fitting together to accomplish the mission. At a minimum, the concept of operations includes the scheme of maneuver and the concept of fires. The concept of operations expands the commander's selected COA and expresses how each element of the force will cooperate to accomplish the mission. Where the commander's intent focuses on the end state, the concept of operations focuses on the method by which the operation uses and synchronizes the BOS to translate the vision and end state into action. The brigade engineer must ensure that relevant assured mobility considerations are incorporated.

(1) Maneuver. State the scheme of maneuver. Ensure that this paragraph is consistent with the operation overlay. It must address decisive and shaping operations, including security operations and the use of reserves. The brigade engineer must ensure that relevant assured mobility considerations are incorporated.

(2) Fires. Describe the scheme of fires. The brigade engineer must ensure that relevant assured mobility considerations are incorporated.

(3) R&S. State the overall reconnaissance objective. Outline the ISR concept and how it ties in with the scheme of maneuver. Address how ISR assets are operating in relation to the rest of the force. Do not list the ISR tasks here. Assign ISR tasks to units in paragraphs 3b, 3c, or 4. Refer to Annex L (ISR) as required. The brigade engineer must ensure that assured relevant mobility considerations are incorporated.

(4) Intelligence. Describe the intelligence system concept. State the priority of effort among situation development, targeting, and battle damage assessment. Describe the priority of support to units and the priority of counterintelligence effort. Refer to Annex B (Intelligence) and Annex L (ISR) as required. The brigade engineer must ensure that relevant assured mobility considerations are incorporated.

(5) Engineer. State the scheme of engineer support. Describe the integration of engineer assets and obstacles. Establish a priority of work if one is not addressed in the SOP. Provide priority of M/CM/S aspects for each phase of the operation as appropriate. Integrate the major aspects of assured mobility. List major environmental considerations here. Delegate or withhold the authority to emplace obstacles. Refer to Annex F (Engineer) and other annexes as required.

(6) Air and missile defense.

(7) Information operations.

(8) NBC operations. Ensure that all NBC MANSPT considerations are coordinated/integrated into this paragraph.

(Classification)

Figure C-1. Sample Brigade OPORD (Continued)

(Classification)

(9) MP operations. Ensure that all MP MANSPT considerations are coordinated/integrated into this paragraph.

(10) Civil-military operations. State the overall civil-military operations concept. Assign priorities of effort and support. Refer to Annex Q (Civil-Military Operations) and other annexes as required. The brigade engineer may have a significant role to play in coordinating the augmentation of the SBCT by other engineer units/assets to support these operations.

b. Tasks to Maneuver Units. State the missions or tasks assigned to each maneuver unit that reports directly to the issuing HQ. Cross-reference attachments that assign tasks. List missions or tasks to be accomplished by engineers task-organized to maneuver elements. List units in task organization sequence, and include reserves. State only tasks that are necessary for comprehension, clarity, and emphasis. Place tasks that affect two or more units in paragraph 3d.

c. Tasks to CS Units. State the missions or tasks assigned to nonmaneuver combat and CS units. Cross-reference attachments that assign tasks. Use a separate subparagraph for each unit. List units in task organization sequence. List only those tasks that are not specified or implied elsewhere. Ensure that all tasks supporting assured mobility and MANSPT are included. Some specific concerns are included below.

(1) Intelligence. Designate any special use of TUAVs. Designate the placement of remote video terminals.

(2) Engineer. May include brigade level tasks assigned to supporting engineer units. This paragraph is used to inform the brigade commander of tasks that are under division control and being done by division level forces in the brigade AO.

(3) Fire support. May include SCATMINE information. At brigade and below, include fire support information here rather than in an annex. Fire support information may be contained in a matrix format.

d. Coordinating Instructions. List only instructions applicable to two or more units and not routinely covered in unit SOPs. This is always the last subparagraph in paragraph 3. Complex instructions should be placed in an annex. Subparagraphs d(1) through d(5) below are mandatory.

(1) Time or condition when a plan or an order becomes effective.

(2) CCIR.

(3) Risk reduction control measures. These are measures unique to the operation and not covered in unit SOPs. They may include MOPP, operational exposure guidance, troop safety criteria (corps only), vehicle recognition signals, and fratricide prevention measures.

(4) ROE. Refer to Annex E (ROE) as required.

(5) Environmental considerations.

(6) Force protection.

(7) Additional coordinating instructions.

4. SERVICE SUPPORT. Address service support, as needed, to clarify the service support concept. Refer to annexes as required.

a. Support Concept. State the concept of logistics support to provide non-CSS commanders and their staffs with a visualization of how the operation will be logistically supported. This could include—

- A brief synopsis of the support command mission.

(Classification)

Figure C-1. Sample Brigade OPORD (Continued)

(Classification)

- The location of the support command HQ and the next higher supporting logistics bases if not clearly conveyed in the CSS overlay, the next higher-level support priorities, and where the engineers fit into these priorities.
- The commander's priorities of support and units in the next higher CSS organization supporting the unit.
- The use of HN support.
- Significant or unusual CSS issues that might impact the overall operation.
- Any significant sustainment risks and unique support requirements in the functional areas of manning, arming, fueling, fixing, moving, and sustaining soldiers and their systems.
- The support concept organized into a framework based on operational phasing or presented in the before, during, and after operations format.

b. Materiel and Services.

(1) Supply. This paragraph should include the brigade allocations of Class IV or engineer Class V supplies (if not contained in the engineer annex) and the tentative locations for the transfer of Class IV and V (obstacle and overload cover) supplies to the SBCT.

(2) Transportation.

(3) Services.

c. MEDEVAC and Hospitalization.

d. Personnel Support.

5. COMMAND AND SIGNAL.

a. Command. State the map coordinates for CP locations and at least one future location for each CP. Identify the chain of command if not addressed in unit SOPs.

b. Signal. List SOI not specified in unit SOPs. Identify the specific SOI (the edition that is in effect), the required reports and formats, and the time the reports are submitted.

ACKNOWLEDGE: The acknowledgement of a plan or order means that it has been received and understood.

Commander's signature (optional)
Commander's last name
Commander's rank

OFFICIAL:

(Authenticator's Name)
(Authenticator's Position)

Use only if the commander does not sign the original order.

ANNEXES:

DISTRIBUTION:

(Classification)

Figure C-1. Sample Brigade OPORD (Continued)

ENGINEER ANNEX

C-2. The engineer annex contains information that is not included in the base order and is critical to the engineer plan or is required for subordinate engineer planning. It does not include instructions or orders directly to engineer units. More importantly, the engineer annex covers critical aspects of the entire engineer plan, not just parts that pertain to the engineer company. The engineer annex is not a replacement for the engineer company order; for example, it does not give subunit orders and service support instructions to the engineer company. Those orders and instructions are contained in the engineer company order. The engineer annex should—

- Include critical information derived from the EBA process.
- Contain all critical information and tasks not covered elsewhere in the order.
- Not contain items covered in SOPs, unless the mission requires a change to an SOP.
- Avoid qualified directives.
- Be clear, complete, brief, and timely.
- Include only information and instructions that have been fully coordinated in other parts of the OPORD and with the brigade commander and staff.

C-3. The engineer annex includes any combination of written instructions, matrices, or overlays to convey the necessary details of the engineer plan. The engineer annex in *Figure C-2*, page C-6, provides a standard format for offensive and defensive operations. This format standardizes the organization of information included as written instructions. The actual content depends on the type of brigade operation and the engineer plan. A standardized annex format makes it easier for the engineer staff officer to remember what should be included and easier for subordinate staff officers to find the required information. The format tailors the standard five-paragraph order to convey critical information.

