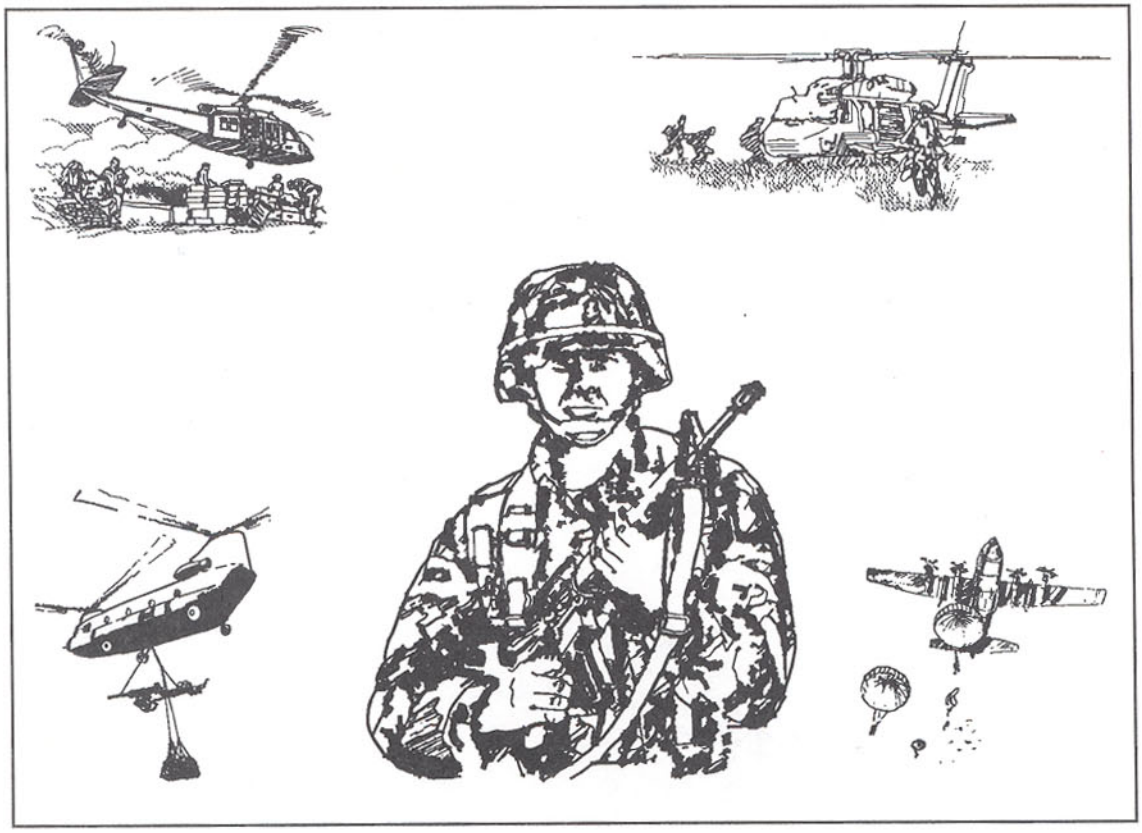
FM 5-7-30

Brigade Engineer and Engineer Company Combat Operations (Airborne, Air Assault, Light)



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FIELD MANUAL
NO. 5-7-30

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 28 December 1994

BRIGADE ENGINEER AND ENGINEER COMPANY COMBAT OPERATIONS (AIRBORNE, AIR ASSAULT, LIGHT)

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PREFACE

Field Manual (FM) 5-7-30 is the capstone manual for engineer support to airborne, air assault, and light infantry brigade operations. It is designed to be the engineer extension to FM 7-30. The manual serves as a guide for light brigade engineers and light engineer company commanders in planning, integrating, and conducting engineer operations to support a light brigade. It also serves as a guide to the brigade staff and subordinate maneuver commanders on the organization, capabilities, and employment of engineers as a force multiplier. The manual provides division-level engineer planners with the principles of brigade engineer operations affecting their integration into brigade operations.

This manual applies to the light brigade and the light engineer company that supports it. *FM 5-7-30* sets forth the principles that guide the conduct of engineer operations supporting the brigade. It addresses engineer tactics, techniques, and procedures (TTP) as necessary to emphasize critical points or principles. The TTP are intended to be descriptive rather than prescriptive and are not a replacement for the TTP or unit standing operating procedures (SOP) unique to the supported brigade.

FM 5-7-30 is fully compatible with *FMs 7-30* and *100-5* and is consistent with other combined arms doctrine. This is not a stand-alone manual. The user must possess a fundamental knowledge of the concepts outlined in *FMs 5-100, 71-100, 100-5, 101-5, and 101-5-1.*

The proponent of this publication is Headquarters (HQ), United States (US) Army Engineer School. Send comments and recommendations on Department of the Army (DA) *Form 2028* directly to Commandant, US Army Engineer School, ATTN ATSE-T-PD-PM, Fort Leonard Wood, Missouri 64573-6650.

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

CHAPTER 1

Light Engineer Operations and the Brigade Battlefield

US Army light divisions—airborne, air assault, and light infantry—add a new dimension to strategic mobility. From the continental United States (CONUS) and outside the continental United States (OCONUS), these forces can rapidly project to either reinforce forward-deployed forces or to satisfy contingencies in regions of the world that lack a developed structure. Their deployability enables them to arrive in a crisis area even before the conflict begins, often precluding the later necessity for a larger force.

The light brigade forms the foundation of this force. When properly task-organized, augmented, and deployed, the light brigade can fight anytime, anywhere, and against any enemy. This level of warfare demands combat-ready units comprised of skilled soldiers who can deploy anywhere in the world. These units are established through tough, thorough, and demanding combined arms training programs conducted and managed by leaders that fully understand the effective employment of the light combined arms force.

The light engineer company is the smallest engineer unit necessary to support the light brigade. With additional support from echelons above division (EAD) engineer units, the light engineer company can support light brigades for extended periods of time. It is organized to fight as part of a combined arms team anywhere in the world and win. Our war-fighting doctrine at the engineer company level equates to enhancing the capabilities of maneuver warfare.

THE LIGHT BRIGADE

Today's modern battlefield requires aggressive and quick-thinking leaders who use their initiative to its fullest extent and can make quick and skillful decisions on the battlefield. To support the combined arms team, light engineer companies must be the most physically fit, the most disciplined, and the most aggressive unit that undergoes demanding training. The inherent strategic mobility of the force dictates that the light engineer company prepare itself for no-notice, worldwide deployment in support of the full spectrum of military operations. The light engineer company establishes and maintains a high state of readiness for the next enemy it will face or the next location to which it will deploy.

This chapter provides a general overview of the brigade engineer and the engineer company's integration to support the light infantry brigade. It also provides a general overview of light engineer organizations and how they integrate into the brigade. Throughout this manual, light forces and their supporting engineers refer to airborne, air-assault, and light infantry divisions and their division engineers (DIVENs) unless otherwise specified.

MISSIONS, CAPABILITIES, AND LIMITATIONS

The mission of light engineers corresponds to those missions normally conducted by a light infantry brigade. Their greatest advantage is that they have great strategic mobility which results in the rapid resolution of crisis situations. They can be used to conduct combat operations anytime and anywhere. They also can be used to—

- Reinforce forward-deployed forces.
- Conduct peacekeeping operations.
- Operate in restrictive terrain, such as forests, jungles, mountains, and urban areas.

Because of their austere, organic mobility assets, light engineers have limited tactical mobility once they are deployed. To compensate for this, light engineers train to operate in a decentralized manner. Like their supported maneuver force, they operate best under conditions of limited visibility. Light engineers are—

- Expert in terrain use and camouflage.
- Skilled in countermobility.
- Quick in supporting the brigade to allow it to seize the advantage.

Light forces are offensively oriented units. The light engineer's focus is mobility. They are experts in supporting infiltrations, air assaults, parachute assaults, ambushes, and raids. In this role, the light engineer may conduct covert breaches, route reconnaissance, and obstacle reduction. They may also identify potential enemy counterattack routes to establish countermobility measures, such as scatterable mines (SCATMINEs), to protect the force. Light engineers train in infantry skills and are able to move undetected when close to the enemy. Light forces seize the initiative through the indirect approach, stealth, and surprise, attacking the enemy on its terrain. This offensive perspective carries through to defensive operations as well. In close terrain or built-up areas, light forces habitually ambush, attack, and counterattack.

COMBAT POWER

Light engineer forces are most effectively used by the commander who thoroughly understands how they affect the elements of combat power and the tactical imperatives for their employment.

Maneuver

Light engineers create maneuver opportunities by crossing natural obstacles and preparing landing zones (LZs), assault airfields, and Low Altitude Parachute Extraction System (LAPES) zones. They also conduct close combat operations for assault breaching and for the assault of fortified positions and ensure the light forces' freedom of maneuver.

Firepower

Light engineers assist in preparing direct- and indirect-fire weapons positions and fighting positions for other crew-served weapons. Their greatest contribution to effective firepower is the ability to analyze and alter terrain so as to place the enemy where the maneuver force can concentrate maximum firepower.

Protection

Light engineers are used as an economy-of-force measure to allow combat power to be concentrated at a decisive time and place. They lay mines and create flank obstacles to

protect the force. They also provide physical protection to the force by preparing fighting positions and protective positions for logistics.

LIGHT ENGINEER ORGANIZATION AND OPERATIONS

The light engineer organization is tailored to fight as part of the combined arms team in the light divisions. It focuses on mobility but also provides limited countermobility and survivability engineer support. The light engineer company can be task-organized with equipment augmentation from its own engineer battalion and/or the corps to provide the necessary engineer functions to fight the battle. The light brigade normally requires augmentation from EAD engineer units to sustain beyond 72 hours (mission, enemy, terrain, troops, and time available (METT-T) dependent). Depending on the level of intensity and the duration of the mission, the light brigade can require the equivalent of an engineer battalion to sustain its operations and enhance its capabilities. Engineer leaders who can accept known risks in pursuit of mission accomplishment in line with the higher commander's intent intensify these capabilities. (See *Table 1-1* for rules of thumb for engineer organization allocation.)

Brigade Engineer

The brigade engineer is an important member of the brigade battle staff. Unlike the heavy force structure where the brigade engineer is a lieutenant colonel, the light brigade engineer is a captain who works closely with the light engineer company commander to support the brigade. He—

- Provides the brigade commander with expertise in all aspects of engineer support, including the five engineer battlefield functions:
  - Mobility.
  - Countermobility.
  - Survivability.
  - General engineering.
  - Topographic engineering.
- Focuses his attention on the integration of engineer functions to support

Table 1-1. Rules of thumb for engineer organization allocation

Engineer Unit Type	Allocation
Battalion (light, airborne, air assault)	1/ light, airborne, air-assault division
Battalion, combat heavy	1/ light, airborne, air-assault division
Battalion, combat engineer wheeled	1.5/ light, airborne, air-assault division
Company (light, airborne, air assault)	1/ light, airborne, air-assault infantry brigade
Company, assault bridge	1.5/ light, airborne, air-assault division
Company, medium girder bridge	1/ division
Company, light equipment	1/ light, airborne, air-assault engineer battalion
Platoon (light, airborne, air assault)	1/ light, airborne, air-assault infantry battalion
Light airfield repair package (LARP)	1/ light engineer brigade (as required)
Equipment section, light division	1/ light engineer company

the maneuver brigade commander's intent and the synchronization of engineer mission support to the scheme of maneuver.

- Identifies the best use of engineer assets for the brigade commander and recommends the task organization of engineers that are allocated to the brigade and the missions they are to perform.
- Tracks the engineer effort throughout the brigade sector, keeping the brigade commander and staff advised of all engineer activity.

Engineer Company

The task-organized engineer company normally executes engineer missions that are identified by the brigade commander. While a habitual training and deployment relationship is established between a company and a light brigade, their ultimate employment depends on the division commander's analysis of METT-T. The light engineer company commander may receive augmentation from his own battalion or from corps units. He directs his unit in the execution of mission support to the brigade.

Engineer Soldiers

Light engineers must be proficient in marksmanship, demolitions, light infantry skills, and field-expedient engineering. Because of the austere conditions in which they operate, light engineers must have knowledge of all weapons in their unit, an intimate understanding of the weapons systems of the forces they support, and a working knowledge of the enemies' weapons. The close combat skills of light engineers must be unequaled. They must hold total confidence in their abilities to apply these skills and tools.

Engineer Operations

To integrate, synchronize, and execute the five engineer battlefield functions, it is important to understand the capabilities and limitations of light engineers. The need for external augmentation of engineers is readily apparent. Planners need to anticipate the requirement for more assets early in the deployment sequence. This includes a recommendation on the command and control (C2) relationship that best supports the maneuver commander without overburdening his support system.

Mobility. The primary focus for engineers in light divisions is mobility support to committed maneuver forces. Light forces bypass obstacles as a first option. When a bypass is not possible or tactically sound, light engineers support the lead maneuver elements to develop obstacle breaches. Bridging, while usually not critical for light forces in the close fight, can quickly become vital when conducting the close fight with light/armor operations. Route-clearance operations are also vital to light forces.

Extensive engineer reconnaissance is essential to light forces. It can be conducted with infantry scouts or any of the other reconnaissance elements of the brigade. Light engineers use their field expertise to identify enemy obstacles and any engineer resources required to bypass or breach through obstacles. They can also—

- Conduct covert obstacle breaching on infiltration lanes or breach protective obstacles to attain surprise.
- Assault breach through obstacles.
- Clear and construct helicopter pickup zones (PZs), LZs, and forward area rearm/refuel points (FARPs).
- Clear airfields of mines or equipment.

However, light engineers have limited capabilities to construct combat trails, quickly repair runways, clear routes, and move themselves around on the battlefield. Without heavy equipment augmentation, light engineers lack the ability to perform heavy engineer work.

Countermobility. Light brigades performing countermobility missions rely heavily on maneuver forces to assist in obstacle emplacement while engineers provide technical expertise. The brigade commander uses obstacle belts to focus the efforts of the brigade. Once established, these belts provide his subordinate commanders with the maximum flexibility to employ obstacles throughout the depth of their sector. Light engineers have the capability to—

- Create road craters and expedient obstacles.
- Destroy bridges.
- Emplace tactical obstacles, such as wire and minefield (conventional and scatterable).

Situational obstacles require detailed planning because of the flexibility they provide the maneuver commander. Vital to this process is the full range of logistics management. The brigade Supply Officer (US Army) (S4) must make thorough plans for the distribution of materials to the obstacle sites, when possible. The brigade uses helicopter airlift and container delivery system (CDS) bundles, if available. Limited organic haul capabilities frequently require light forces to deploy with palletized Class IV / Class V materials (mines and demolitions) in preconfigured unit loads for obstacles and minefield. This ensures the efficient and effective use of resources.

Survivability. Survivability in light brigades is critical because of the vulnerability of light forces to the effects of direct and indirect fires. When light forces stop, they must immediately dig in. In a stationary position, everything requires protection. Light engineers can provide limited support to maneuver forces in preparing survivability positions. The brigade requires augmentation from EAD engineers to prepare survivability positions and protect the force, especially during defensive operations. Engineers are experts at making maximum use of on-site materials. Maneuver forces routinely use standard platoon packages to rapidly construct survivability positions, with little engineer involvement. Engineers also prepare survivability positions for key assets, such as artillery, crew-served weapons, and C2 elements within the brigade support area.

General Engineering. Light brigades depend on corps engineers for general engineering support. General engineering is more important in an underdeveloped area where lines of communication (LOC) are not established or developed. Typical requirements for general engineering of light divisions include airfield maintenance, lodgment-support-facility construction, and main supply route (MSR) maintenance. DIVENs normally support maneuver forces in mobility, countermobility, and survivability missions in a close fight.

Topographic Engineering. Light brigades depend on the division terrain detachment for topographic products. The terrain detachment is collocated with the Assistant Chief of Staff, G2 (Intelligence) (G2) / Assistant Chief of Staff, G3 (Operations and Plans) (G3) planning and operations staff. The detachment provides each brigade with special or tailored topographic products. Examples are as follows:

- Area of operations (AO) analysis.
- Cover and concealment.
- LOC.

- Cross-country mobility (CCM).
- Combined obstacle overlays.
- Helicopter LZ/drop zone (DZ) analysis.
- Air-assault packets.
- Target folders.
- Infiltration routes to an objective.
- Possible weapons placements.
- River-crossing sites.

These products are produced with digital terrain elevation data (DTED). Direct coordination with the terrain detachment results in products tailored specifically to meet the users needs.

Engineer Support of the Combined Arms Team

Engineers supporting the light brigade must be integrated into all aspects of the battlefield framework. Most engineer missions concentrate on mobility and survivability (M/S) functions. However, engineers must have a fundamental understanding of their role in supporting all of the members of the combined arms team. More importantly, they must understand their impact on the rest of the maneuver team in terms of engineer planning, preparation, and execution. The relationship between the Battlefield Operating System (BOS) framework and engineer functions provides a unique tool to analyze the interaction of the engineer with the other members of the combined arms team.

Intelligence. The brigade intelligence and intelligence and electronic warfare units provide the capability to locate and attack the enemy in support of the brigade's current and future battles. The intelligence preparation of the battlefield (IPB) process provides the products that drive all aspects of planning and execution. The brigade engineer—

- Uses the engineer battlefield assessment (EBA) to provide input and enhance the brigade's overall IPB.
- Focuses on the terrain analysis and its impact on enemy and friendly operations.
- Analyzes threat and friendly mobility, countermobility, and survivability capabilities.
- Analyzes host-nation (HN) capabilities and limitations and other factors affecting the mission.
- Nominates named areas of interest (NAIs) and priority intelligence requirements (PIR) to the Intelligence Officer (US Army) (S2) to confirm or deny critical engineer characteristics of the terrain, enemy, and HN situation.

Engineer forces can act as intelligence-collection assets for technical and tactical reconnaissance. Technical reconnaissance focuses on collecting engineer information about a potential resource, target area, or route. For light forces, the most important target is the primary LOC into the AO whether it is a port facility, an improved airport, or an unimproved airstrip. Technical reconnaissance gathers engineer information about the target with minimal regard to the enemy. It is usually conducted under a low-level threat with outside security or in secure areas. Engineer forces should anticipate conducting technical reconnaissance at—

- Ports.
- River-crossing sites (unopposed).
- Bridges.
- Routes and roads.
- Airfields.
- Flight landing strips (FLSs).

- Tunnels.
- Fords and ferries.
- Bodies of water.

Tactical reconnaissance is conducted against targets in areas where enemy contact is likely or where information is needed to confirm the enemy situation template. Either engineers or nonengineer reconnaissance units can conduct tactical reconnaissance of targets with engineer significance. Brigade engineers can anticipate reconnaissance of—

- Enemy obstacles.
- Enemy engineer activities.
- Rivers.
- LZs/PZs.
- Situational obstacle locations.
- Reserve or directed obstacles (bridge demolitions and road craters).
- Buildings for military operations on urbanized terrain (MOUT).

For tactical reconnaissance, engineers normally augment maneuver or specific reconnaissance elements.

Maneuver. Maneuver at brigade level is the movement of battalions and companies, supported by fire, to achieve positional advantage from which to destroy or threaten destruction of the enemy. The relationship of engineer functions in support of maneuver differ significantly in deployment, offensive, and defensive operations.

During deployment, the brigade engineer focuses on establishing, defending, and sustaining the port, the airhead, or other facilities. The initial lodgment is critical as a link with the higher HQ. Once the higher HQ has established itself in theater, it generally relieves the brigade of this mission. Engineer requirements of the lodgment often include corps engineer assets to move with or immediately follow the deployment of the initial brigade. Another key consideration during this phase is the establishment of the commander's force-protection plan. The engineer planners provide critical input and also execute portions of the plan. Forward aviation combat engineering (FACE) is another important concern for aviation units in the unimproved environment in support of contingency operations.

In the offense, the brigade engineer focuses on mobility support requirements. The most common ones are—

- Route sweeps/clearance.
- Obstacle breaching.
- River crossing.

Mobility support enables the brigade to move freely, to concentrate combat power against a weakness, or to create a weakness. The engineer's planning and integration have an impact on the total scheme of maneuver. For example, the allocation of engineers for the breach force and the synchronization of the breaching fundamentals (suppress, obscure, secure, and reduce (SOSR)) have a direct impact on task organization. The brigade engineer also must plan for countermobility support to protect the flanks with situational obstacles and to assist with a possible hasty defense near the objective.

In the defense, the brigade engineer focuses on mobility, countermobility, and survivability operations (M/CM/S). This allows the brigade to fight from survivability positions against the enemy's fires and to use obstacles and terrain to turn, fix, disrupt, and block the enemy. The combination of the two allows the brigade to mass fires to complete the enemy destruction. The brigade engineer plans obstacle belts and groups that are tied directly to the brigade's maneuver scheme. The brigade commander's intent provides focus to the countermobility

effort. It also provides the necessary obstacle control for tactical repositioning.

Engineer forces breach obstacles (enemy and friendly), clear routes, construct tactical and protective obstacles, build fortifications, and construct vehicle fighting and protective positions. They also provide engineer expertise to brigade forces. All activities directly relate to and support the commitment of combat power.

Fire Support. Fire support integrates the full range of indirect-fire systems to support the brigade's scheme of maneuver and destroy the enemy. It includes US and allied air forces, army aviation, naval support, and artillery. The engineer's challenge is to provide timely and effective integration of the engineer battlefield functions to enhance their effectiveness.

In the offense, the brigade engineer cell, working with the fire-support coordinator (FSCOORD), focuses its fire-support-integration efforts on—

- Suppression.
- Neutralization.
- Destruction.

For breaching operations, all available fires focus on suppressing enemy personnel, weapons, and equipment to prevent effective fires on friendly forces. The brigade engineer coordinates with the brigade fire-support officer (FSO) for indirect fires to support the breaching force. The brigade commander ensures that the FSCOORD plans well-synchronized fire-control measures for timely massing, lifting, or shifting. Obscuration hampers the enemy's observation and target acquisition and conceals friendly activities and movement. The engineer cell coordinates with the fire-support cell for screening or deception smoke to protect the obstacle reduction effort and the passage of assault forces. Counterfires are crucial in protecting the force as it closes with the enemy and makes the initial penetration. The engineer cell coordinates with the fire-support cell for counterfires for breaching and river-crossing operations during critical periods of vulnerability.

In the defense, the engineer cell focuses integration efforts on the link between obstacle effects and indirect fires. Each obstacle effect requires specific integration techniques of indirect fires. For example, to achieve a disrupt obstacle effect, the engineer cell coordinates indirect fires to cover the obstacles while direct fires target the bypass. In contrast, to achieve a turn effect, mass indirect-fire groups at the beginning point of the turn and then throughout the rest of the obstacle. The brigade engineer and brigade FSO work together to ensure that the scheme of fires and obstacles are mutually supportive. The planning of indirect-fire assets to deliver SCATMINEs for a situational obstacle is another major countermobility integration concern for the brigade engineer and the FSCOORD.

Engineer forces assist fire-support assets in several ways. They provide mobility support for battery movement, and they construct battery and Q-36 radar survivability positions for protection against direct and indirect fires. The latter is a very high priority for light forces due to the lack of mobility for towed artillery forces.

Air Defense (AD). AD thwarts or reduces the effects of enemy air attacks on friendly units, supplies, and facilities. The brigade engineer focuses integration efforts in two distinct areas. He coordinates for AD protection—

- For critical engineer assets, such as Class IV and Class V supply points, engineer equipment, and bridging assets.

- For his forces, when they are working well forward.

Engineer forces construct fighting positions for forward AD assets to protect them from direct and indirect fires and to ensure that the enemy does not restrict our AD operations.

Combat Service Support (CSS). CSS sustains the fight. The brigade engineer and staff focus their integration efforts on three different areas of CSS operations. The first area is the sustainment of engineer battlefield functions. Logistics requirements must be anticipated based on the estimate process and then transported to the theater and pushed forward to the fight. The second area is the engineer mission support to the brigade's CSS operations. This may include the general engineering functions of MSR maintenance, the construction of route bypasses, and the clearance of routes. Finally, engineer unit sustainment must be integrated. In light infantry, airborne, and air-assault forces, early and accurate logistics planning is critical due to the shortage of haul assets. The brigade engineer must be thoroughly integrated into the S4's planning process. He must also be totally familiar with the different haul techniques appropriate for his unit, from strategic haul and corps throughput down to infantry task-force- (TF) level capabilities. *Chapter 6* further explains the CSS challenge.

Command and Control. C2 is the allocation, prioritization, and synchronization of assets to employ and sustain combat power. The brigade engineer must integrate C2 of all engineer battlefield functions into the C2 process for all operational support in the brigade AO. This integration must take place at every command post (CP) within the brigade to ensure a responsive, synergistic relationship between the engineers and the brigade units. It must use brigade and engineer company C2 channels to achieve responsive support and timely, accurate battle tracking. Because light operations are decentralized, the C2 system must be flexible enough to allow proper execution at the lowest level. Productive engineer task organizations, annexes, operation orders (OPORDs), and operational updates are all products of the effective integration of engineer missions and C2. The C2 assets must be prepared for and capable of incorporating external engineer support from the division, the corps, and allied nations. *Chapter* 2 further explains the C2 challenge.

LIGHT INFANTRY AND ENGINEER ORGANIZATIONS

DIVEN organizations are tailored to match each division's mission, capabilities, and employment.

Light Infantry Brigade

The light infantry brigade provides the flexibility to accomplish missions globally due to its ability to deploy. The brigade combat team frequently finds itself as one of the first units on the ground at the forefront of larger operations. It can operate in any terrain and against a variety of forces. The brigade conducts operations that exploit the advantages of restricted terrain and limited visibility. It uses its technological and organizational advantages to overcome the threat's deficiencies in these areas. Based on the factors of METT-T, a light infantry brigade with appropriate CS and CSS augmentation can be task-organized to an armored or mechanized infantry division or have these forces task-organized to them, The brigade is also designed to conduct autonomous operations for short periods of time without external support. The brigade typically deploys with three light infantry battalions, one forward support battalion (FSB), and other supporting units.

The light engineer company provides the base organization for engineer support to the light infantry brigade. It maintains a habitual training and deployment relationship with the brigade it supports. Normally, the company is augmented with equipment from the assault and obstacle (A&O) platoon of the engineer battalion HQ company. METT-T is the critical component driving engineer task organization. As an austere resource, light engineers are normally concentrated at the critical time and place under centralized control. For example, two or more companies could be massed to one maneuver brigade or one company could be massed to one infantry battalion if METT-T dictates this level of support. Light engineer companies require external engineer augmentation for extended operations.

Airborne Infantry Brigade

The airborne infantry brigade can rapidly deploy anywhere in the world. It conducts airborne assaults in the enemy's rear to secure terrain, interdict supply routes, or interdict withdrawal routes. It is ideally suited to seize, secure, and repair airfields and provide secure lodgment for follow-on forces. Normally, the airborne brigade is employed as the initial assault force for contingency operations, securing the lodgment for force buildup. It consists of three airborne infantry battalions and generally deploys with the full range of support units to include a task-organized FSB.

The airborne engineer company usually provides the base organization for engineer support to the airborne infantry brigade. While the company maintains a habitual training and deployment relationship with the brigade it supports, its employment and task organization in the AO is METT-T dependent. Normally, the company will be augmented with equipment from the A&O platoon of the engineer battalion HQ company. However, it could also be augmented with equipment from a light equipment company (LEC) (corps) (airborne). Based on the tactical situation, one platoon is normally enough to support an airborne infantry battalion. Although airborne engineer companies have more resources than light engineer companies, they must still be concentrated at the critical time and place under centralized control. For example, two or more airborne engineer companies could be massed to one maneuver brigade or one airborne engineer company could be massed to one infantry battalion if METT-T dictates this level of support. Airborne engineer companies are often augmented by light corps engineer assets for extended operations.

Air-Assault Infantry Brigade

The air-assault infantry brigade combines strategic mobility with extremely high tactical mobility within its AO. It can rapidly deploy anywhere in the world. The brigade conducts air assaults in the enemy's rear to secure terrain or interdict supply or withdrawal routes. Its air mobility permits rapid deployment and redeployment. The brigade is suited to seize or secure airfields and key facilities. It can also provide a forward operating base (FOB) for follow-on forces. Like the airborne infantry brigade, the air-assault infantry brigade can be employed as the initial assault force for contingency operations. It secures the necessary lodgment for force buildup. The air-assault infantry brigade consists of three air-assault infantry battalions and generally deploys with an aviation TF and the full range of support units, to include a FSB.

The air-assault engineer company provides the base organization for engineer support to the air-assault infantry brigade. It too

maintains a habitual training and deployment relationship with the brigade it supports. Normally, the company is augmented with equipment from the A&O platoon of the engineer battalion HQ company. However, it could also be augmented with equipment from a LEC (corps). METT-T drives engineer task organization. Although engineers have more resources than light units, they must still be concentrated at the critical time and place under centralized control.

External Engineer Support

External engineer augmentation is required for the brigade to accomplish its most fundamental engineer missions. This augmentation can be—

- Other DIVEN platoons and companies.
- Engineer equipment from the parent battalion A&O platoon.
- Corps engineer platoons or companies.
- Corps equipment, including specialized packages such as LARP or bridge companies.
- Armored engineers in support of an armored force working in the brigade area.

Other engineer assets working in the brigade AO may be provided by topographic, well drilling, or other specialized engineer teams. Furthermore, the brigade engineer may be the staff representative for nonengineer augmenting units, such as explosive ordnance disposal (EOD) teams. The brigade engineer must be fully familiar with the available assets and capable of integrating them into the brigade scheme.

CHAPTER 2

Command and Control

Modern warfare demands a responsive C2 system that protects the force, enforces discipline, establishes the warrior spirit, and motivates the soldier to fight. Its essence involves applying leadership; transmitting and receiving information; predicting battlefield events; and synchronizing combat, combat support (CS), and CSS assets. Leadership is one of the essential components of the C2 system. It provides purpose, direction, and motivation in combat. The leader must be a resourceful, tenacious, and decisive warrior. He must be innovative and flexible in the employment of his unit. He must also have the mental agility to quickly grasp the situation and the initiative to take independent action based on the higher commander's intent.

The engineer C2 system must work quickly. The cycle of receiving information, completing instructions, and setting actions in motion must be well organized and efficient. Engineers supporting the light infantry brigade must have a flexible, synchronized, and totally integrated C2 system that allows the military decision-making process to remain ahead of the enemy's actions.

The brigade engineer and the engineer company are the two primary components of engineer C2 in support of the brigade that are examined in this chapter. It also covers the brigade engineer's relationship with the brigade staff and the supporting light engineer company's internal C2 system and process and how the two synchronize their efforts in support of the brigade.

C2 SYSTEM

C2 is the balanced process of directing, coordinating between, and controlling units to accomplish the mission. The brigade commander executes missions through a C2 system consisting of three interrelated components:

- Organization.
- Process.
- Facilities.