C-4. Matrices may be used as part of the engineer annex or as separate appendixes. Matrices are used to quickly convey or summarize information not needing explanation, such as logistics allocations, obstacle zone priorities and restrictions, or a task summary (execution matrix). Finally, overlays are used to give information or instruction and to expedite integration into the overall combined arms plan. At the division level, information included on overlays may include, but is not limited to—

- All existing and proposed friendly obstacles and control measures (obstacle zones, restrictions, and lanes; directed or reserve targets; and brigade level situational obstacles, including associated NAIs/TAIs and decision points).
- Known and plotted enemy obstacles (must also be on SITEMP).
- Logistics locations and routes (as they apply to engineer operations).
- NBC-contaminated areas.
- Areas affected by environmental considerations.

(Classification)

ANNEX F (ENGINEER) TO OPORD ____________________.

Task Organization.

- List engineer units only, including to which HQ they are task-organized.
- List all engineer units supporting the brigade, and list units that are task-organized to units other than the parent unit.
- Include a summary of low-density equipment, as necessary, to clarify the unit task organization.
- Address command support relationships as appropriate.
- Identify changes in engineer task organization that occur during the operation.

1. SITUATION.

a. Enemy Forces.

(1) Terrain. Include critical aspects of the terrain that affect engineer operations.

(2) Weather. Include critical aspects of the weather that affect engineer operations.

(3) Enemy engineer capability/activity. Include**—**

- Known and plotted locations and activities of enemy engineer units and obstacles.
- Significant enemy maneuver and engineer capabilities that impact engineer operations.
- Expected employment of engineers based on the most probable enemy COA.

b. Friendly Forces.

- State the higher HQ concept of engineer support.
- State the designation, location, and activities of higher and adjacent engineers.
- List nonengineer units capable of assisting in engineer operations (emplacing SCATMINEs or other activities).

c. Attachments and Detachments.

- List units attached or detached, as necessary, to clarify task organization.
- Highlight changes in engineer task organization occurring during operations, including effective times or events.

2. MISSION. (Same as the brigade mission statement.)

3. EXECUTION.

a. SOEO.

- Provide a narrative of M/CM/S tasks that support the maneuver plan, regardless of what unit performs the task (for example, artillery-delivered SCATMINEs would be addressed in this paragraph).
- Explain what the essential M/CM/S tasks are and how they support the scheme of maneuver. Focus primarily on engineer support of the close area.
- Ensure that the SOEO corresponds to the maneuver unit concept of operations. Describe the concept of operations supporting the maneuver plan. The SOEO must tie critical tasks or the main effort to the brigade defeat mechanism. The concept provides the foundation and structure from which engineer operations are modeled. If the operations are phased, the SOEO is also phased using the same phases. If the supported unit is not phased, the SOEO uses the same format that the supported unit used in its concept of operations.
- Discuss division level/JTF missions that impact the brigade.

(Classification)

Figure C-2. Sample Engineer Annex

(Classification)

- Address four areas under each phase in the SOEO—general comments and M/CM/S. Address each in the order of priority for that particular phase. Do not address each area as a separate bullet, but as four clearly identified parts of a narrative. If there is no support provided in a specific area during a phase, do not mention that area.
- Ensure that the support addressed under each phase applies to the M/CM/S effort that supports a maneuver unit during that phase, no matter when the effort was completed.
- Ensure that each of the four areas covered under each phase provides a standard set of information with a general format as follows:
  - General comments. A brief, one-sentence comment about M/CM/S support for the phase.
  - Mobility. Explanations for each mobility task (for example, reducing obstacles, marking lanes, providing guides, and maintaining a route), relative location (route and objective), priority of the breaching asset used (for example, use plows first, then MICLICs), and the maneuver unit supported.
  - Countermobility. Each obstacle group (in order of its priority) its intent (target, effect, and relative location), the maneuver unit it supports, and any indirect fires allocated to a group by a TF. Provide execution criteria for reserve targets and situational obstacles.
  - Survivability. Explanations for each survivability task, relative location (BP and vicinity of an EA), and maneuver unit supported.

b. Tasks to Subordinate Units. List engineer tasks to be accomplished by a specific subordinate unit of a TF that are not included in the base OPORD. Include TF level tasks assigned to an engineer company or subordinate element. This is used to inform subordinate unit commanders of tasks being performed by forces under TF control.

c. Coordinating Instructions. Include—

- Critical engineer instructions common to two or more maneuver units not already covered by the base OPORD.
- SOP information only if needed for emphasis.
- Times or events in which obstacle control measures become effective (if different from the effective time of the order).
- TF PIR that must be considered or that require reports to a TF engineer.
- Obstacle restrictions.
- Mission reports required by a TF engineer (if not covered in the signal paragraph or unit SOP).
- Explanation of engineer work lines, if used.
- References to countermobility/survivability timelines as necessary.
- Lane marking (if not covered in a TF SOP).
- Relevant environmental considerations and protection measures. These may be placed in Appendix 2.

4. SERVICE SUPPORT.

a. Command-Regulated Classes of Supply. Highlight subunit allocations of command-regulated classes of supply that impact the controlled supply rate of an operation. This information may be summarized in a matrix or table.

b. Supply Distribution Plan. State the method of supply (supply point, tailgate, or service station) to be used for Class IV and V (obstacle) supplies for each subunit. Give tentative locations for Class IV and V supply points for linkup of corps push packages directly to units. Give the allocation of Class IV and V supplies by group. This information may be summarized in a matrix or table.

(Classification)

Figure C-2. Sample Engineer Annex (Continued)

(Classification)

c. Transportation. List the allocation and priority of support for brigade haul or airlift assets dedicated to moving TF Class IV and V supplies. List the requirements for the TF to supplement brigade transportation of mission loads.

d. Combat Health Support. Address the support for higher echelon engineer units that are performing brigade level missions in the brigade area.

e. HN. List the—

- Type and location of HN engineer facilities, assets, and support.
- Procedures for requesting and acquiring HN engineer support.
- Limitations and restrictions on HN support (for example, HN personnel not authorized forward of PL WHITE).

5. COMMAND AND SIGNAL.

a. Command. Include the location of key engineer leaders by phase. For example—

- The brigade engineer is with the command group throughout the operation.
- The assistant brigade engineer is with the planning staff throughout the operation.
- The company commander is with the engineer company during Phase I, with the cavalry squadron command group during Phase II, and with the engineer company during Phase III.
- The company XO is with the main effort TF for Phase I and at the BSB for Phases II and III.
- The company 1SG is with the BSB during Phase I, with the main effort TF during Phase II, and with the company during Phase III.

b. Signal.

- Identify communication networks monitored by the brigade engineer if different from the SOP. Reports may be passed through multiple means and communications.
- List the nets monitored by the engineer company for reports if different from the SOP.
- Identify critical engineer reporting requirements of subordinates if not covered in the coordinating instructions or SOP.
- List the FBCB2 communications plan (by the platoon initial data set) and the communication bump plan (by phase).
- List the MCS connectivity plan and the node of the engineer company MCS (by phase).
- Task organization linkup times, places, and signals.