The engineer C2 system in support of the brigade is composed of two distinct, yet mutually dependent, participants. They are the—

- Brigade engineer.
- Company commander(s) supporting the brigade.

A properly established and functioning engineer C2 system is a prerequisite to the integrating of other division and EAD engineers into the brigade.

Successful engineer support on the brigade battlefield requires a balanced combination of C2 by the brigade engineer and the company commander. The brigade commander relies on both his brigade engineer and the supporting

engineer unit commanders as the engineer functional-area planners and executors for all engineer-related missions in support of the brigade. The capabilities and flexibility of the engineer C2 system determine the role and effectiveness of supporting engineer units as combat multipliers. METT-T determines the best mix of engineer C2. However, an effective C2 balance that the brigade engineer and the company commander establish will foster subordinate engineer leader's initiative. This allows subordinate leaders the maximum flexibility to apply initiative on the brigade battlefield in support of the commanders' intent.

BRIGADE C2

The brigade C2 process is one of planning and preparing for and executing of the battle. The brigade commander ensures that his intent is clearly understood by his subordinate commanders throughout the C2 process. The principal component of the brigade C2 process is the military decision-making process.

MILITARY DECISION-MAKING PROCESS

This process begins and ends with the brigade commander and is as simple or as detailed as time permits. The brigade commander plays the central role in the process, with the staff providing advice and information related to its respective areas. The results of the process are preparing synchronized, detailed orders and, ultimately, executing the operation. *Figure 2-1* details the military decision-making process.

ENGINEER ESTIMATE

Engineer input into the brigade's military decision-making process is primarily through the use of the engineer estimate. *Figure 2-2, page 2-4,* shows the relationship between the military decision-making process and 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 from-the-bottom-up feedback. *Figure 2-3, pages 2-5 through 2-7,* shows key aspects of the engineer estimate as it relates to the military decision-making process at the maneuver brigade, the battalion TF, and the engineer company level. *Appendix A* describes the engineer estimate process.

FACILITIES AND FUNCTIONS

The light brigade is controlled by C2 organizations containing more than one echelon. Staff participation varies at each echelon. These organizations include a—

- Tactical CP.
- Main CP.
- Rear CP.
- Command group.

FM 7-30 provides details on the exact composition, function, and layout of the command group and each CP.

The key to establishing an effective engineer C2 organization is to complement the brigade's existing structure. The brigade engineer and the supporting company commander(s) 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. The brigade C2 organization and process and the

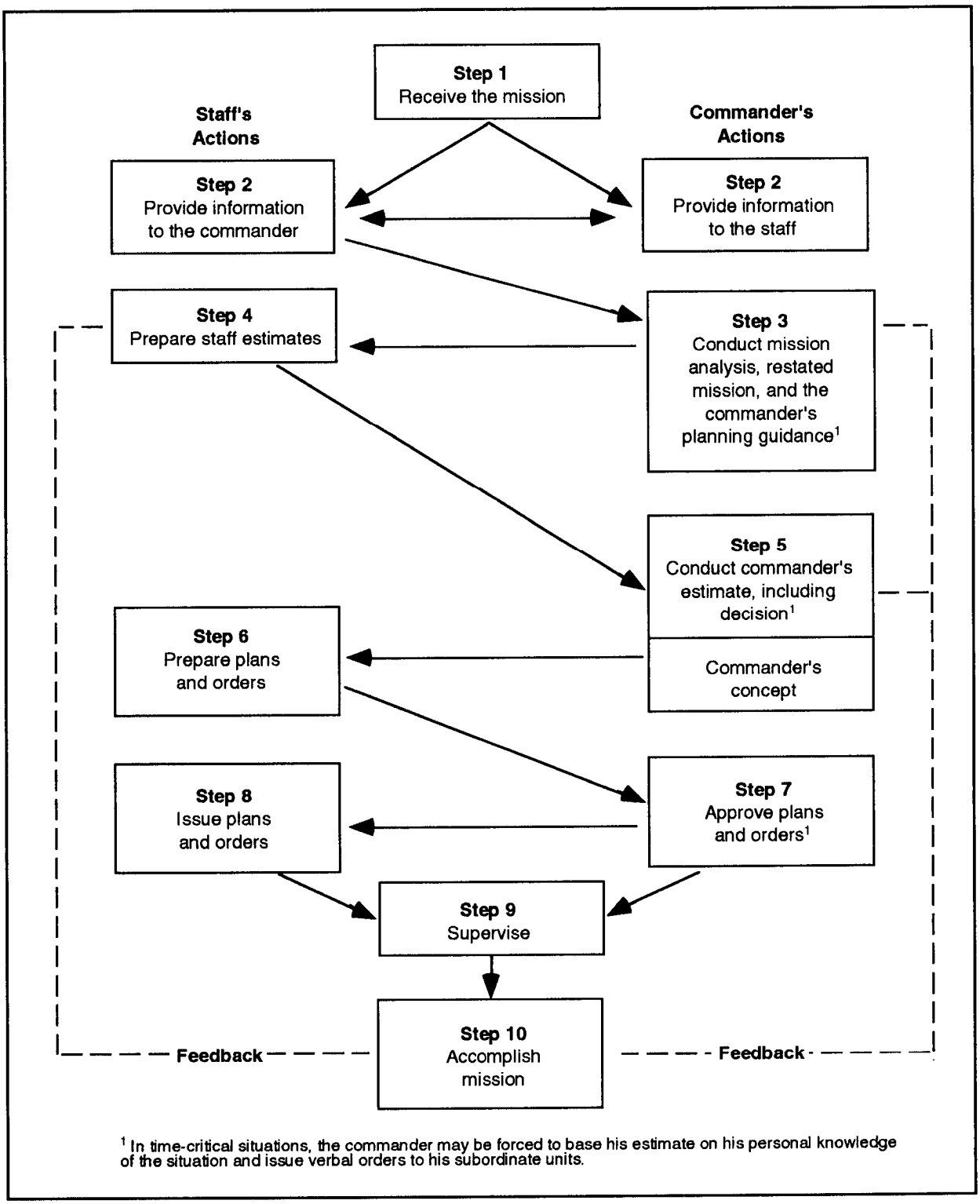


Figure 2-1. Military decision-making process

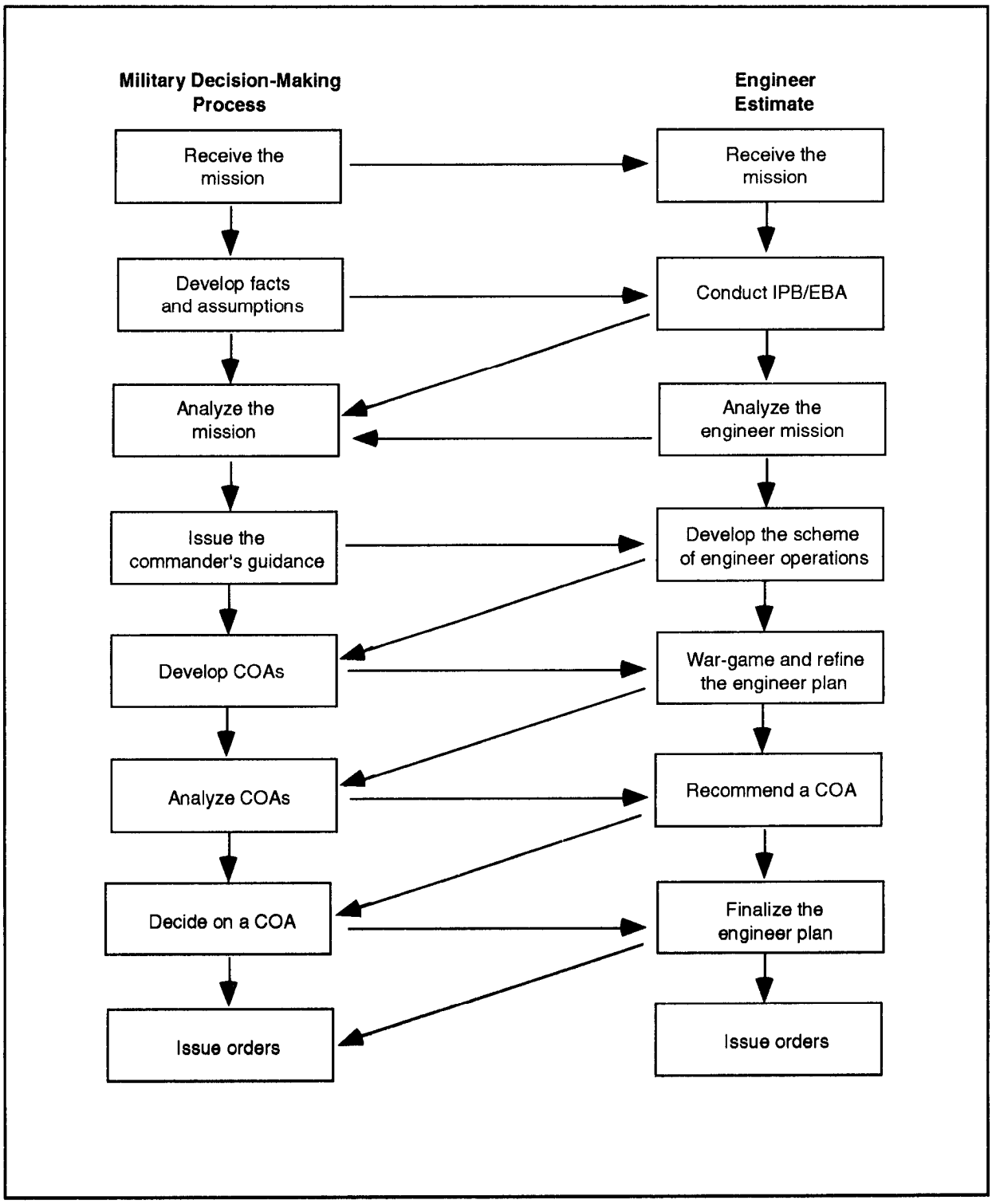


Figure 2-2. Relationship between the military decision-making process and the engineer estimate

Military Decision-Making Process	Engineer Estimate	Actions to Be Taken
Receive the mission	Receive the mission	Sources of Information: • Enemy situation, from the necessary situation paragraph and the intelligence annex • Mission paragraph • Brigade's task organization • Service and support paragraph and annex • Engineer annex Determines: • Types of operations (offense, defense, and entry) • Assets available • Current intelligence picture • Time available (initial estimate)
Develop facts and assumptions	Conduct IPB/EBA	IPB/EBA Process • Develops facts and assumptions on— – Enemy engineer weaknesses/vulnerability – Critical friendly engineer capabilities and requirements • Mutually supports the S2's IPB process (continually) • Breaks the IPB/EBA process into three components: – Terrain analysis – Enemy missions and M/S capabilities – Friendly M/S capabilities Terrain Analysis Sources of Information: • Brigade S2 through terrain-analysis products produced during the IPB • Modified combined obstacle overlay (MCOO) • Terrain analysis (with the S2) • Observation and fields of fire, cover and concealment, obstacles, key terrain, avenues of approach (OCOKA) • Ground reconnaissance Determines: • Terrain-enhancement requirements for the brigade • Effects of the terrain on friendly and enemy maneuver • Avenues of approach (AAs) • Critical LOCs Enemy Mission and M/S Capabilities Sources of Information: • S2's order of battle • Doctrine template of enemy engineer organizations • Enemy engineer personnel/equipment capabilities • Current activities (such as size, activity, location, unit, time, and equipment (SALUTE) reports) Determines: • Situation template of enemy engineer activity and location • Tentative employment of specific engineer equipment and capability critical to the mission (for example, SCATMINES and breaching assets)

Figure 2-3. Engineer estimate aspects relating to decision-making at the maneuver brigade, the battalion TF, and the engineer company level

Military Decision-Making Process	Engineer Estimate	Actions to Be Taken
Develop facts and assumptions (continued)	Conduct IPB/EBA (continued)	Friendly Mission and M/S Capabilities Sources of Information: • Engineers task-organized to the brigade • Refined time estimate (from step one in conjunction with the brigade Operations and Training Officer (US Army) (S3) • Known unit work rates • Availability of critical resources Determines: • Estimate of the total engineer capability for the mission • Impact of new information on the mission; this process is continuous. • Critical resource impacts on the mission
Analyze the mission	Analyze the engineer mission	Sources of Information: • Higher HQ mission • Commander's intent (analyze two levels up) • Scheme of maneuver (paragraph 3) • Scheme of engineer operations (paragraph 3) • Subunit instructions (paragraph 3) • Coordinating instructions (paragraph 3) • Service and support (paragraph 4) • Command and signal (paragraph 5) • Engineer annex Determines: • Specified M/S tasks • Implied tasks (analyze the mission with facts and assumptions) • Assets available (entire brigade TF) • Limitations (constraints and restrictions) • Risk as applied to an engineer capability • Time analysis (time line) • Essential tasks (specified and implied tasks that are critical to the mission) • Restated mission
Issue the commander's guidance	Develop the scheme of engineer operations	Sources of Information: • Brigade commander • Brigade S3/executive officer (XO) • Maneuver courses of action (COAs) • Relative combat-power analysis Determines: • Tailoring of scheme of engineer operations • Engineer priority of effort/support • Higher commander's intent for M/S operations within the brigade sector • Employment considerations of engineers; the brigade engineer assists in the staff's maneuver COA development. • Tailored engineer scheme of operations for each maneuver COA (Complete engineer plans for each COA are not developed; they are just concepts.) • Engineer missions and allocation of forces/assets. (Hasty assessment tools, such as belt planning, blade-hour estimates, or breach lane requirements, are used to quickly evaluate each COA to determine if adequate assets are available to support the plan.) • Integration of engineer scheme of operations into maneuver COA (continuous process during this step)

Figure 2-3. Engineer estimate aspects relating to decision-making at the maneuver brigade, the battalion TF, and the engineer company level (continued)

Military Decision-Making Process	Engineer Estimate	Actions to Be Taken
Develop COAs	War-game and refine the engineer plan	Sources of Information: • Staff analysis. (Identifies the best COA to recommend to the commander) • War-gaming techniques (outlined in *Student Text (ST) 100-9)* They are used to visualize the flow of the battle (each COA is independently war-gamed). • Advantages/disadvantages analysis of a given COA relative to another Determines: • Scheme of engineer operations that best supports the maneuver plan • Weaknesses in the engineer plan to make adjustments, such as— – Shifting assets to the main effort – Shifting engineer priorities – Recommending to the commander to accept risk at a specific time – Requesting additional engineer assets from higher headquarters • Integration of enemy engineer assets and actions as the S2 plays the enemy force • Engineer scheme of operations that best supports mission accomplishment
Analyze COAs	Recommend a COA	Sources of Information: • Combined staff analysis of the COAs during war gaming • Higher and adjacent engineer unit task organizations Determines: • Unified recommendation to the commander on which COA is best (engineer is prepared to inform the commander where risk must be accepted or what additional assets are needed to avoid risk). • Recommended COA for commander's decision Recommended COA for commander's guidance
Decide on a COA and issue orders	Finalize the engineer plan and issue orders	Sources of Information: • Commander's approved COA • Initial mission analysis (identify all specified/implied tasks) • Accepted engineer scheme of operations Determines: • Final engineer task organization • Final coordination with the staff on approved COA • Input to basic OPORD (scheme of engineer operations, subunit instructions, coordinating instructions, and engineer annex) • Engineer participation in the OPORD brief

Figure 2-3. Engineer estimate aspects relating to decision-making at the maneuver brigade, the battalion TF, and the engineer company level (continued)

corresponding engineer functions in support of the brigade are discussed in this chapter.

Tactical CP

When active, the tactical CP controls the close operation and is established in the main battle area (MBA) near the forward battalions. This allows the commander to be close to his subordinate commanders where he can directly influence operations. The tactical CP is structured to synchronize and coordinate—

- Maneuver.
- Fire support.
- Engineer operations in the brigade close battle.

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 the close operation. 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 its C2 responsibilities.

Main CP

The heart of the brigade C2 organization is the main CP. The main CP is designed to provide the brigade with the capability of "seeing 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.

The main CP sees the battle through reports from the tactical CP, rear CP, and subordinate units. When there is an active tactical CP, most information that arrives at the main CP is assumed to be historical and of insufficient amount to help make timely tactical maneuver decisions. Therefore, the role of the main CP in current 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. The main CP monitors the operations of higher and adjacent units and provides this information to the tactical and rear CPs. The main CP assumes C2 of close operations if the tactical CP is moving, destroyed, or inactive.

Rear CP

The rear CP focuses on the C2 of all units located within the brigade rear area. It synchronizes and sustains rear 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 rear operations. The rear CP is located in the brigade support area (BSA) and is manned by the brigade Adjutant (US Army) (S1) and S4 and the coordinating elements of the FSB.

The rear CP's primary C2 role is to ensure that rear operations are synchronized and integrated with close and deep 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 rear operations and units to the main CP.

The rear CP analyzes future brigade plans for their impact on current and future rear

operations. This allows the rear CP to ensure that the necessary sustainment support is available. The rear CP is also responsible for planning, coordinating, and synchronizing rear security. It assigns units to bases and base clusters and appoints commanders for each. The rear CP also develops and controls the total rear defensive plan. The rear CP monitors activities in the brigade's rear areas to prevent potential conflicts. Lastly, the rear CP may assume control of the current close fight, if augmented, when the main and tactical CPs can no longer function.

Command Group

The command group consists of the brigade commander and selected members of his staff. 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 his personal influence. He also anticipates the rapid decisions and orders that will be 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 staff 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 his command group.

ENGINEER C2 AT BRIGADE LEVEL

The essence of effective engineer C2 is the uninterrupted integration of engineer planning for and the functional control of engineer assets supporting the light brigade. The engineer staff presence at each of the brigade CPs serves two primary functions. They provide the—

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

Functionally, the maneuver brigade tactical, main, and rear CPs are the same in every light brigade. For each of the three brigade CPs the brigade commander establishes, corresponding engineer functional responsibilities exist, regardless of the tactical situation. These responsibilities are the same in each CP. 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 his available resources. Rarely will all of the responsibilities be addressed because of time and manpower constraints.

Engineer C2 within the brigade must be responsive to changes in engineer capabilities, limitations, 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. The functions and responsibilities of the engineer cells established to support the brigade C2 process are discussed in the following paragraphs.

ENGINEER CELLS

There are three engineer cells established to provide engineer support to the light infantry brigade C2 organization. They are the—

- Tactical engineer cell in the tactical CP.
- Brigade main engineer cell (BMEC) in the brigade main CP.
- Brigade rear engineer cell (BREC) in the BSA, which is linked to the brigade rear CP.

The actual size, composition, and organization of the engineer cells supporting each brigade CP depend on the brigade commander's needs, the current operational status of the brigade, and the level of engineer support needed by the brigade.

The BMEC and BREC are the two principal cells; however, as the situation requires, the tactical CP and the supporting tactical engineer cell are established. *Figure 2-4* shows a sample laydown of these engineer cells. It

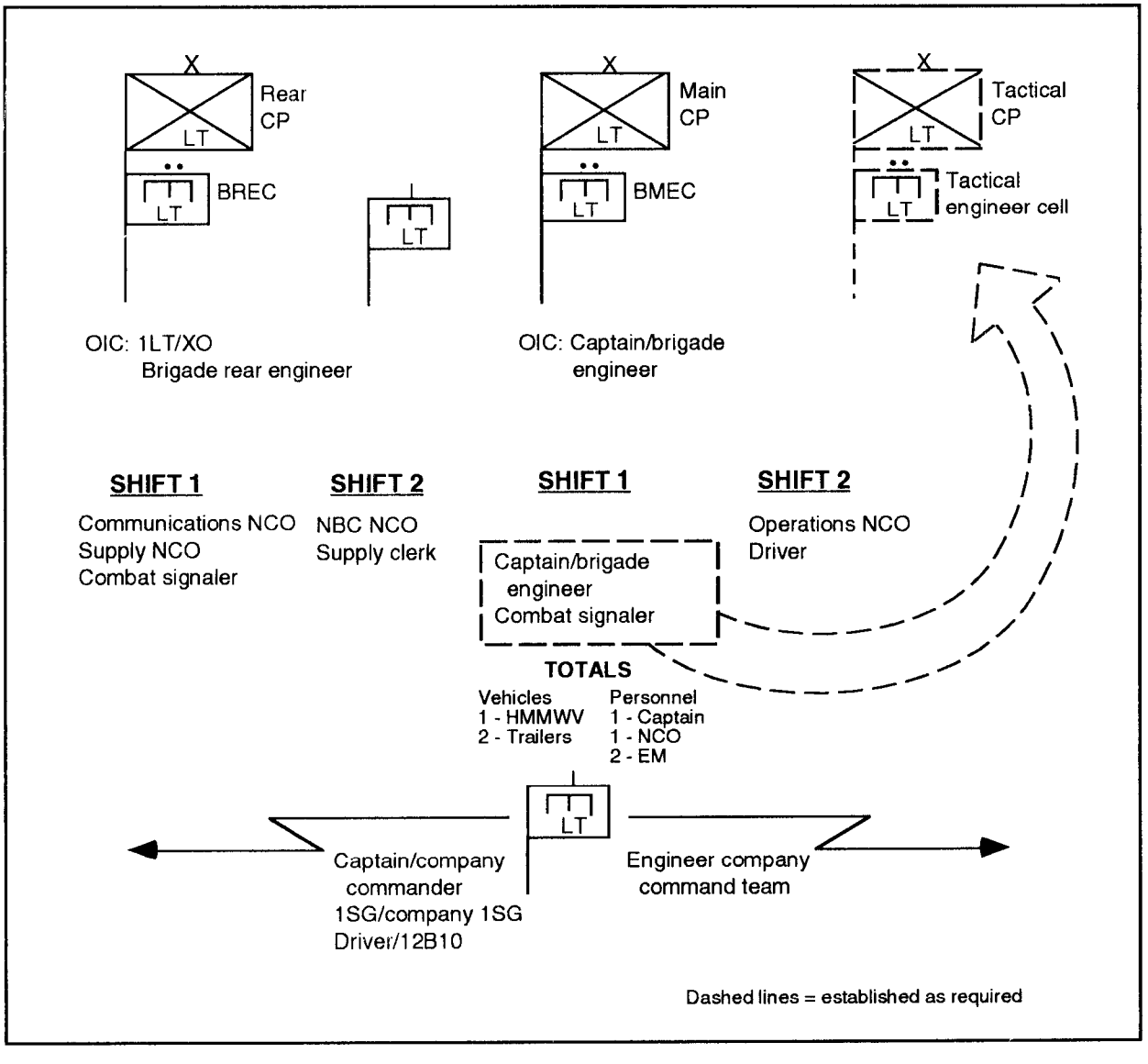


Figure 2-4. Sample laydown of the C2 CP and the supporting engineer cells

also shows the positioning of key leaders of a supporting light engineer company. Although the figure shows a division light engineer company, the engineer C2 organization is established so that it allows the use and integration of any engineer company providing support to the brigade for an extended period.

The BMEC and BREC each have an officer in charge (OIC). Both cells must have the capability to sustain 24-hour operations. The BMEC must also be capable of providing situational staff support to the brigade tactical CP without degrading mission performance at the brigade main or rear CPs.

The BMEC and BREC serve as the nucleus for all future and current engineer operations planning and execution within the brigade C2 organization. As more engineer units are task-organized to support the brigade, the brigade engineer's capability to track, monitor, plan, and control engineer activities must also expand. This ensures that the engineer C2 system remains proactive to the changing brigade battlefield. The ability of the BMEC and BREC to expand their C2 capabilities is derived from the assets and C2 capabilities of supporting engineer units. To establish and integrate engineer C2 with the existing brigade C2 organization requires an understanding of the brigade engineer's key C2 duties and responsibilities.

Tactical Engineer Cell

The tactical engineer cell assumes control of the current close engineer fight when the brigade tactical CP deploys. The tactical engineer provides information about the engineer current close operation to the brigade commander so he can make timely decisions. In this position, the tactical engineer must—

- Track the status of engineer missions and units in current close operations.
- Provide engineer expertise to the brigade commander.
- Pass critical engineer requirements that affect the current close fight to the brigade main CP, as necessary.

Depending on the commander's requirements, the tactical engineer cell will be derived from the BMEC or the supporting engineer company. Normally, the brigade engineer or the company commander executes the duties as the brigade tactical engineer.

Brigade Main Engineer Cell

The BMEC is the nucleus for all M/S planning and synchronization to support brigade operations. The division light engineer battalion detaches its brigade engineers to habitually associated brigades to—

- Provide engineer staff support to the infantry brigade's planning and execution process.
- Establish the BMEC and the base for engineer C2 for the brigade.
- Conduct uninterrupted 24-hour operations.

The primary missions of the BMEC are to—

- Integrate and synchronize engineer battlefield functions into future brigade plans.
- Track the current battle.
- Develop the necessary input to brigade orders, annexes and, as required, engineer unit orders.

Its major functions are to—

- Develop a scheme of engineer operations concurrently with the brigade maneuver COAs.

- Prioritize and recommend the allocation of engineer personnel, equipment, logistics, and units.
- Provide timely input to the brigade on requests from the TF engineers, recommending immediate tactical support.
- Issue timely instructions and orders to subordinate engineer units through the brigade base order to simplify subordinate planning, preparation, execution, and battlefield integration.
- Monitor the execution of engineer orders and instructions in the brigade sector.
- Track all M/CM/S and general engineering aspects of all current operations.
- Establish a direct link to task-organized TF engineers.
- Track current engineer operations according to brigade directives.
- Work closely and continually with the brigade S2 in the IPB.

Current Operations. The BMEC is responsible for providing the main CP with current engineer information that is needed to see the total battlefield. To accomplish this, the BMEC relies heavily on reports from supporting engineer companies, the tactical engineer, and the BREC. Because of this functional requirement, the BMEC is the central C2 node for all engineer reports. There are two basic categories of reports consolidated at the BMEC:

- Engineer-mission status reports.
- Engineer-unit combat-power reports.

The information that is gathered is normally historical; and the BMEC uses it to analyze the current scheme of engineer operations, anticipate conflicts, and form the basis for planning transitions to future operations. The BMEC maintains its own situation maps. It also ensures that mission-critical engineer information posted on maps within the brigade main CP is accurate, pertinent to current operations, and up to date.

As the current battle develops, the tactical CP receives requests for immediate support from the maneuver battalions. The brigade commander makes decisions in response to these requests and issues FRAGOs to the battalions. His decisions are then forwarded to the main CP for coordination. When the decisions involve engineer operations or engineer forces, the tactical engineer ensures that the BMEC receives them and any support requirements. The BMEC then works closely with the main CP to completely resource and synchronize the current operation.

Another source of requests for immediate tactical support is the brigade rear CP. It makes decisions for adjustments to the current rear operation. Likewise, when these requests involve adjustments to the scheme of engineer rear operations or engineer forces, the BREC forwards requirements to the BMEC for coordination and, as required, resourcing.

The BMEC must also track combat intelligence reports from the division and brigade tactical CPs and the rear CP. The tactical engineer and the BREC must anticipate intelligence information that impacts current and future close and rear operations. They also ensure that the information is passed directly to the BMEC. Similarly, the BMEC must aggressively track the intelligence reports received by the S2 cell in the main CP and forward information affecting the current operation to the tactical engineer and the BREC.

Finally, the BMEC is responsible for monitoring current engineer operations and coordinating with adjacent engineer units

and the parent engineer battalion HQ. The BMEC maintains the necessary data base for the transfer of critical engineer information to adjacent or relieving units, as required.

Future Operations. When the brigade receives a FRAGO, the brigade engineer assists the main CP in processing the order and gathering the information necessary for future planning (see *Figure 2-5).* It is vital that the brigade engineer also notify the supporting company commander, as soon as possible, to ensure his early involvement in the planning process. The BMEC receives—

- Critical information and engineer input on the current fight from the tactical engineer cell.
- Logistical considerations and engineer input on the current rear fight from the BREC.

The brigade engineer and the company commander develop the scheme of engineer operations for COAs produced by the main CP. In developing the scheme of engineer operations, the BMEC considers the engineer requirements to support the total future operations (deep, close, and rear).

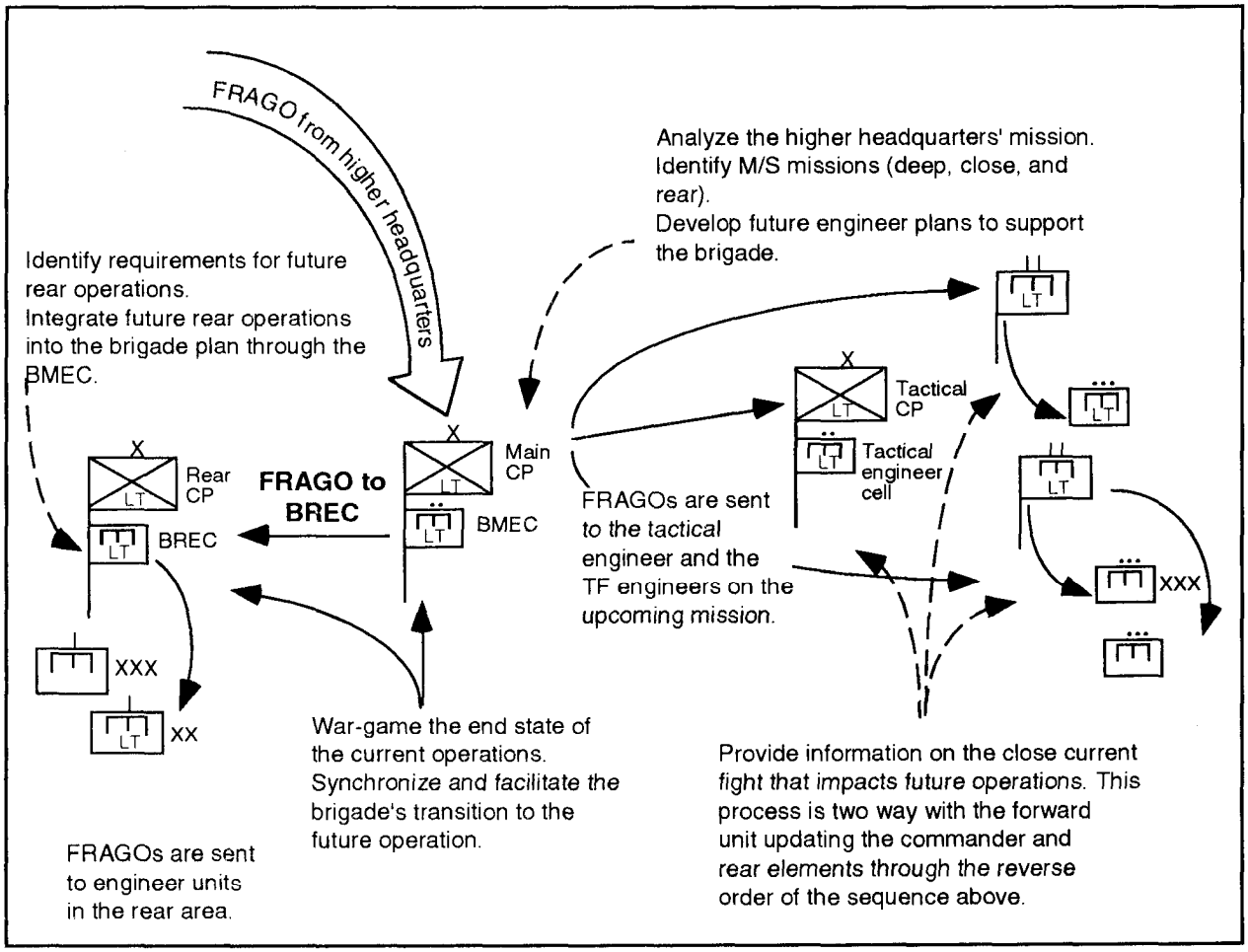


Figure 2-5. Processing the FRAGO

The BMEC works closely with the main CP in identifying critical engineer missions, allocating the necessary engineer forces, and recommending an engineer task organization. The brigade engineer prepares engineer input for the brigade base OPORD or FRAGO, as well as the engineer annex, when required. Once the brigade engineer develops the scheme of engineer operations, the company commander completes his unit planning. To simplify parallel planning, the brigade engineer issues warning orders (WARNORDS) and updates the tactical engineer, the BREC, and subordinate engineer units as the plan develops.