ACKNOWLEDGE:

Authenticator’s signature (optional)
Authenticator’s last name
Authenticator’s rank

APPENDIXES:

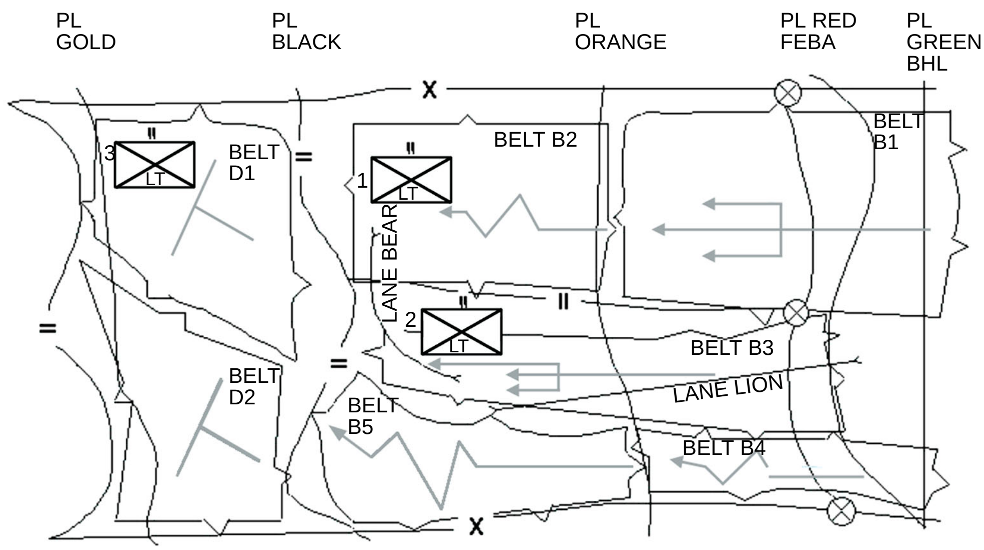
1. Engineer overlay.
2. Environmental considerations.
3. GI&S.
4. Countermobility execution matrix/timeline.
5. Survivability execution matrix/timeline.
6. Obstacle execution matrix (directed, situational, and reserve).
7. General engineering integration.

DISTRIBUTION: (If distributed separately from the base order.)

(Classification)

Figure C-2. Sample Engineer Annex (Continued)

C-5. *Figure C-3* provides a sample matrix and overlay.



Limit	Belt	Priority	Restrictions
1st Bn	B1 B2	5 6	Surface-laid mines only on/ around Lane Bear
2d Bn	B3 B4 B5	1 3 2	Surface-laid mines only on/ around Lane Lion No SCATMINEs
3d Bn	D1 D2	7 4	

Figure C-3. Sample Matrix and Overlay

ENGINEER UNIT ORDER

C-6. The company commander uses a unit order to exercise unit control over subordinate engineer units. At the outset of an operation, the company commander uses the order to—

- Affect the necessary task organization of engineers in the brigade.
- Assign initial missions.
- Establish sustainment integration with the BSB.

C-7. After task organization is effective and during combat operations, the company commander directs subsequent unit orders only to engineers under his command. Orders, missions, and instructions to engineers supporting maneuver battalions in command relationships are included as tasks to the battalions in the brigade order.

C-8. The brigade engineer issues WARNOs to all engineers supporting the brigade to facilitate parallel planning within engineer units and TFs. WARNOs to engineers supporting maneuver battalions are for planning only and are not for executing.

BRIGADE ENGINEER WARNING ORDER

C-9. The purpose of a WARNO is to help engineer staff officers and units initiate planning and preparation for an upcoming operation. The WARNO is critical to foster parallel planning at the engineer unit and maneuver battalion levels (see *FM 101-5* for the specific format and outline of a WARNO). The following is the minimum amount of information included in each WARNO to facilitate parallel planning by subordinate units:

- WARNO 1. Draft mission statement about the critical task. For example: "The engineer company reduces two lanes VIC GL123456 to pass the assault company on to OBJ DOG NLT 291700Z Feb 04."
  - MDMP timeline.
  - Orders times and locations.
  - Inspection times.
  - Nested rehearsal times.
  - Expected enemy contact time.
- WARNO 2. Completed mission statement.
  - Intent statement that set the tempo.
  - Adjusted timeline.
  - Tentative task organization.
  - SOEO.
- WARNO 3.
  - Adjusted timeline.
  - SOEO.
  - Task organization.
  - Key logistics node locations.
  - C2 and signal priorities and updates.

ENGINEER COMPANY OPERATION ORDER

C-10. The engineer company commander issues an OPORD (*Figure C-4*) to all subordinate engineer units. Once the task organization is effective, all instructions and missions to engineers supporting maneuver battalions are conveyed in the brigade order and are addressed to the maneuver battalion commanders.

(Classification)

Copy___ of ___ copies
Issuing engineer HQ
Place (coordinates) of issue
DTG of signature
Message reference number

OPORD (number) (code name, if used).
References (maps and other references required).
Time zone used throughout the order.

Task Organization.

- Do by phase.
- Include all engineer HQ of units under brigade control.
- Include all engineer HQ of organic units if the OPORD is the initial order for the operation.
- List companies and special platoons task-organized to HQ other than their parent unit.
- May list special equipment if it is not clear in the unit task organization.
- Streamline C2.
- Address command support relationships as necessary.

1. SITUATION.

a. Enemy Forces.

(1) Terrain and weather.

- Critical aspects of the terrain that affect operations.
- Critical and decisive terrain in the brigade area that relates to operations.
- Expected weather conditions and their impact on operations.
- Light data and its impact on engineer missions.

(2) Enemy situation.

- A macro picture of enemy forces facing the brigade.
- Current disposition of enemy forces, including the location of major enemy units (known and plotted), strength, designation (if known), composition, and current activities.
- Enemy engineer activities and capabilities.
- Most probable enemy COAs.
- Enemy activities, capabilities, and COAs at brigade level engineer operations.

b. Friendly Forces.

(1) Higher.

- Division and brigade (or TF) missions and the commander's intent (paraphrase the commander's intent as it applies to engineer operations).
- A brief description of the brigade plan (highlight those aspects of the plan that give purpose to the missions).
- Division level engineer plans and priorities (where applicable, describe them as they apply to brigade engineer operations).

(2) Adjacent.

- Highlight missions of adjacent divisions and engineer units that impact brigade missions.
- Highlight any attachments and detachments that occur during the operation, including the time or event that triggers the change.

(Classification)

Figure C-4. Sample Engineer Company OPORD

(Classification)

2. MISSION.

- Who (the engineer company organization).
- What (essential brigade level engineer missions).
- When.
- Where.
- Why (the brigade mission).

3. EXECUTION.

a. Intent. This is the company commander's intent for the operation.

- Give the company commander's vision of the operation and how it supports the brigade plan.
- Describe the purpose of the operation (why).
- Describe the end state of company level operations and their link to the end state of brigade operations.
- Do not describe the SOEO or subunit tasks here.
- Link the engineer intent to the brigade defeat mechanism.

b. SOEO.

- Must be a clear, concise narrative of the engineer plan from beginning to end. Use phases of the defense or battlefield framework to organize the narrative.
- Must focus on mission-essential engineer missions and the brigade engineer main effort only. The SOEO is not a summary of all engineer tasks. The company order usually concentrates on engineer operations in brigade rear or division level missions in the close area.
- Must clearly identify the company main effort and how it shifts during the operation to support the brigade plan.

(1) Obstacles.

- Supplement the narrative above, focusing specifically on the details of the countermobility effort.
- Identify obstacle belts used to support brigade deep, close, and rear areas. Assign belt responsibilities, priorities, and restrictions to brigade level countermobility efforts and engineer units.
- Identify and assign responsibilities for brigade-directed, division-directed, and reserve targets to be prepared by brigade-controlled engineer units.

(2) Situational obstacles.

- Include the concept for the employment of situational obstacles, focusing on how they will be used to complement or augment conventional tactical obstacle efforts.
- Ensure that the company plan includes details on NAIs, TAIs, decision points, and execution criteria if the SCATMINE target is division-directed and executed by brigade-controlled engineer units.
- Clearly state the HQ maintaining the authority to use SCATMINEs and any restrictions on duration (by belt).