Under this C2 structure, the location, focus, and span of control of the company command team (commander and first sergeant (lSG)) remain flexible. The command team normally focuses on engineer control of the current operation to—

- Provide information to the brigade staff on future operations.
- Ensure engineer unit integration.
- Ensure that the brigade commander's intent is reflected in the engineer plan.

Brigade Rear Engineer Cell

The BREC is the nucleus for M/S planning and synchronization to support brigade rear operations. The task-organized engineer company (or larger unit) provides C2 augmentation support to engineer C2 at the brigade level by establishing the BREC. Depending on mission requirements, the supporting engineer unit can also provide support to the infantry battalions' TF engineers.

Frequently, the BREC operates out of the engineer unit CP that is located in the BSA, close to the brigade rear CP. As engineer units are task-organized to the brigade, the level of engineer battlefield functions increases. This requires either full-time engineer support or some level of engineer staff support to the brigade rear CP.

Current Operations. The primary mission of the BREC is twofold. It—

- Integrates and synchronizes M/S battlefield logistical requirements with the brigade rear CP.
- Provides required data to the BMEC for future brigade plans.

Its major functions are to—

- Monitor the current close battle (through mission and unit combat status reports of its subordinate platoons and the BMEC) and track the current rear battle.
- Develop the necessary input to brigade orders, annexes and, as required, engineer unit orders.
- Coordinate future engineer mission sustainment needs of the unit with the brigade rear CP and the FSB.
- Assist the BMEC in developing an engineer estimate of the work needed in the brigade rear area.
- Provide the brigade rear CP with the engineer information and expertise needed to make immediate tactical decisions on the current rear operation. When decisions involve engineer operations in the rear area, the BREC recommends the necessary adjustments in engineer support.
- Monitor, analyze, and troubleshoot current rear-area engineer operations and forward reports to the BMEC, as required. Engineer units working in the brigade rear report the status of engineer missions directly to the BREC.

Future Operations. The BREC is also responsible for assisting the rear CP in analyzing future plans to ensure that the necessary sustainment support is planned for future operations. Specifically, the BREC looks at the engineer missions required in the rear area to sustain the brigade. The BREC also provides the rear CP with countermobility, survivability, and force protection expertise in planning base and base-cluster defenses. It helps identify resource requirements for future general engineering, base-cluster defenses, and force protection, forwarding them to the BMEC. Furthermore, the BREC identifies engineer logistic issues for the brigade engineer, the brigade S4, and the FSB that affect the ability of engineer units to perform missions for future operations.

Finally, the BREC assists the brigade rear CP in tracking all engineer aspects of the current fight in the event that the brigade rear CP has to assume control of the battle. The BREC must maintain situation maps and track critical engineer information parallel with that of the BMEC. The BREC must be capable of assuming the duties of the BMEC, if required.

ENGINEER FUNCTIONS

The following paragraphs explain in detail the duties and responsibilities of each engineer staff element of the engineer cells.

Duties and Role of the Brigade Engineer

The brigade engineer is the primary engineer staff planner for the brigade commander. He is task-organized from the division light engineer battalion by the division engineer and is responsible to the brigade commander for—

- Providing organizational focus.
- Synchronizing cohesive engineer support for the entire brigade.

As a special staff officer, the brigade engineer is the principal engineer advisor to the brigade commander and the rest of his staff. The brigade engineer is responsible for integrating specified and implied engineer tasks into the brigade plan. He also ensures that supporting engineer units are completely integrated into the brigade's 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 commanders.

Staff Responsibilities. 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 engineer battlefield functions into future brigade plans and develop the necessary input to brigade orders, annexes and, as required, engineer unit orders.
- Make time-sensitive engineer decisions on requests received from the TF engineers for immediate tactical support.
- Train the brigade engineer cell located at the brigade main CP.
- Establish the BMEC and integrate the BREC into brigade C2 operations.
- Formulate ideas for engineer support to meet the brigade commander's intent.
- Visualize the future state of engineer operations in the brigade.
- Recommend to the brigade commander the engineer priorities of effort and support and the acceptable mission risks.
- Determine and evaluate critical aspects of the engineer situation.
- Decide what engineer missions must be accomplished to support the brigade's current and future fights.

- Prioritize and recommend the allocation of engineer personnel, equipment, logistics, and units.
- Develop a scheme of engineer operations concurrently 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 the maneuver battalions and engineer units, as required.
- Coordinate with the division engineer on the following:
  - DIVEN plans.
  - Status of brigade engineer missions.
  - Identification of any brigade requirements for division or EAD engineer assets to support the brigade.
- Make the brigade commander aware of the capabilities, limitations, and employment considerations of supporting engineers.

Functional Control Responsibilities. 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 (this is done by identifying the engineer missions that are necessary to support the brigade plan).
- Establishing and maintaining a continuous and open link between all engineer cells, TF engineers, and supporting engineer CPs.
- Using his mission analysis and continuous link with the supporting company commander(s) to compute resource and force requirements and to recommend engineer task organization.
- Developing specific engineer missions and conveying them to subordinates through the brigade order and 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.

Duties and Role of the Brigade Rear Engineer

The brigade rear engineer is normally the XO of the company habitually task-organized to the brigade. His primary functions are—

- Engineer staff representative to the brigade rear CP.
- Company XO (detailed later in this chapter).

The brigade rear engineer's principal focus is monitoring rear-area engineer operations; anticipating future engineer rear requirements; ensuring the execution of engineer mission sustainment; and coordinating engineer future mission logistic

requirements with the BMEC, the brigade rear CP, and the FSB. The brigade rear engineer is also responsible for—

- Providing engineer expertise in the brigade rear area and effecting direct coordination with all brigade rear-area CS and CSS elements.
- Establishing and running the BREC (normally the engineer company CP), which provides a 24-hour operational capability.
- Assisting the brigade engineer in developing an engineer estimate of the work needed in the brigade rear area by analyzing the division FRAGOs and preparing logistics estimates (these estimates define engineer requirements for rear operations to support future missions and unit logistics requirements based on the unit's current and projected CSS posture).
- Monitoring and providing the status of engineer missions done in the brigade rear to the BMEC.
- Providing functional control for engineer units committed to rear-area engineer missions by the brigade.
- Providing the rear CP with the information and expertise needed to make immediate tactical decisions on the current rear operation.

When decisions involve engineer operations in the rear area, the BREC recommends the necessary adjustments in engineer support. The BREC ensures that the decisions of the rear CP are forwarded to the BMEC for coordination and implementation. When the rear operation requires other engineer resources, the BREC estimates this requirement and forwards the request to the BMEC for action.

Engineer C2 Process

The engineer C2 process in support of the brigade is one of planning, directing, coordinating, and controlling the battle. It is initiated through the brigade commander's intent, concept of the operation, 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 which information is necessary for the brigade commander's decision making.

Two vital components of the brigade-level engineer C2 process are the—

- Brigade engineer.
- Company commander.

Together, they must establish a synchronized and continuous procedure of information management and exchange. They must also establish a proactive C2 process to effect C2 for engineer assets supporting the brigade. Engineer C2 cannot exist within the brigade without this joint effort employing all available assets to help the common C2 goal.

C2 Communications

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, with input from the company commanders. Functional control means that the brigade engineer plans, manages, directs, and tracks engineer activities and assets in the brigade area.

However, he does not execute command over these assets.

Communications and information management are key to the C2 process. The BMEC receives engineer mission and status reports directly from the TF engineers, the BREC, and the engineer commanders (see *Figure 2-6).* Additionally, it receives battlefield information from within the brigade main CP through spot reports. The BMEC 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

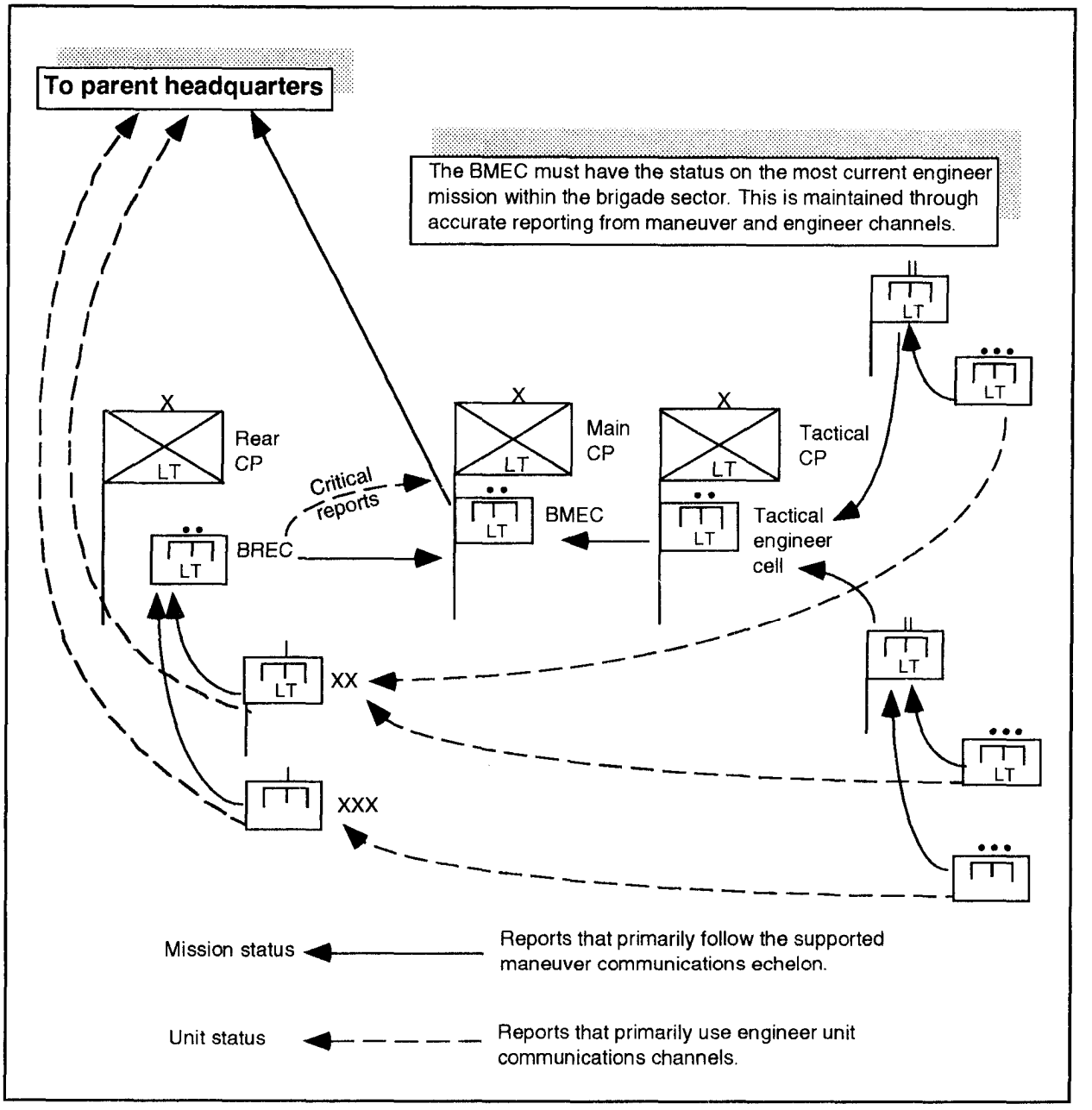


Figure 2-6. C2 communications

brigade sector. The brigade engineer is responsible for submitting all operational reports to the next higher engineer HQ. The company CP is responsible for submitting all noncritical administrative and logistics reports to the next higher engineer HQ.

Communications between all engineers enable 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 engineer mission and status reports, the engineer unit commander is able to make informed decisions that influence the battle.

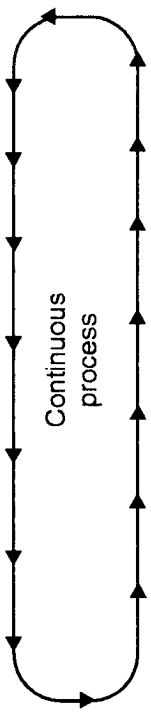
While the brigade engineer establishes the base for the engineer C2 process at the brigade, the company commander provides him with an assessment of the current fight. The brigade engineer's vision of the battlefield is limited to the accuracy and the frequency of situation reports coming to the brigade main CP. The company commander provides quality control to all planning figures that the brigade engineer has integrated into the brigade's plan. He also makes recommendations on the task organization and the employment of corps engineers in the brigade sector. The corps engineer units must provide an engineer liaison officer (LO) to the BMEC if they are operating in a direct support (DS) or general support (GS) role within the brigade sector. However, if they are under operational control (OPCON) or attached, the established DIVEN chain of C2 should be sustained. The DIVEN commander may establish a situational C2 organization when there are more than two engineer companies task-organized to the brigade.

Engineer Input to the Brigade OPORD

A critical by-product of the brigade engineer's and the company commander's coordination and synchronization during the brigade's military decision-making process is integrating engineer missions and instructions into the brigade OPORD and the engineer annex. Engineer information and instructions are not just consolidated in the engineer annex. The brigade engineer must ensure that the necessary M/S missions and instructions are included in the appropriate areas throughout the brigade OPORD. This ensures that critical M/S information and instructions are not hidden from subordinate commanders. For example, if it is critical to the brigade plan to identify and mark two lanes to enable a covering force to pass through the brigade sector, then it may appear as a specified task to the battalion(s) that the lanes pass through. Likewise, the enemy's recent integration of SCATMINEs into its preattack fires may indicate its intentions. This should be included in the enemy situation paragraph of the FRAGO.

The scheme of engineer operations is another example of engineer information contained in the brigade OPORD. It describes the general concept for engineer support to the brigade operation, usually concentrating on the close battle. The engineer estimate identifies critical M/S information and mission-essential tasks for inclusion in the base order. *Figure 2-7, page 2-20*, illustrates how key components of the engineer estimate process drive engineer input into the brigade OPORD.

At the brigade level, most OPORDs and detailed FRAGOs have an engineer annex attached. The annex conveys critical engineer information and engineer-specific instructions that are either too large or not appropriate for inclusion in the base order. The annex may take the form of written instructions, matrices, overlays, or a combination of these. *Appendix B* covers the format and content of the annex in more detail and provides some sample matrices and



Engineer Estimate	Input	OPORD Paragraph
Conduct IPB/EBA	Critical aspects of the terrain and enemy engineer activity that impact the maneuver plan	1. Situation a. Enemy Intelligence annex
Analyze the engineer mission	Mission-essential M/S tasks assigned to maneuver units or separate engineers	3. Execution e. Subunit missions • Maneuver • Engineer
Develop the scheme of engineer operations	Concept of engineer operations to support the brigade plan Task organization of engineer forces and command/support relationships Allocation of M/S mission resources to maneuver units Graphic-control measures needed for obstacle-control, river-crossing, and large-scale breaching operations	3. Execution e. Subunit missions • Maneuver • Engineer Task organization 4. Service support Overlays: Operations Engineer CSS
War-game and refine the engineer plan	Additional coordinating instructions to maneuver units that are needed to synchronize engineer effort	3. Execution f. Coordinating instructions
Recommend a COA	None	None
Finalize the engineer plan		

Figure 2-7. Relationship of the engineer estimate to the brigade OPORD

overlays. *Figure 2-8* illustrates how the content of the annex is derived from the engineer estimate process.

Staff Surge

Massing or surging the brigade staff is only a temporary technique used to quickly facilitate deliberate planning. It provides the brigade commander with a robust and complete staff. In short, it temporarily places the nucleus for current and future operations at the brigade main CP. The brigade S1 and S4 and key members of the FSB usually relocate to the main CP during critical planning times. There are cases

Engineer Estimate	Content	Engineer Annex Format
Develop the scheme of engineer operations for— • Force allocation • Task organization	Task organization of engineer units (includes who they support and in what command/support relationship)	Task organization
Conduct IPB	Aspects of the weather, terrain, and enemy M/S activities that significantly impact engineer missions	1. Situation a. Enemy
Conduct EBA of the— • Terrain • Enemy M/S capability	Missions and plans of higher and adjacent engineers that impact on the current planning should be identified	b. Friendly
Develop higher HQ OPORD and engineer annex	Changes in task organization which occur during the execution that need to be clarified	c. Attach/detach
Receive restated mission from the supported unit	Mission statement of the supported unit	2. Mission
Develop the scheme of engineer operations	Concept of the engineer operations to support the maneuver	3. Execution a. Scheme of engineer operations
	Details on the use of obstacles and SCATMINES	b. Obstacles c. SCATMINES
Analyze mission	Missions to engineer units: • Task-organized to brigades • Under brigade troops	d. Subunit missions
War-game and refine the engineer plan	Instructions common to two or more engineer units	e. Coordinating instructions
Develop the scheme of engineer operations	Allocation of M/S mission resources that should be identified	4. Service support a. Command-regulated supplies
Allocate resources	Method of mission sustainment	b. Forward supply point (FSP) locations c. Transportation d. Medical
Finalize the engineer plan	Method of unit sustainment	e. HN assistance
Finalize the engineer plan	Location of engineer CPs Special C2 arrangements required reports	5. Command and signal

Figure 2-8. Relationship of the engineer estimate to the engineer annex

when the staff will mass at the brigade main to facilitate a more deliberate planning process. For example, the brigade staff may consolidate at the brigade main during the initial development of the brigade OPORD.

During a staff surge, the brigade engineer and the company commander(s) must be present at the planning session. The company commander may opt to have his XO and/or lSG present to speed up company planning. Otherwise, the commander may opt to communicate with his XO and/or lSG by wire, radio, or other means at the company CP.

Command and Support Relationships

Engineer units are normally task-organized to the brigade in either a command or support relationship. Command relationships prescribe the supporting engineer unit's chain of command and the degree of authority that a commander exercises over it. Support relationships show the manner of support that the supporting engineer commander receives.

Command Relationship. Command authority over engineer units is given to the maneuver commander when he requires responsive engineer forces. Command relationships can be attached or OPCON.

An attachment is appropriate when a subordinate maneuver commander needs task organization or direct-command authority over engineer units and when time, distance, or communications prevent the parent engineer HQ from providing adequate logistical support. Contingency operations are an example of when the light engineer company is attached to the maneuver brigade. Time, distance, and communications all play a part in this decision. A key factor to attachments is ensuring that they are accomplished as early as possible to ensure full integration into the maneuver force.

OPCON is appropriate when a subordinate maneuver unit needs task organization or direct-command authority over engineer units; however, the parent engineer HQ can still provide logistical support. This is also a method of giving the maneuver commander authority over a unit when the duration of the operation is short and it can be supported without impacting the established logistics infrastructure. It is the parent engineer unit's responsibility to coordinate CS and CSS for subordinate units. An example of OPCON within the light brigade is multiple corps engineer units being used to support the brigade during a search-and-attack operation. The brigade commander requires task-organization authority over the corps units when he cannot sustain its logistical requirements and search-and-attack operations are not going to be over an extended period of time.

Support Relationship. Command, administrative, and logistical responsibilities remain with the parent engineer unit in a support relationship. The engineer unit commander organizes the unit and suballocates tasks in a manner that most effectively meets the needs of the maneuver commander. Support relationships can be DS or GS.

ADS relationship is appropriate when the subordinate maneuver commander needs a high degree of responsiveness from engineers but does not need task-organization authority. A higher HQ often uses this relationship when it anticipates a change to the engineer task organization that requires the shifting of engineer units to other locations.

A GS relationship is appropriate when the higher HQ requires central control and flexibility in employing limited engineer forces. Engineers in the rear areas are usually employed in GS.

ENGINEER COMPANY C2

The engineer company's 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's C2 system is the most complex system in the company. However, its output must be clear and concise instructions that focus the entire unit toward the goals and objectives of the company and the brigade commander.

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 subordinate's freedom of action.

COMMAND

Command is the process that instills the commander's will among his subordinates. It provides focus and direction to the company. The commander's leadership is an integral part of command.

CONTROL

Control, as the counterpart of command, follows up a decision and minimizes deviation from the commander's concept. It also provides supervision to the operations while synchronizing all systems and activities.

SYNCHRONIZATION

The commander must avoid depending on close control of his platoons to achieve synchronization. This slows execution and limits his subordinates' initiative. Synchronization initiated at the brigade is maintained during execution by the proper decision of subordinates. A clear understanding of the commander's intent and a simple effective concept are the keys to maintaining engineer-company synchronization on the brigade battlefield.

C2 PRINCIPLES

To achieve his C2 goal, the commander continually applies the following principles during operations:

- Expect uncertainty.
- Minimize leader intervention.
- Maximize subordinate planning time.
- Give subordinates maximum freedom of action.
- Command/lead well forward.

Expect Uncertainty

The commander must understand the environment of the battlefield. Force-projection operations are inherently dynamic, decentralized, and nonlinear. The battlefield environment frequently degrades the commander's ability to communicate with his subordinates. This fact, combined with the violence and nature of war, often prevents the commander from knowing what is transpiring beyond his immediate span of control. The tactical situation used as a basis for planning always changes before execution; therefore, flexibility is essential.

Minimize Leader Intervention

The decentralized nature of the light brigade battlefield requires the absolute minimum of leader intervention during execution. Not only is this important to mission accomplishment, but common decentralized engineer task organizations necessitates nonintervention of leaders

during an operation. When the company's subordinate leaders expect the commander to make a decision or initiate an action on the battlefield, they are reluctant to take action. In those instances where precise control is required (for example, an on-order mission), the commander's goal is to provide the subordinate with the criteria and the information necessary to make the decision and execute.

Maximize Subordinate Planning Time

This is one of the biggest challenges to the company commander. While most planning takes place at the engineer company and the brigade, the squads and platoons also require time to conduct troop-leading procedures (TLP) (for example, precombat inspections (PCIs) and rehearsals). This is especially critical when a subordinate unit is task-organized away from the company. SOPs and WARNORDs are essential tactical time-management tools.

Give Subordinates Maximum Freedom of Action

Given the expected battlefield conditions, leaders at every level avoid unnecessary limits on their soldier's freedom of action. The leader at the point of decision must have the knowledge, the training, and the freedom to make a decision that best supports the commander's intent.

Command/Lead Well Forward

The company commander must position himself where he can best direct the fight of his company. The commander's leadership is most effective face-to-face, in other words, when he can see the tactical situation and his soldiers can see him. Since he cannot be everywhere on the brigade battlefield, the commander focuses his attention on the decisive actions of his unit. During the execution, this may be with the main effort or possibly with the brigade commander in the tactical CP. During the initial stages of a new brigade plan, the commander's place is usually at the brigade main CP, working with the brigade engineer. This serves to ensure that the—

- Plan is executable.
- Commander's company is briefed early on the future operation.
- Engineer plan is adapted to the conditions that truly exist on the battlefield.

COMMANDER'S INTENT

The commander's intent describes the desired end state of the mission. It is a clear and concise expression of the purpose of the operation. The ultimate purpose of an intent is to help subordinates pursue the mission's desired end state without further orders, even when the operation does not unfold as planned. Knowing the commander's intent enables subordinates to use their initiative during the execution of an operation. It must be clearly and completely understood by the entire company through the following means of communication:

- Written.
- Face-to-face.
- Radio.
- Any other communications technology available to the unit.

The company commander begins to form his intent as he analyzes the mission assigned to him by the brigade. The company commander's intent is the focus for the entire engineer planning process. His intent is refined as the planning process evolves and as information is gained and evaluated.

KEY PERSONNEL DUTIES AND RESPONSIBILITIES

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. The duties and responsibilities of the company commander, the XO, and the 1SG are covered in the following paragraphs. The remainder of the company HQ is covered in *Appendix C*.

Company Commander

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 his company. The company commander must fully understand the capabilities of his soldiers and know the best method of employing them. He must also completely understand the capabilities of the light brigade and battalions and how they fight.

Company Responsibilities. The company commander is the engineer executor on the brigade battlefield. He has unit control and command responsibility over his unit. One of his greatest challenges is maintaining an execution focus for the brigade commander while sustaining his staff-level input to the brigade engineer. The company commander is ultimately responsible for—

- Writing the company OPORD that supports the brigade commander's intent and concept of the operation and the brigade's engineer annex.
- Providing mission-oriented C2 to his engineer company.
- Supervising the execution of his units' engineer support within the brigade area.
- Achieving integration with the supported brigade through his link with the brigade engineer and the brigade commander's C2 organization. (C2 assets from the company are key in facilitating this process.)
- Dividing duties among the key leaders of his company. Each subordinate must know his job and how the company functions while executing its missions. The decentralized nature of light brigade 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 HQ. Although every situation is different, the company SOP standardizes the way tasks are accomplished and simplifies the execution of decentralized operations.
- Remaining focused on engineer missions rather than the method of his subordinates' execution. The company commander must not give his subordinates missions and guidance that conflict with those of the maneuver brigade and the supported battalion commanders.
- Assuming the duties of the brigade engineer, as required. He is also an advisor on his unit's 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's focus is more on brigade planning and less on unit command.
- Providing mission and status reports to the brigade commander and the brigade engineer (and his immediate engineer commander). These report should be current and accurate so the brigade commander and the brigade engineer

can make decisions that could influence the battle.

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. The company commander supporting the brigade is the primary executor of engineer missions that the brigade develops. The brigade engineer, with the brigade staff's assistance, ultimately develops the engineer missions. The company commander plays a vital role in mission identification and development and in establishing engineer mission priorities. He accomplishes this by integrating with the brigade engineer during the military decision-making process concurrently with his TLP. This ensures that fundamental considerations about mission execution are synchronized with the brigade plan and the supporting engineer annex. This early and continuous involvement also serves to ensure that the company commander and his subordinates remain proactive during mission planning, preparation, and execution. *Figure 2-9* shows an example of the company commander's integration into the brigade staff's planning process.

This parallel work and the synchronization of the company commander and the brigade engineer serve to accomplish two primary functions. They provide—

- An executor-level input that enhances the brigade engineer's input into the brigade's military decision-making process and his engineer estimate.
- The company commander with detailed insight into future operations, decisions, scheme of maneuver, and ultimately, the engineer plan to support these operations.

The company commander and the brigade engineer must weigh the mission requirements with the supporting engineer unit's capabilities and design a COA to accomplish the brigade mission. If the requirements exceed the engineer unit's current capabilities, the brigade engineer sets priorities and requests additional support from the DIVEN battalion or supporting corps engineer units.

When the tactical situation allows the company commander to conduct his TLP parallel to the military decision-making process, it helps synchronize key activities providing mission support to the brigade as a whole. When the brigade order is issued, the engineer company and its platoon already know the task organization of engineers. The platoon leaders can then initiate their TLP and still be present with their supported battalion to receive the brigade's OPORD. This places the three key echelons of engineer C2 together at one time (brigade engineer, company commander, and platoon leaders), which facilitates coordination and clears up any discrepancies or changes to the brigade plan.

Figure 2-9 depicts the mutually supporting efforts of the brigade engineer and the company commander. The company commander's level of involvement in the planning process is situation-dependent. It is vital, however, that he is involved from the beginning and as much as possible during the planning process.

The company commander returns to the company CP after receiving the brigade commander's decision on the mission. He finalizes his plan and issues the company OPORD. The platoons can then finalize and refine their TLP based on this OPORD and

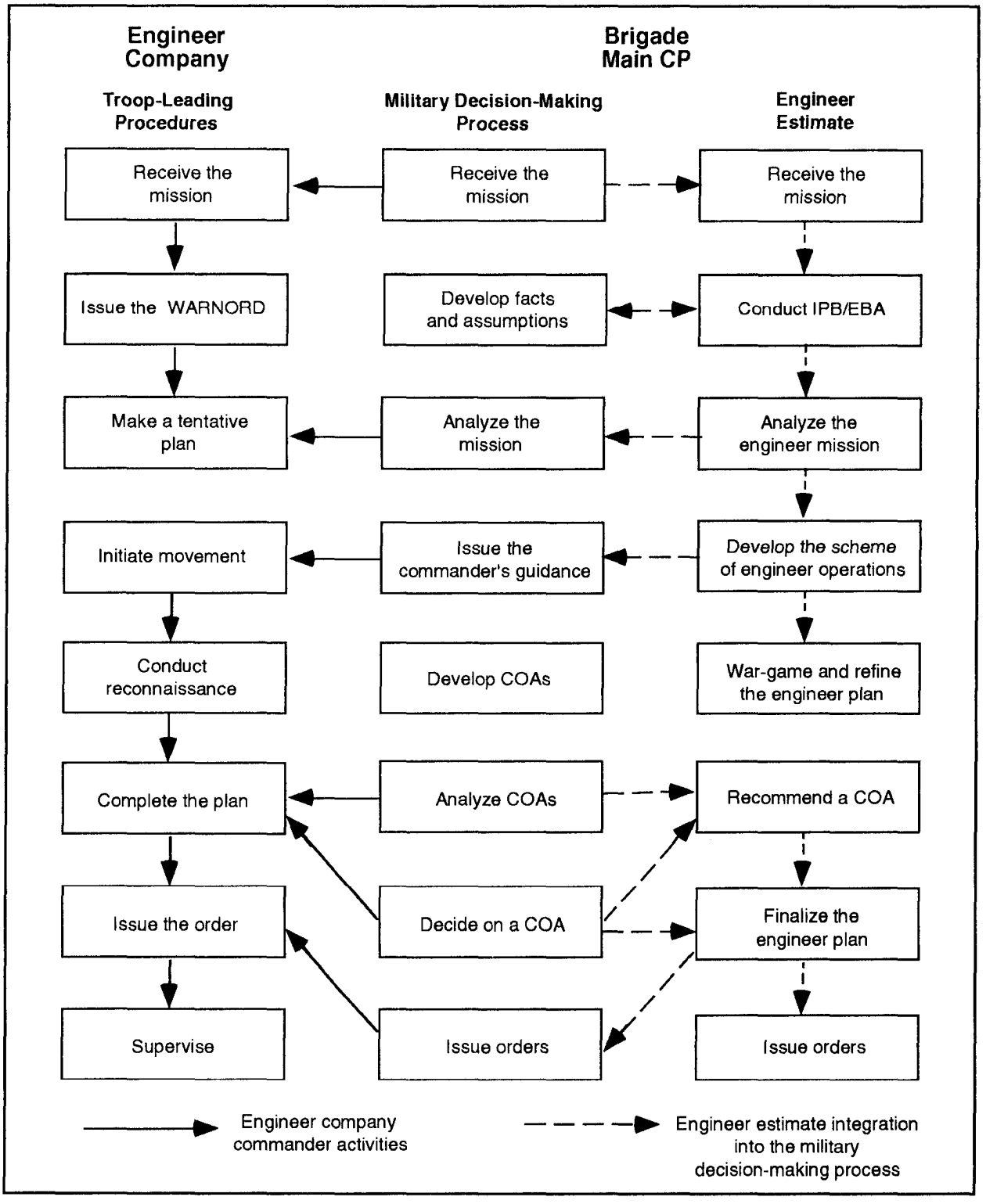


Figure 2-9. Engineer company commander integration into the brigade staff's planning process

their pending task organization to the maneuver battalions. The company commander and the platoon leaders displace to the brigade main CP to receive the brigade OPORD. Platoon leaders link up with their supported battalion and then subsequently move to the battalion CP to integrate with the battalion's military decision-making process. In the platoon leader's absence, the platoon sergeant continues the platoon's TLP, awaiting any further guidance from the platoon leader (such as mission-essential rehearsals, displacement of the platoon, or PCI). Once the battalion plan is finalized, the platoon OPORD can be finalized and issued to the platoon.