(Classification)

Figure C-4. Sample Engineer Company OPORD (Continued)

(Classification)

c. Tasks to Subordinate Units.

- Include a clear, concise listing of all tasks assigned to engineer units remaining under the company commander's control.
- List tasks assigned by units (tasks are generally listed in the order that they will be executed during the operation).
- Clearly distinguish be-prepared and on-order tasks from normal tasks.
- Ensure that tasks and instructions common to two or more units are not included, but rather placed in the coordinating instructions.
- Ensure that all brigade level missions are identified during the estimate process, if necessary.

d. Coordinating Instructions.

- Include tasks and instructions that are common to two or more units subordinate to the company organization.
- Include all pertinent coordinating instructions listed in the brigade order.
- Do not list SOP tasks unless they are needed for emphasis or have changed due to the mission.
- May include reporting requirements common to two or more units if not covered in the signal paragraph.
- May authorize direct coordination between subordinate or adjacent engineer-specific tasks.
- Include environmental considerations as appropriate.
- Give the time that the task organization is effective.

4. SERVICE SUPPORT.

a. Support Concept.

- Provide subordinates with the general concept of logistics support for units under the company commander's control throughout the operation.
- Identify, in general, primary and backup (emergency) means of subunit sustainment for each type of engineer unit under the company commander's control. Must address who (platoons and sections), how (area support, unit support, supply point distribution, and unit distribution), where (BSB/FSB), and what (classes of supply and critical services).
- Must be consistent with task organization and command support relationships.
- Make maximum reference to brigade CSS graphics.
- List the locations of key CSS nodes as they apply to the concept for logistics support and planned subsequent locations if they change during the operation.

b. Materiel and Services.

(1) Supply. For each class of supply—

- List the allocation and controlled supply rate for each unit (based on missions).
- List basic loads to be maintained by the unit.
- List the method of obtaining supplies if it is different from the general concept. (Mission logistics may be different from unit [scheduled] logistics).
- Address any special arrangements or plans to sustain specific mission needs (Class III, IV, or V supplies to sustain the engineer preparation of defenses).

(2) Transportation.

- List primary, alternate, and designated contaminated MSRs during the operation.
- State allocations of haul assets.

(3) Services. List the location and means of requesting and obtaining each service.

(Classification)

Figure C-4. Sample Engineer Company OPORD (Continued)

(Classification)

c. MEDEVAC and Hospitalization. For each type of engineer unit, indicate the primary and backup means of MEDEVAC and hospitalization, including locations of health service facilities providing support on an area or unit basis.

d. Personnel Support.

- Identify the method of handling EPWs and the locations of EPW collection points.
- Identify the method of receiving mail, religious services, and graves registration for each type of unit under the company commander's control.

e. Civil-Military Cooperation. Identify engineer supplies, services, or equipment provided by the HN.

5. COMMAND AND SIGNAL.

a. Command.

- List the location of key leaders and the company CP during the operations and planned movements.
- Identify locations and planned movements of key brigade C2 nodes.
- Designate the logical chain of command.

b. Signal.

- Identify communications/signal peculiarities that are not covered in the SOP.
- May identify critical reporting requirements of subordinates if they are not covered in the coordinating instructions or SOP.
- Designate nets for mission and routine reports.

ACKNOWLEDGE:

Company commander's signature (optional)
Company commander's last name
Company commander's rank

OFFICIAL:

(Authentication)

ANNEXES: Annexes may include, but are not limited to—

- OPORD execution matrix.
- Directed-obstacle execution matrix.
- Situational-obstacle execution matrix.
- Reserve-obstacle execution matrix.
- Company timeline.
- Survivability execution matrix.
- Environmental considerations.

OVERLAYS: Overlays may include, but are not limited to—

- SITEMP.
- Operations graphics (brigade and/or TF).
- Engineer company operations graphics (include brigade maneuver and engineer graphics as necessary).
- Scheme of obstacle.
- Brigade CSS.
- Brigade obstacle plan.
- Environmental considerations.

DISTRIBUTION:

(Classification)

Figure C-4. Sample Engineer Company OPORD (Continued)

C-11. *Figure C-5* shows a sample engineer execution matrix.

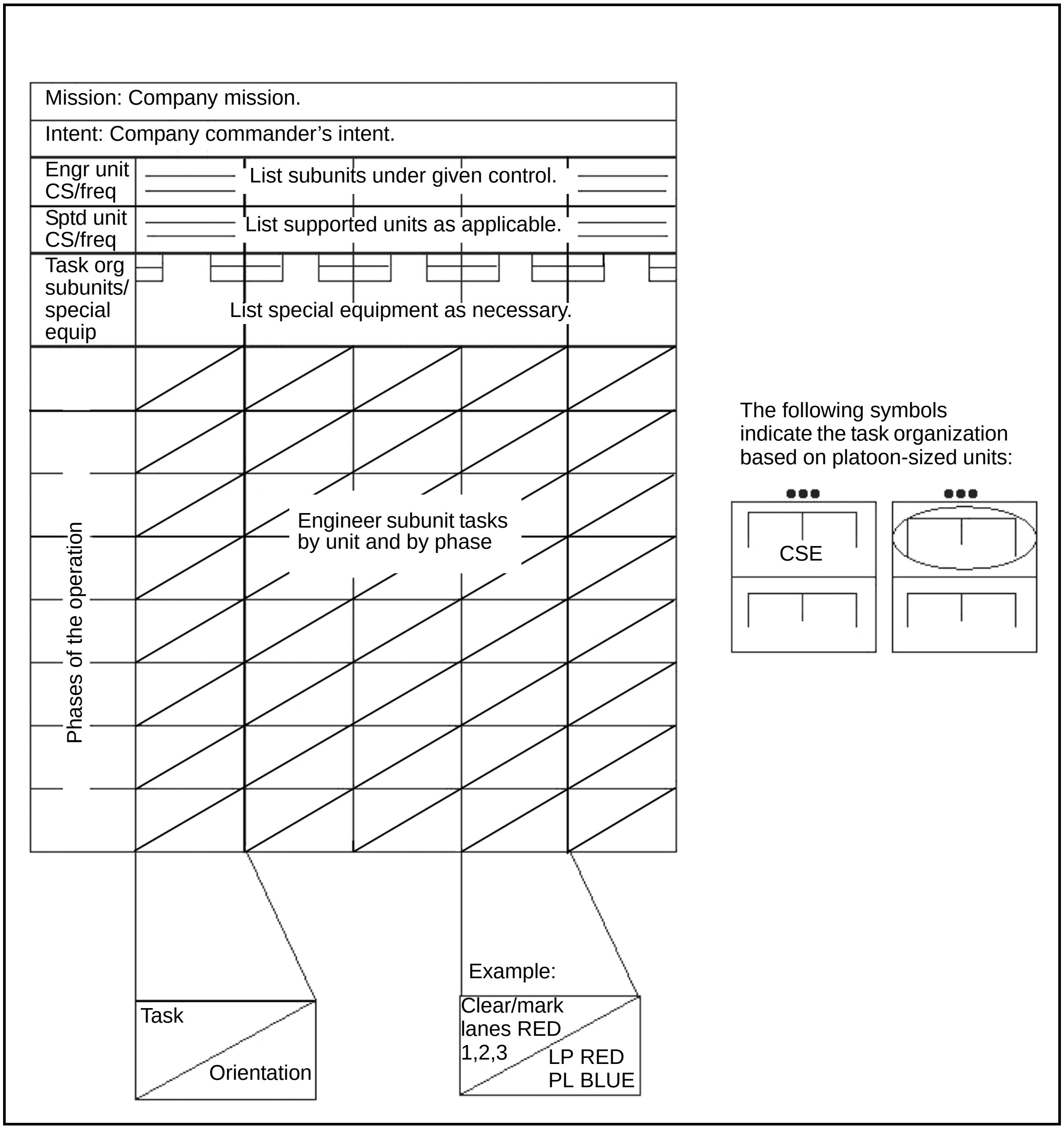


Figure C-5. Sample Engineer Execution Matrix

ENGINEER COMPANY FRAGMENTARY ORDER

C-12. The company commander frequently needs to modify the company OPORD to make changes in engineer operations that allow the brigade to take advantage of tactical opportunities. The company commander can do this by issuing a FRAGO, but only to engineer units under his command. Changes in instructions to engineers supporting maneuver battalions in command relationships are conveyed through input to the brigade FRAGO (see *FM 101-5* for a FRAGO format). The key to issuing a FRAGO is to maximize the use of the current OPORD by specifying only information and instructions that have changed. The company commander may be afforded the opportunity to issue the FRAGO to subordinate leaders face to face; if not, he normally issues it over the radio. The company commander may use the XO or 1SG to issue the FRAGO in person to ensure that direct coordination is made and that graphics are distributed to platoon leaders. A FRAGO usually contains the following elements:

- **Changes to task organization.** Lists any required changes to unit task organizations made necessary by modifications to the OPORD.
- **Situation.** Includes a brief statement of current enemy and friendly situations, which usually gives the reason for the FRAGO. It may also update subordinates on the current status of brigade level engineer missions.
- **Concept.** Gives changes to the SOEO and the corresponding changes to subunit tasks. It must also include any changes in the brigade or company commander's intent.
- **Coordinating instructions.** Includes changes to the service support and command and signal paragraphs of the current OPORD that were made necessary by the change in the SOEO.

Appendix D

Stryker Brigade Engineer Systems

This appendix provides a baseline understanding of the engineer systems used by the SBCT.

ENGINEER SQUAD VEHICLE

D-1. The ESV (*Figure D-1*) is a variant of the infantry carrier vehicle, which is a member of the Stryker armored vehicle family. The ESV is air-deployable by a C130 and capable of sustained hard-surface speeds of 40 miles per hour, with a cruising range of 300 miles without refueling. The ESV carries a squad of nine and provides mobility and limited countermobility support. Obstacle neutralization systems integrated with the ESV include a full-width blade, a lightweight roller, and a magnetic signature duplicator. The blade or the roller can be mounted to provide limited mounted mobility support.

D-2. The ESV is an armored personnel carrier that is used primarily to transport engineer squads on the battlefield and tow engineer assets (MICLICs, trailer-mounted Volcanos, cargo trailers). The basis of issue is nine per SBCT engineer company.

Figure D-1. ESV

RAPIDLY EMPLACED BRIDGE SYSTEM

D-3. The REBS (*Figure D-2*) is a deployable/retrievable bridge that provides the SBCT with an expedient, tactical gap crossing capability. The REBS can be employed by two soldiers within 10 minutes and is air-transportable by the C130. The REBS has an MLC 30 and is capable of crossing gaps up to 13 meters wide. It is also capable of an MLC 40 caution crossing. Limitations of the REBS need to be considered in planning. Key limitations include—

- No more than a 1-meter difference in height from the near and far banks.
- No more than a 5 percent transverse slope on either bank.

NOTE: The REBS is not intended to be employed in an assault role.

D-4. The REBS is organic to SBCT engineer units and provides the capability to maintain freedom of maneuver through high tactical mobility. Engineers deploy with REBS forward in support of the three maneuver battalions and the cavalry squadron to provide gap crossing capabilities. The basis of issue is four per SBCT engineer company.

DEPLOYABLE UNIVERSAL COMBAT EARTHMOVER

D-5. The DEUCE (*Figure D-3*, page D-4) is a high-speed, high-mobility, rubber-tracked, earth-moving system that is capable of conducting excavating operations in support of M/CM/S and general engineering missions. Its earth-moving capability matches or exceeds the current D5B dozer. Instead of traditional steel tracks, the DEUCE uses one-piece rubber tracks to allow travel on paved surfaces.

D-6. The DEUCE performs the same missions as the D5B it replaces, but it provides self-mobility between jobsites and it arrives faster. This represents a significant increase in total work effort. The basis of issue is six per SBCT engineer company.

TRAILER-MOUNTED VOLCANO

D-7. The trailer-mounted Volcano (*Figure D-4*, page D-4) is a downsized system primarily used by the SBCT to protect the flanks of the maneuver forces as point obstacles. The trailer-mounted Volcano uses a MICLIC M200A1 trailer with two racks (40 canisters per rack) and is towed by an ESV.

D-8. The trailer-mounted Volcano provides a speedy, flexible method of emplacing minefields. With two full racks, it can efficiently emplace a minefield with a 250-meter frontage, but its versatility makes it especially effective in emplacing situational obstacles (particularly for flank protection). The system dispenses AT and AP mines that can be set to self-destruct within 4 to 48 hours. The basis of issue is three per SBCT engineer company.