The platoon sergeant's role during the battalion's planning process is vital. The platoon leader is totally consumed with providing staff input to the battalion's planning process. To provide the platoon with insight into the upcoming mission, the platoon sergeant conducts the actions required to ensure mission readiness, to include involvement in the battalion's planning process. (The platoon's TLP can begin with issuing the company commander's WARNORD early in the battalion's planning process. However, this is usually not possible because of on-going mission support to the brigade.)

Executive Officer

The XO is second in command. His primary role is to help the company commander direct the fight of the company and ensure its seamless integration into the brigade combat, CS, and CSS structure. His responsibilities include—

- Receiving and consolidating unit and mission reports from the platoons and submitting them to the BMEC, the brigade rear CP, and the parent engineer battalion commander, as required.
- Assuming command of the company, as required.
- Establishing and operating the company CP. This CP has two primary tasks:
  - Facilitate the C2 process of the company.
  - Augment and synchronize the engineer C2 organization in support of the brigade.
- Planning and supervising the engineer company CSS.
- Ensuring that PCIs are complete throughout the company.
- Planning and coordinating all logistical support with the FSB, the parent engineer battalion, and other agencies outside the company.
- Preparing or assisting in the preparation of the company OPORD, specifically focusing on paragraph 4.
- Coordinating with higher, adjacent, and supporting units. This function is vital when the company receives support from other units of the parent battalion (equipment, maintenance, or medical assets) or corps engineers.

The XO has a secondary role as the brigade rear engineer. In this role, he accomplishes those tasks required to integrate and synchronize engineer support for rear 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 the FSB.

- 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.

First Sergeant

The lSG is the senior NCO and 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. He operates where the commander directs or where his duties require him. His responsibilities include—

- Being involved early in the planning process to provide quality control in the execution of engineer missions and logistics operations.
- Checking on the welfare of the soldier, as a second set of eyes for the commander. He may be located with the company commander.
- Enforcing the tactical SOP.
- Planning and coordinating training.
- Coordinating and reporting personnel and administrative actions.
- Supervising supply, maintenance, communications, field hygiene, and medical evacuation (MEDEVAC) operations.
- Ensuring that CSS priorities are requisitioned and replenished.
- Monitoring logistics status and submitting reports to the company XO and the brigade rear CP, as required.
- Supervising, inspecting, and observing matters the commander designates. He may observe and report on the status of obstacles and survivability within the brigade.
- Assisting and coordinating with the XO. He should also be prepared to assume the XO's duties, as required.

Succession of Command

The engineer company's chain of command exercises the succession of command if leaders become casualties. The normal succession of command is commander, XO, platoon leaders (by seniority), 1SG, and then NCOs (by seniority).

To reestablish the chain of command, the new commander immediately establishes communications with the supported brigade commander, the parent engineer battalion, and subordinate units of the company. Information that is passed focuses on the—

- Current unit situation (mission and unit).
- Receipt and passing of status reports and any changes to the mission.
- Issuing any FRAGOs, as required.

Once the information is passed, the unit continues operations. Company tactical SOPs cover reestablishing the chain-of-command requirements, addressing items such as communications requirements and critical actions key leaders take.

COMPANY CP

The engineer company CP has two primary missions. It—

- Commands and controls the company and any other task-organized elements.
- Establishes, or functions as, the BREC.

The company CP's primary purpose, in addition to those outlined under the BREC, is to—

- Provide communications with higher, lower, supporting, and adjacent units.
- Support the commander in planning, coordinating, and issuing the company OPORDs.
- Support continuous company operations.

The company CP does not have a set organization. It is normally configured with the XO, 1SG, and other personnel and equipment required to support the C2 process and the mission. When supporting the light brigade, the company CP is normally located in the BSA and is physically linked to the brigade rear CP. This facilitates its C2 and sustainment missions and its role as the BREC. C2 requirements for the company CP are explained in *Mission Training Plan (MTP) 5-025-31.*

The company CP—

- Provides the engineer unit with C2 of its organic engineer assets in the brigade sector.
- Manages and maintains equipment assets task-organized to it while working in the brigade sector.

The brigade commander commits engineer assets and assigns mission priorities while the company CP (according to task-organization standards) ensures its subordinate platoons are provided unit sustainment.

COMPANY C2 PROCESS

Engineer leaders use the C2 process to—

- Ascertain the current situation.
- Make decisions.
- Track operations.

The military decision-making process and the engineer estimate are the commander's primary planning tools, whereas, the TLP are the process by which he receives, plans, and executes a mission. Two other tools that are part of the C2 process are the—

- Estimate of the situation.
- METT-T analysis.

Figure 2-10 shows the relationship between TLP, the estimate of the situation, and the METT-T.

Troop-Leading Procedures

TLP begin when a mission is received and end when that mission is completed. They are as follows:

- Receive the mission.
- Issue the WARNORD.
- Make a tentative plan.
- Initiate movement.
- Conduct reconnaissance.
- Complete the plan.
- Issue the order.
- Supervise.

The sequence of individual TLP are not rigid. TLP can be modified to meet the mission situation and the available time. Some steps are done concurrently while others may go on continuously throughout the operation. Ultimately, TLP are time-savers (see *Figure 2-10).* The leader conducts them in the order that most effectively uses the available time.

Receive the Mission. A mission may be received as either a written or verbal WARNORD, OPORD, or FRAGO. There will be times when the leader deduces a change in the mission based on the current situation.

Once the commander identifies an upcoming mission, he begins to prepare the company for it. The company commander

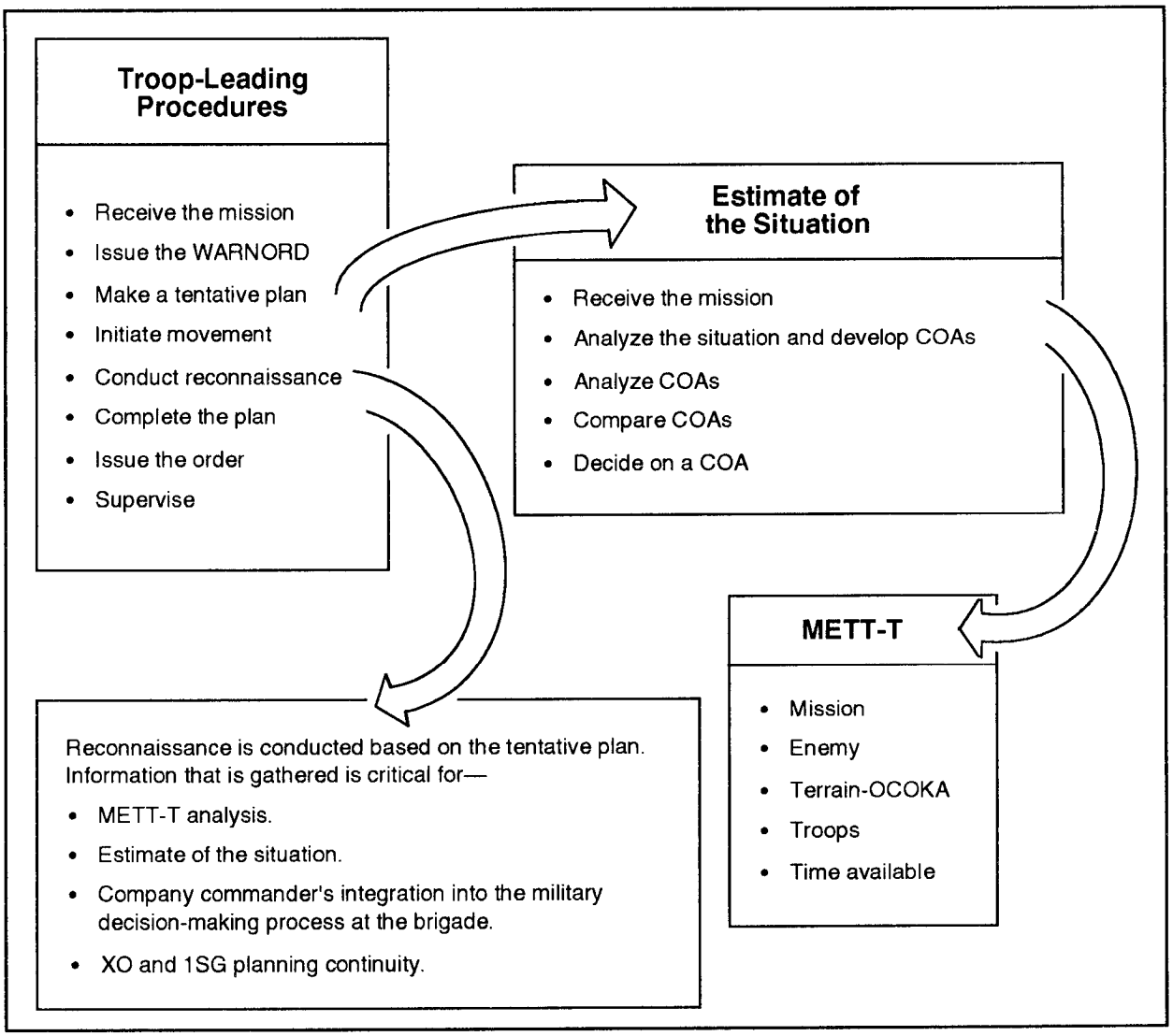


Figure 2-10. Relationship between the estimate of the situation, TLP, and the METT-T

conducts an initial METT-T analysis to determine the requirements for his WARNORD. With the information available, the commander sets his time schedule by identifying the actions that must be done to prepare the company for the operation. These preparatory actions are identified by a preliminary consideration of the information on the mission, enemy, terrain, and troops (METT). (It is key that the company commander includes his lSG and XO, when available, in this process. This ensures continuity in the planning process for the company when the commander goes to the brigade main CP for the military decision-making process.) As time allows, an initial reconnaissance is conducted to allow the commander to better understand the effects of the terrain on the operation. This initial reconnaissance will prove vital to the brigade staff's planning process. The commander then develops his time schedule by reverse planning, starting with the mission execution time and working backwards.

The commander must ensure that his subordinates have sufficient time for their own planning needs. The "one-third, two-thirds rule" is used whenever possible. This leaves the bulk of the time available for subordinate leaders to use for their planning and preparation. This is a tentative time schedule that may require an adjustment as the TLP process continues.

Issue the WARNORD. It is imperative that the commander issue the WARNORD immediately or as soon as possible; he should not wait for more detailed information. The WARNORD can be updated, as needed, with more WARNORDs. The WARNORD lets units prepare for combat as soon as possible after being alerted of an upcoming mission. As a minimum, the WARNORD includes the—

- Situation.
- Mission type (attack, defend, or delay).
- Start time of the operation.
- Time and place to issue the OPORD.

The WARNORD normally involves several standard actions that should be addressed in the engineer company SOP.

Make a Tentative Plan. Tentative plans are the basis for the OPORD. The leader uses the commander's estimate of the situation to—

- Analyze METT-T information.
- Develop and analyze COAs.
- Compare COAs.
- Decide on a COA.

There may not be enough information to decide on which COA is best at this point. The leader uses the time available to complete the parts of the plan that are sure to be used when the brigade order is issued. The commander from the brigade main CP can update the tentative plan during the military decision-making process. This allows the XO to continue to develop the commander's tentative plan, collect information for it, and receive additional instructions from the commander.

Initiate Movement. Based on the initial plan, immediate movement of the company or some of its units may be required. Movement instructions can be given in a WARNORD. The commander coordinates security and fire support for all company moves.

Conduct Reconnaissance. Reconnaissance must be a continuous process during TLP. It should be planned and conducted to adjust or confirm the tentative plan. When possible, the commander and platoon leaders reconnoiter the terrain where the operation will be conducted. (It is essential that the reconnaissance is synchronized with the current operations of the maneuver battalions.) While this is being done, the 1SG and the platoon sergeants supervise the company's preparations for the upcoming operation. Information gained through reconnaissance will prove vital to the brigade's military decision-making process. Frequently, the brigade engineer will not be able to conduct an on-site reconnaissance and will rely on a map reconnaissance.

Complete the Plan. The brigade commander gives the company commander guidance on the upcoming mission. After the company commander has gathered all available facts, he revises his tentative plan. Usually, the company commander's involvement in the development of the brigade plan precludes significant changes to his tentative plan. The engineer company CP is able to update or modify the company's plan during the military decision-making process due to its continuous communications with the BMEC.

Mission-essential tasks listed in the plan should be covered in either the OPORD, the FRAGO, or the SOP. See *Appendix B* for an example of an OPORD. The execution matrix is a tool to help complete and execute the plan. However, it is not designed to replace a verbal order, an overlay, a sketch, or a terrain model. It is designed to help the company commander develop and execute the order. The execution matrix also helps the engineer company CP, as well as the brigade engineer, track the actions of the company. See *Appendix B* for an example of an execution matrix.

Issue the Order. Preferably, the company commander issues the order while viewing the terrain on which the operation will be conducted. This allows the company commander to maximize the use of the terrain. Maximum use of visual aids, such as sketches or terrain models, enhances the understanding of the order by subordinates. In those instances where the company commander has issued a tentative plan before the leader's reconnaissance, he can issue a FRAGO to complete his plan before execution.

Supervise. After the company commander issues the order, subordinate leaders should use the remaining time to complete their TLP. No matter how good the brigade and supporting engineer company plans are, they will fail if they are not managed properly. Subordinate leaders conduct inspections and rehearsals and continually coordinate their plans, both internal and external to the unit.

During PCIs, check the following:

- Weapons and ammunition.
- Uniforms and equipment.
- Special engineer equipment required for the mission.
- Other mission-essential equipment (MEE).
- Soldiers' knowledge and understanding of the mission and their specific responsibilities.
- Communications.
- Rations and water.
- Camouflage.