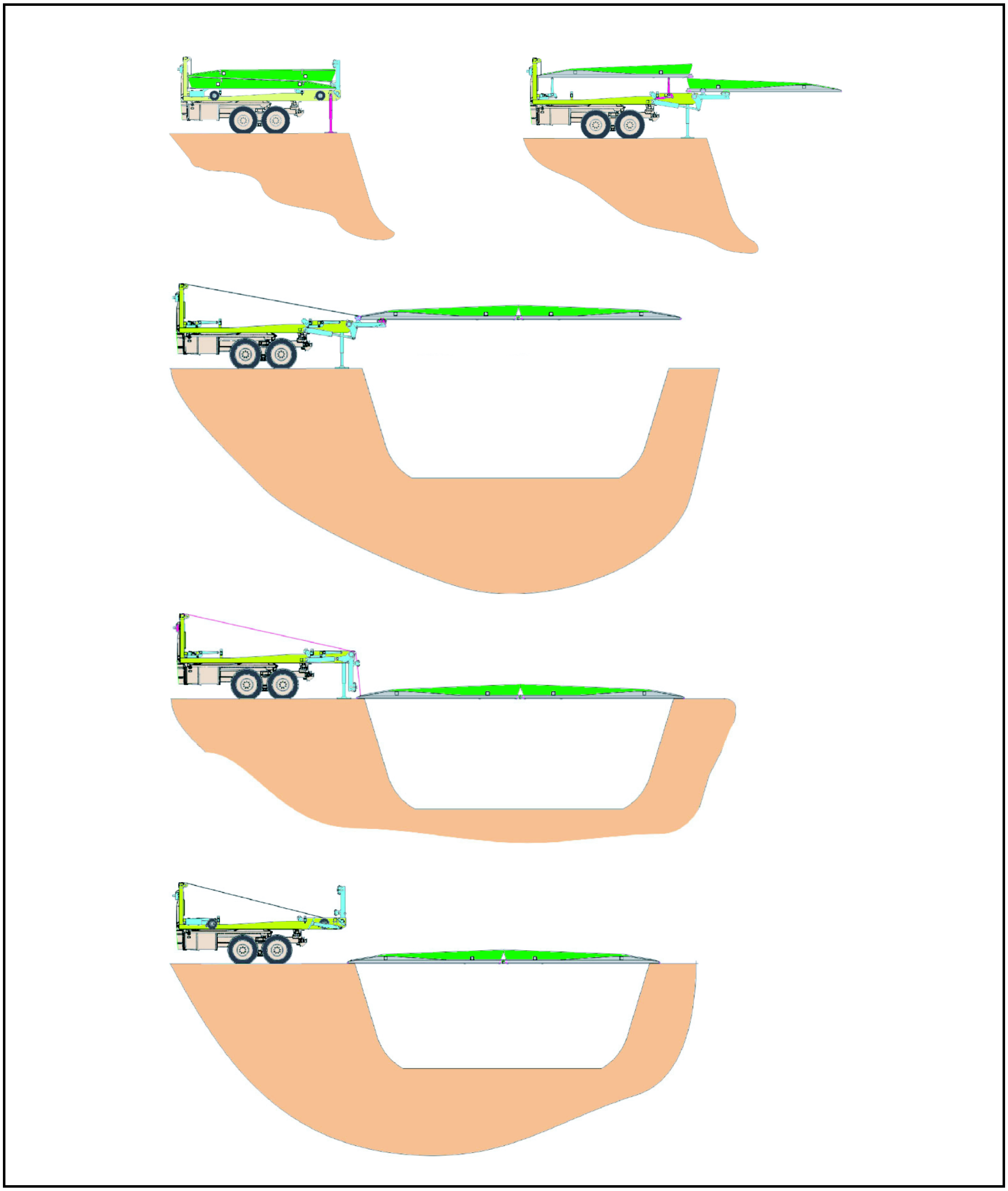


Figure D-2. REBS Employment

Figure D-3. DEUCE

Figure D-4. Volcano Mounted on an M200A1 Trailer

MINE CLEARING LINE CHARGE

D-9. The MICLIC (*Figure D-5*) is a rocket-projected explosive line charge that provides a close-in breaching capability for maneuver forces. It is effective against conventionally fused mines; and when detonated, it provides a lane that is 8 meters wide and 100 meters long. The MICLIC system consists of an M353 3½-ton trailer, M200A1 2½-ton trailer, or M200 tracked trailer chassis; a launcher assembly; an M147 firing kit; an M58A3 line charge; and a 5-inch MK22 MOD 4 rocket. The line charge is 350 feet long and contains 5 pounds of C4 explosive per linear foot.

Figure D-5. MICLIC Mounted on an M200A1 Trailer

D-10. Engineer units employ the MICLIC in response to minefield breaching requirements identified by the maneuver unit. The basis of issue is six per SBCT engineer company.

INTERIM HIGH-MOBILITY ENGINEER EXCAVATOR

D-11. The IHMEE (*Figure D-6*) is a self-deployable excavation system with select attachments that are used to execute a wide range of M/CM/S and general engineering missions. The IHMEE is normally configured with a backhoe and a 4-in-1 multipurpose bucket loader to perform most missions. However, it is capable of operating additional attachments and tools, such as an articulating forklift, an auger, a picket driver, and a chain saw. The IHMEE is road-legal and can sustain speeds in excess of 40 miles per hour on-road and 25 miles per hour off-road.

D-12. The IHMEE is deployed to construct protective shelters, bunkers, and helipads; prepare bivouac sites; and assist with the emplacement of culverts, seaport construction, logistics base operations, and other structures and facilities. When equipped with various attachments, the IHMEE can provide combat-deployed units with a host of earth-moving and construction support capabilities. The basis of issue is six per SBCT engineer company.

Figure D-6. IHMEE

MEDIUM TACTICAL VEHICLES

D-13. Medium tactical vehicles (MTVs) (*Figure D-7*) are designed to transport cargo and soldiers. The Stryker model is air-deployable by a C130 and has a payload capacity of 5,000 pounds. It may be equipped with material-handling equipment that has a lifting capability of 1,500 pounds. To facilitate loading and unloading, the bedside rails are mounted on hinges and can be lowered.

M1093 standard cargo truck

M1086 long wheel base truck

Figure D-7. MTVs

D-14. The cargo bed can be equipped with an optional bench seat kit for transporting soldiers. The bench seats are constructed of a nonwood material, are attached to the cargo bedside rails, and can be folded down and stowed when not in use. Soldiers are assisted climbing in and out of the cargo bed area with the aid of a ladder stowed on the vehicle when not in use. A canvas and bows kit is available to keep soldiers and cargo protected from the elements.

D-15. MTVs can be equipped with a self-recovery winch kit capable of fore and aft vehicle recovery operations. Depending on the MTV model, the winch can have 280 to 308 feet of line capacity and 10,000 to 15,500 pounds of bare drum line pull at 110 percent overload. The basis of issue is one per SBCT company.

DIGITAL TOPOGRAPHIC SUPPORT SYSTEM

D-16. The DTSS (*Figure D-8*) is an integrated, self-contained, terrain data manipulation and analysis system that is employed from the brigade through echelon above corps. The DTSS is configured to communicate with other ABCSs over the local area network (LAN). It is capable of receiving, formatting, creating, manipulating, merging, updating, storing, retrieving, and managing digital geospatial products.

Figure D-8. DTSS

D-17. The three active variants include the Digital Topographic Support System–Light (DTSS-L), Digital Topographic Support System–Deployable (DTSS-D), and Digital Topographic Support System–Base (DTSS-B). The basis of issue for the SBCT is one DTSS-L and one DTSS-D.

DIGITAL TOPOGRAPHIC SUPPORT SYSTEM–LIGHT

D-18. The DTSS-L combines operator workstations, software packages, and custom software components. It is a completely self-contained system that is capable of storing and manipulating imagery, imagery intelligence, and geospatial information. A low-volume, large-format plotting capability is resident with the system, and it incorporates a laptop computer that can be removed from the configuration for remote workstation use. The DTSS-L is housed in an S788 lightweight, multipurpose shelter and is mounted on a high-mobility, multipurpose, wheeled vehicle (HMMWV).

D-19. It provides updated map backgrounds and terrain intelligence information to all ABCSs in the SBCT by populating and managing the ABCS map server and serving as the secondary map server. DTSS-L software components provide battlefield analysis by using the following custom tactical decision aids:

- Mobility analysis by vehicle type (cross-country, on-road, and maneuver networks).
- Visibility analysis (site [point], route, and area).
- Terrain visualization (terrain profile and slope generation).
- Data queries (helicopter LZs, aerial concealment).
- Standardized map production.
- Standardized National Imagery and Mapping Agency (NIMA) vector data generation.

DIGITAL TOPOGRAPHIC SUPPORT SYSTEM–DEPLOYABLE

D-20. The DTSS-D is a militarized version of the system with components that are placed into hardened transit cases to facilitate its use in a tactical deployed environment where vehicles may be minimized. It consists of commercial geographic information systems (GISs), image processing software packages, and custom software components that are suitable for hardened deployment.

NOTE: See TC 5-230 for assistance in using the DTSS and developing terrain folders.

MAP SERVER

D-21. The ABCS map server provides the right map at the right time so that commanders can make critical tactical decisions quickly and efficiently. The basis of issue is two per SBCT staff. The major functions of the ABCS map server are—

- Receiving, storing, managing, and disseminating NIMA-produced digital geospatial data and products and custom geospatial data.
- Providing a web-based graphical user interface for querying NIMA and custom geospatial data within a user-defined area of interest.
- Allowing the download of NIMA and custom geospatial data to a user workstation.

D-22. Members of the SBCT staff can access the map server via the tactical LAN. They can use a web browser to see what geospatial data is available on the map server and can decide what data to download to their ABCS C2 system via an intuitive user interface.

D-23. The SBCT has primary and secondary map servers to allow fail-safe operation. Replication functions are built into the software to ensure that common data is present (horizontally and vertically) throughout the C2 hierarchies. This common data is especially critical for ensuring a COP of the battlefield for the SBCT commander and staff.

TERRABASE II

D-24. TerraBase II is a computer software program that aids in terrain analysis, and it is compatible with most computer systems. It provides a way to integrate a wide variety of terrain data in a flexible manner using computer screen images and hardcopy products. SBCT engineers at the brigade and company levels use TerraBase II alone or as a supplement to DTSS and MCS-Engineer.

D-25. TerraBase II products enhance the brigade commander's ability to make informed battlefield decisions. It is most useful when employed in the brigade planning cell, where the staff officers can analyze the effects of terrain on their particular battlefield function. Terrain products can be viewed while developing or analyzing COAs and can be digitally distributed, saved on a floppy disk, or printed to support subordinate unit planning.

D-26. With little training, users can create LOS profiles; assess placement locations for weapons, radar, and radios; and view three-dimensional representations of the terrain. They may compute slope overlays, make user-specific analysis maps, classify and make maps with Landsat data, and obtain climate- and weather-related facts. In addition, the user may add digitized features from photographs and maps to the database. This database may be searched using limits that the user establishes to produce overlays or textural reports.

D-27. TerraBase II supports the brigade planning process with tailored topographic products. It provides terrain information to analyze—

- AO.
- Cover.
- LOC.
- Landing and drop zones.
- Intervisibility lines.

D-28. Special or tailored products can also be produced to support the user. These include air assault packets, target folders, infiltration routes to a specific objective, weapons placement, and river crossing and ford sites. TerraBase II can produce computer-generated products using the NIMA digital terrain evaluation data (DTED), including LOS profiles, visible area plots, and oblique and perspective views.

MANEUVER CONTROL SYSTEM-ENGINEER

D-29. The MCS-Engineer provides a seamless, integrated engineer C2 capability to support maneuver forces during battlefield planning and execution. It interfaces with the joint common database and is DTED 2 COE-compliant within the ABCS as part of the MCS-Light architecture.

D-30. The MCS-Engineer also provides an easy-to-use, comprehensive C2 capability that allows for planning, executing, reporting, and visualizing to update the common tactical picture. It supports all combat engineer functions, focusing on the—

- Development of OPORDs and OPLANs, the generation of engineer annexes, and the integration of engineer information into appropriate annexes and appendixes.
- Reporting and visual updates of real-time engineering.
- Completion of reports of initiation and progress.
- Completion of projects, tasks, and missions.
- Tracking of engineer units, schedules, assets, and capabilities.
- Tracking and display of individual obstacles.
- Identification of obstacle reporting conflicts.
- Automation of the joint variable message format.
- Functionality of integrated GIS and C2.

D-31. The MCS-Engineer provides tools that improve the efficiency of engineers in conducting the MDMP. The major areas supported include IPB, EBA, and COA development.

D-32. The MCS-Engineer C2 capability is fully functional within a GIS. The GIS features a comprehensive relational geodatabase with raster, vector, and imagery visualization.

Appendix E

Engineer Augmentation Packages

The SBCT has limited engineer capability in its organic engineer company, engineer staff planning section, and terrain team. These elements have been optimized to provide minimum essential capabilities, which allows the SBCT to conduct highly mobile, decentralized combat operations that are on SSCs. Based on the SBCT mission, this austere engineer capability may likely be augmented with additional engineer elements and assets. The actual augmentation must be derived from the maneuver commander's requirements for M/CM/S and general engineering. Engineer augmentation generally comes from the Army and may include active Army and reserve components. Additional augmentation may come from other service engineers, contract engineers, coalition engineers, HN engineers, and the United States Army Corps of Engineers (USACE).

PLANNING

E-1. Planning for augmentation must be part of the SBCT engineer staff cell MDMP process. If an engineer element is task-organized to support the SBCT, identify a headquarters early and include it in the SBCT planning effort. This provides the benefits of technical knowledge and allows parallel planning. If the engineer element has a planning capability, the SBCT engineer staff planning section may focus its efforts on planning for short-term combat engineering missions while the task-organized element focuses on general engineering and long-term requirements.

E-2. For MTW missions, the SBCT requires additional combat engineers to conduct combat engineering (M/CM/S) tasks. These engineer units are task-organized from the EAB headquarters where the SBCT is assigned. The division or corps sizes the augmentation package based on the expected METT-TC of the SBCT. The SBCT brigade engineer and the task-organized engineer headquarters must plan engineer operations to support the SBCT commander's requirements.

E-3. While the SBCT is optimized for SSC operations, METT-TC may necessitate engineer augmentation to support the brigade. SSC operations typically require more general engineering effort when task-organized at the SBCT level than in MTW. The SBCT may also require augmentation to conduct combat engineering tasks. In SSC operations, the SBCT and the task-organized engineer headquarters planners may have more responsibility for defining the augmentation requirements than in MTW.

E-4. In stability operations and support operations, engineer efforts may include significantly more general engineering missions. These missions require augmentation that may be met by a variety of engineer possibilities, including the support of other service engineers, contract engineers, coalition engineers, HN engineers, and USACE. The strengths and weaknesses of each possible solution must also be considered early in the engineer planning.

TRANSITION

E-5. The SBCT is designed for full-spectrum operations. Engineer planners must understand that an operation can transition within the spectrum of operations. For example, successful combat operations may change the focus to support operations or stability operations. Engineer planners must plan and prepare for transition engineer operations as the maneuver commander's requirements change.

E-6. All Army operations have constraints on available forces. These constraints may be dictated by force caps, sustainment or force projection limitations, or other considerations. Engineer planners work within constraints to provide the best possible support. This may require moving some engineer elements out of the AO and allow more critical elements to take their place. Such changes to the task organization are most likely parallel with operational transitions, but they may occur at other times as well.

COMMAND AND CONTROL

E-7. The engineer major assigned to the SBCT is the brigade engineer. When an engineer battalion, group, or brigade is task-organized in support of the SBCT, the commander of the engineer battalion or brigade is the senior engineer. The designation of the brigade engineer is the prerogative of the SBCT commander. Without digital connectivity and a team trained to work with the enhanced COP of the SBCT, the senior engineer may not be able to effectively assume the duties of the SBCT engineer. If the senior engineer's headquarters is integrated into SBCT operations and is remaining with the brigade for a significant period of time, the senior engineer is likely to be designated as the SBCT brigade engineer.

E-8. An engineer headquarters supporting the SBCT may be task-organized to the SBCT higher headquarters to reduce impacts on the SBCT headquarters footprint and planning requirements. In this event, the engineer headquarters may be located inside or outside the SBCT AO. When the headquarters is outside the AO, LNOs or deputy commanders are required in the AO and at the SBCT headquarters.

E-9. The augmenting force will probably not have digital capability and will require interfaces to provide the SBCT with appropriate SA. If the supporting engineer headquarters is assigned to the higher headquarters of the SBCT, the digital bridge cell will provide this connectivity. If the headquarters is task-organized to the SBCT, additional ABCSs may be needed to enhance the ability to support the SBCT.

PACKAGES

E-10. Several engineer tasks should be considered when planning engineer augmentation. Because the scope of the task depends on mission considerations, the size or capabilities are not described in detail in this manual. Mobility task packages may include elements from combat, CS, and combat heavy engineer units. Mobility support missions are likely across the spectrum of conflict. Such tasks may include, but are not limited to, breaching, bridging, and the construction of MSRs.

COUNTERMOBILITY MISSIONS

E-11. Countermobility missions (such as obstacle emplacement) are most likely in MTW, very likely in SSC, and less likely in stability operations and support operations. They may include situational and standard obstacles.

SURVIVABILITY SUPPORT MISSIONS

E-12. Survivability support missions (including the hardening of vehicles, facilities, and fighting positions) are possible across the spectrum of conflict. Because SBCT combat capabilities are based on mobile operations, survivability support capabilities may be limited early in a conflict. Such efforts are more likely in an extended conflict or during a transition to stability operations and support operations.

GENERAL ENGINEERING

E-13. General engineering missions are possible across the spectrum of conflict. Some tasks, such as RRR, are more likely in SSC or MTW. Other missions, such as prime power production, are more likely in stability operations and support operations. Other SBCT requirements may include TUAV landing strip construction, LOC maintenance, and base camp support.

GEOSPATIAL ENGINEERING

E-14. While some geospatial engineering augmentation may be required for the SBCT, it will most likely be supported through assets outside the SBCT AO and connected through the reach capabilities of the organic terrain team.

Glossary

1SG	first sergeant
AA	avenue of approach
AAP	allied administrative publication
ABCS	Army Battle Command System
ACE	armored combat earthmover
ADA	air defense artillery
ADAM	artillery-delivered antipersonnel mine
ADC	area damage control
AFATDS	Advanced Field Artillery Tactical Data System
AHD	antihandling device
AJP	allied joint publication
AMDWS	air and missile defense workstation
AO	area of operations
AOR	area of responsibility
AP	antipersonnel
APLA	antipersonnel land mine alternative
ARFOR	Army force
ASAS-RWS	All-Source Analysis System–Remote Workstation
AT	antitank
ATTN	attention
BHL	battle hand over line
bn	battalion
BOS	Battlefield Operating System
BP	battle position
BSA	brigade support area
BSB	brigade support battalion
BTRA	battlespace terrain reasoning and awareness
C2	command and control
C4I	command, control, communications, computers, and intelligence
C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CA	civil affairs
CBR	chemical, biological, and radiological
CBRNE	chemical, biological, radiological, nuclear, and high-yield explosive
cbt	combat
CCIR	commander's critical information requirements

CJCSI	Chairman of the Joint Chiefs of Staff instruction
co	company
COA	course of action
COE	contemporary operational environment
COLT	combat observation and lasing team
CONUS	continental United States
COP	common operational picture
CP	command post
CRT	combat repair team
CS	combat support
CSE	combat support equipment
CSS	combat service support
CSSCS	Combat Service Support Control System
DA	Department of the Army
DC	District of Columbia
DEUCE	deployable universal combat earthmover
DOD	Department of Defense
DODD	Department of Defense directive
DRS	Digital Reconnaissance System
DS	direct support
DST	decision support template
DTED	digital terrain evaluation data
DTG	date-time group
DTSS	Digital Topographic Support System
DTSS-B	Digital Topographic Support System–Base
DTSS-D	Digital Topographic Support System–Deployable
DTSS-L	Digital Topographic Support System–Light
EA	engagement area
EAB	echelon above brigade
EAD	echelon above division
EBA	engineer battlefield assessment
EMST	essential mobility/survivability task
EN	engineer
engr	engineer
EOD	explosive ordnance disposal
EPW	enemy prisoner of war
equip	equipment
ERT	engineer reconnaissance team
ESV	engineer squad vehicle
F	Fahrenheit

FACE	forward aviation combat engineering
FARP	forward arming and refueling point
FBCB2	Force XXI Battle Command–Brigade and Below
Feb	February
FEBA	forward edge of the battle area
FFE	field force engineering
FID	foreign internal defense
FIST	fire support team
FM	field manual
FM	frequency-modulated
FOB	forward operating base
FRAGO	fragmentary order
freq	frequency
FSB	forward support battalion
FSO	fire support officer
FWF	former warring faction
FXXI	Force XXI
gal	gallon(s)
GI&S	geospatial information and services
GIS	geographic information system
GSR	ground surveillance radar
HCA	humanitarian and civic assistance
HHC	headquarters and headquarters company
HMA	humanitarian mine action
HMMWV	high-mobility, multipurpose, wheeled vehicle
HN	host nation
HQ	headquarters
HQ TRADOC	Headquarters, United States Army Training and Doctrine Command
HVT	high-value target
IED	improvised explosive device
IHMEE	interim high-mobility engineering excavator
IPB	intelligence preparation of the battlefield
IR	intelligence requirements
ISR	intelligence, surveillance, and reconnaissance
JCS	Joint Chiefs of Staff
JFLCC	joint-forces land component command
JP	joint publication
JTF	joint task force
JTTP	joint tactics, techniques, and procedures
LAN	local area network

LD	line of departure
Landsat	The Land Remote-Sensing Satellite Program managed by the US Geological Survey. The Landsat series began in 1972 to gather information about land surface features of the planet.
LNO	liaison officer
LOC	lines of communications
LOGPAC	logistics package
LOS	line of sight
LP	listening post
LRP	logistics release point
LT	light
LZ	landing zone
M/CM/S	mobility, countermobility, and survivability
MANSCEN	Maneuver Support Center
MANSPT	maneuver support
MBA	main battle area
MCOO	modified combined-obstacle overlay
MCS	Maneuver Control System
MCWP	Marine Corps warfighting publication
MDMP	military decision-making process
MEDEVAC	medical evacuation
METT-TC	mission, enemy and threat, terrain and weather, troops, time available, and civilian considerations
MICLIC	mine clearing line charge
MLC	military load classification
mm	millimeter(s)
MO	Missouri
MOOTW	military operations other than war
MOPMS	Modular-Pack Mine System
MOPP	mission-oriented protective posture
MOUT	military operations on urbanized terrain
MP	military police
MSR	main supply route
MTOE	modified table(s) of organization and equipment
MTV	medium tactical vehicle
MTW	major theater war
NAI	named area of interest
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, and chemical
NCA	national command authority
NCO	noncommissioned officer

NCS	net control station
NEO	noncombatant evacuation operations
NGO	nongovernmental organization
NIMA	National Imagery and Mapping Agency
NLT	no later than
NO	number
OAKOC	observation and fields of fire, avenues of approach, key terrain, obstacles and movement, cover and concealment
obj	objective
OBSTINTEL	obstacle intelligence
OP	observation post
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
OPTEMPO	operating tempo
org	organization
PCI	precombat inspection
PEO	peace enforcement operations
PIR	priority intelligence requirements
PKO	peacekeeping operations
PL	phase line
plt	platoon
PME	peacetime military engagement
POL	petroleum, oil, and lubricants
PSG	platoon sergeant
PSYOP	psychological operations
R&S	reconnaissance and surveillance
RAAMS	Remote Antiarmor Mine System
REBS	Rapidly Emplaced Bridge System
RECCE	reconnaissance
ROE	rules of engagement
ROI	rules of interaction
RRR	rapid runway repair
RSTA	reconnaissance, surveillance, and target acquisition
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
SA	situational awareness
SBCT	Stryker brigade combat team
SCATMINE	scatterable mine

SECDEF	Secretary of Defense
SINCGARS	Single-Channel, Ground-to-Air Radio System
SITEMP	situation template
SME	subject matter expert
SOEO	scheme of engineer operations
SOF	special operations forces
SOI	signal operating instructions
SOP	standing operating procedure
SOSRA	suppression, obscuration, security, reduction, and assault
spt	support
sptd	supported
SSC	smaller-scale contingency
STANAG	standardization agreement
SU	situational understanding
TAI	targeted area of interest
TC	training circular
TF	task force
TLP	troop-leading procedure
TM	technical manual
TOC	tactical operations center
TOE	table(s) of organization and equipment
trk	truck
trl	trailer
TSOP	tactical standing operating procedure
TTP	tactics, techniques, and procedures
TUAV	tactical unmanned aerial vehicle
UN	United Nations
US	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USMC	United States Marine Corps
UXO	unexploded ordnance
VIC	vicinity
WARNO	warning order
XO	executive officer

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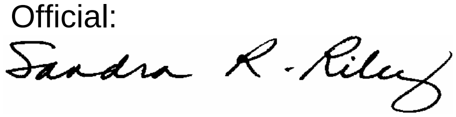

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