Rehearsals are always conducted. They are essential to ensure mission success, complete coordination, and subordinate understanding. The company WARNORD should provide subordinate leaders with enough detail for them to schedule and conduct rehearsals of drills and SOPS before receiving the company OPORD. Rehearsals conducted after the company OPORD can help the leaders focus on mission-specific tasks. In those instances where the platoons will be closely supporting a maneuver unit (for example, during assault or covert breaches), rehearsals are very important. These rehearsals facilitate and focus the combined arms rehearsals that will be conducted once the engineers link up with the maneuver forces.

Rehearsals should be conducted on terrain that is similar to the objective area. When possible, mock-ups of the objective should be used, with the actual rehearsals being conducted under the same light and weather conditions. Rehearsals include—

- Soldier and leader back briefs of individual tasks.
- Sand tables, or sketches. to portray the execution of the plan.

Orders

All commanders issue timely, clear, and concise orders to give purpose and direction to subordinate planning, preparation, and execution. The company commander issues orders to his subordinate units to execute

the scheme of engineer operations for brigade operations, as necessary. Orders transform the brigade commander's scheme of engineer operations into clear, concise engineer missions. They combine the concept of engineer support with engineer unit-specific plans needed to accomplish engineer missions and sustain the engineer force. In short, they bind the entire engineer plan together and ensure unity of engineer effort.

The company commander uses clear, concise unit and supported brigade orders to provide the necessary engineer C2. As a commander, he uses his own unit orders to command engineer forces remaining under his control for the operation. These orders also allow him to provide functional control over his organic or task-organized engineers. However, the bulk of the engineer missions in the close operation are conducted by engineers supporting the maneuver battalions.

Regardless of the command support relationship, the company commander must provide the brigade commander with functional control of his task-organized engineers within the brigade and the maneuver battalion's sectors to ensure unity of effort. The routine decentralized nature of engineer support to the brigade (combined with the challenges of command support relationships to the battalions) and the overall command authority of the brigade commander complicate giving orders directly to supporting engineers. Therefore, the company commander exercises functional control of subordinate engineer efforts through his involvement in the development and use of brigade orders and supporting engineer annexes.

Engineer unit orders are used to focus subordinate units' planning and preparation and to increase their integration at the beginning of the brigade's and the maneuver battalion's planning. These orders are not issued to undermine the authority of the supported commander; ultimate command authority lies with the supported commander. Therefore, engineer unit orders must be coordinated with the brigade commander and his staff. These orders enable the subordinate units' planning to be more responsive to the rapid decision cycle of the brigade. For example, the engineer company and the engineer platoons may receive WARNORDs before their supported commander because of their direct link to the brigade staff. The company commander must use this as an asset and not allow it to grow into a liability. These orders are information on which to base planning. They are not to be executed without the coordination and the consent of the supported commander.

There are essentially three types of orders issued by the company commander. They are—

- WARNORDs. They give subordinates advance notice of operations that are to come and the time to prepare for them. WARNORDs should be brief but complete.
- OPORDs. They give subordinates the essential information needed to carry out an operation. OPORDs are prepared in a five-paragraph format to organize thoughts and ensure completeness. When possible, the OPORD is issued while observing the AOs.
- FRAGOs. They provide timely changes to existing orders. FRAGOs are normally used to issue supplemental instructions or changes to a current OPORD while the operation is in progress.

On the fluid battlefield, the company commander most frequently uses the WARNORD and the FRAGO. His intent is to give his subordinate leaders the necessary framework within which to take initiative.

Freedom of subordinate action, mission focus, and clear intent are all vital components of effective engineer unit orders. The company commander avoids unnecessary detail and does not restate doctrine or established SOPs. He ensures that SOPs are developed that simplify the use of essential planning time during TLP.

CHAPTER 3

Offensive Operations

The primary purpose of the offense is to destroy the enemy and its ability to resist. Offensive operations are designed to defeat, disrupt, and destroy the nucleus of the enemy's operations. They may also be conducted to—

- Secure key or decisive terrain.
- Deceive or misdirect uncommitted enemy forces.
- Fix or isolate units.
- Gain information.
- Spoil an enemy's offensive preparation.

Gaining and retaining the initiative and forcing the enemy to fight and react at a time and place not of its choosing is critical to the success of offensive operations.

Although light brigades are employed as an entity, their normal method of operation is to disperse throughout an area and conduct synchronized but decentralized operations primarily at night or during periods of limited visibility. Mass is achieved through the combined effects of synchronized, small-unit operations and fires rather than through the physical concentration of forces on the battlefield. Massing of forces only occurs when the risk is low and the payoff is high.

Engineer offensive doctrine and considerations for the airborne, air-assault, or light infantry brigades are described in this chapter. It also serves as an extension of *FM 7-30*. The purpose of this chapter is twofold. It—

- Explains how brigade engineers integrate into the brigade's military decision-making process for planning future operations and for tracking and controlling the current battle.
- Defines the role of the company commander (and his company) in executing engineer missions in support of the maneuver commander.

OFFENSIVE CHARACTERISTICS

Offensive operations are the brigade's primary means of gaining and maintaining the initiative. Successful engineer support of the brigade attack depends on the brigade engineer's and supporting engineer company commanders' understanding of enemy doctrine and the following offensive characteristics:

- Surprise.
- Concentration.
- Tempo.
- Audacity.

SURPRISE

Surprise is achieved by attacking the enemy where it least expects. The brigade achieves surprise by avoiding the enemy's strength and attacking its weaknesses. During the military decision-making process, engineers provide input on terrain and enemy M/S capabilities. This allows the attack forces to bypass enemy forces or minimize the effects of enemy fortifications, natural and man-made, and countermobility effects. Engineer reconnaissance forces verify infiltration lanes and breach points, with follow-on engineer forces conducting assault and covert breaching to rapidly pass the maneuver forces to the objective.

CONCENTRATION

Concentration is achieved by massing combat power at the point of attack. The brigade engineer recommends task organizations and develops a scheme of engineer operations that masses the right type of engineer support at the right place and time. The engineer task organization must provide the most responsive support at the point of attack. The focus of engineer planning and execution is normally mobility (maintaining the speed of the attack and providing the force with protection during movement and while static).

TEMPO

Tempo is vital to infantry offensive operations. It prevents the enemy from using effective countermeasures against the force. Tempo, synchronized with surprise, can effectively compensate for the lack of mass by denying the enemy the time to recover or identify the main effort and react effectively. Well- thought-out engineer planning and synchronized engineer C2 facilitate quick and decisive engineer actions in support of the brigade. As part of the combined arms team, engineers perform drills and rehearsed movement techniques to enhance tactical mobility and to allow rapid movement.

AUDACITY

Audacity is the willingness to risk bold action to achieve decisive results. The commander's audacity is tempered and balanced with the knowledge of the—

- Capabilities of his engineers.
- Terrain.
- Enemy.

This allows him to take an informed risk to gain an advantage over the enemy. Informed and well-trained engineers, who comprehend the commander's intent, aid the commander in his ability to see the battlefield and anticipate future operations.

BRIGADE OFFENSIVE FRAMEWORK

All tactical actions are based on a simple and complete concept of the operation. In planning and conducting the offense, the brigade concentrates on synchronizing the offensive battlefield framework—deep, close, rear, security, and reserve operations. Brigade engineer planners, commanders, and units each have a role in these five components. Understanding how engineers support the brigade's offensive framework is imperative to effective integration. Figure 3-1 shows the offensive framework and considerations for each component. Additional details on the offensive framework are found in *FM 7-30*.

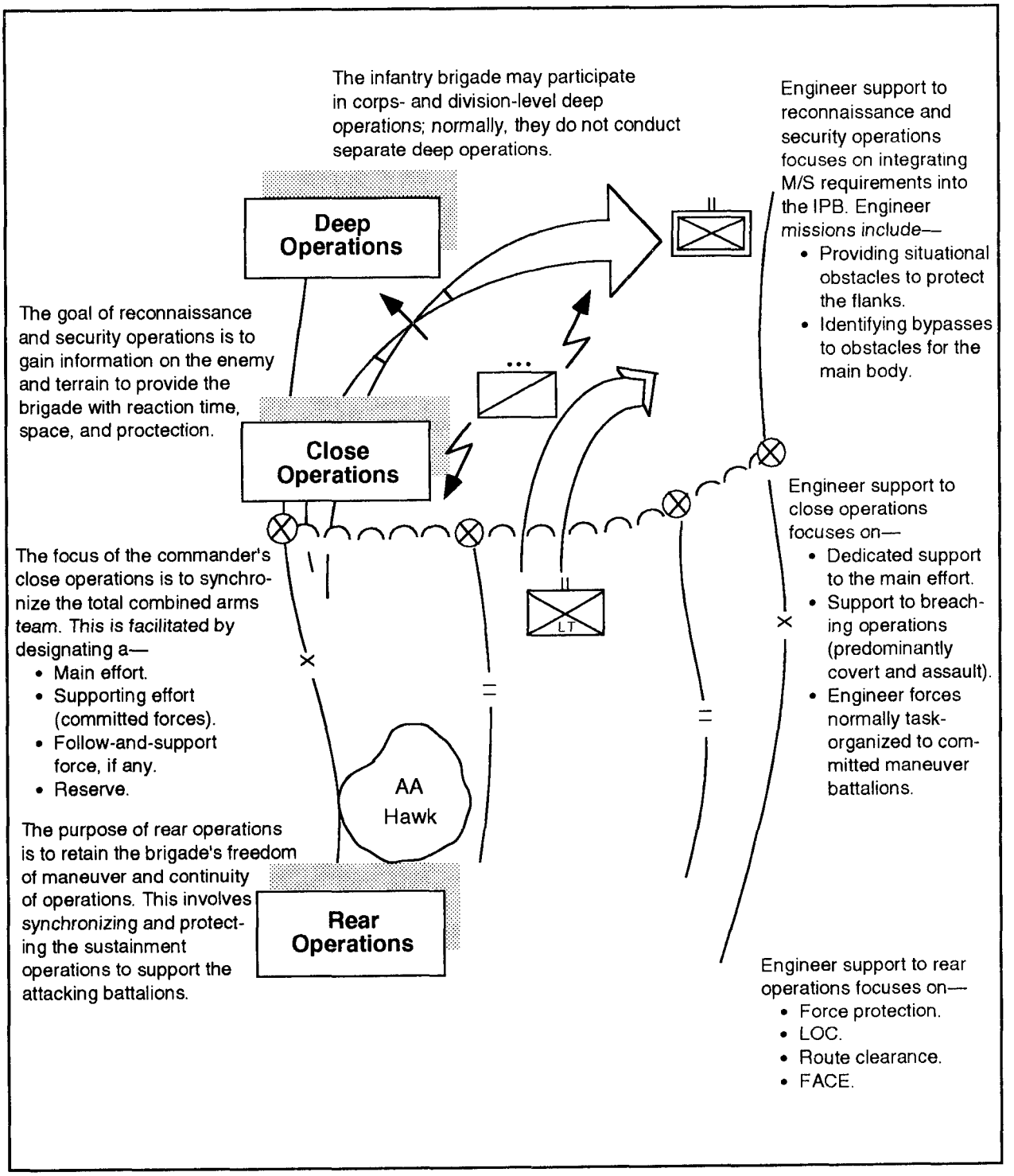


Figure 3-1. Brigade offensive framework

BRIGADE OFFENSIVE MANEUVERS AND ENGINEER CONSIDERATIONS

The five basic forms of maneuver in the offense are—

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

The brigade can conduct an envelopment, a penetration, and a frontal attack. Normally, the brigade only participates as one element of a turning movement conducted by a larger force; therefore, this form of maneuver will not be discussed in this chapter. Subordinate infantry units can conduct an infiltration as part of the brigade's larger mission. The brigade commander determines which form of maneuver to use based on his METT-T analysis.

The majority of light brigade combat operations are conducted under limited visibility conditions. These conditions are characterized by, but are not limited to, darkness, fog, heavy rain, and falling snow. Operations are conducted during limited visibility to—

- Achieve surprise.
- Gain superiority over the enemy through stealth.
- Exploit success and maintain momentum.
- Disrupt the enemy's defense by taking key terrain in its rear.
- Exploit US technical and tactical advantages.

Technical ability, afforded by night-vision devices (NVDs), and tactical ability, afforded through realistic training, allow the infantry brigade to operate routinely in limited visibility conditions. Successful engineer support to the brigade and its maneuver battalions dictates that the engineers possess the same level, as a minimum, of technical and tactical ability as their supported force. NVDs organic in the engineer squad are vital in allowing the engineers to provide effective and responsive support in the same battlefield conditions as the infantry. This becomes especially critical during detailed manipulative tasks, such as breaching operations. NVD capabilities are further enhanced by continuous training in limited-visibility operations with the combined arms team.

The infantry battalions try to conduct limited-visibility attacks much like daylight attacks. The major difference is that limited-visibility conditions frequently require more control measures to conduct the operation. Engineer support to these operations frequently requires the same increased level of control measures to be applied. Limited visibility complicates tasks, such as obstacle detection, marking, and clearance. Movement of forces (such as breaching operations) takes longer under these conditions than in daylight. To simplify control of these types of operations, engineer planners and executors strive to simplify the scheme of engineer operations and the actual application of SOSR. Detailed and synchronized combined arms rehearsals of these operations are essential to mission success.

Most missions performed by engineer units in the offense are mobility missions. Therefore, the common focus of engineer mission planning, task organization, and support is maintaining the mobility of the brigade. The actual execution of breaching operations is primarily accomplished at TF level

and below. The brigade plans for either in-stride, deliberate, assault, or covert breaches. Breaching is the employment of a combination of tactics and techniques to project combat power to the far side of an obstacle. *FM 90-13-1* provides the doctrinal foundation for combined arms breaching operations. It is critical to the success of breaching operations that all members of the combined arms team understand its theory.

The selected form of maneuver expresses the intent and the overall concept of the operation; it also directs brigade planning. The brigade engineer and supporting engineer leaders must understand each brigade's form of maneuver and its implications on engineer mission development.

ENVELOPMENT

The envelopment is the basic form of maneuver. It seeks to apply friendly strength against an enemy's weakness. To accomplish this, one unit suppresses the enemy from the front while another unit maneuvers around and strikes its flank or rear. This forces the enemy to fight along lightly defended or undefended AAs. An envelopment requires the enemy to have an open flank, a weakness in its positions, or a gap in its lines, which affords the enveloping force an exploitable weakness. In an envelopment, the brigade normally makes a supporting attack with one or more battalions. The remaining units maneuver against the enemy's flank to destroy it or seize objectives in its rear.

Preliminary Considerations

Engineer support priorities for an envelopment are the mobility of the enveloping force and the protection of its extended flanks (see Figure 3-2, page 3-6).

The TFs that make up the enveloping force normally organize for in-stride breaching operations. Once committed, the enveloping force must have the capability to breach unforeseen obstacles with minimal delay and maneuver. Critical to this ability is—

- Obstacle intelligence (OBSTINTEL) gathered before the enveloping-force mission. The brigade engineer must ensure that engineers are totally integrated into the brigade reconnaissance and surveillance (R&S) plan.
- Engineers task-organized to the enveloping-force commander. They provide him with responsive and rapid obstacle-reduction capabilities and the ability to further task-organize forces to accomplish his mission.

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

Main-Effort Considerations

Engineer support to the main effort is broken into two separate areas, requiring dedicated engineer forces to—

- Protect the enveloping force's flanks.
- Construct, maintain, or improve LOC.

Engineer support to protect the enveloping force's flanks centers on situational obstacles, which are planned at the brigade level. SCATMINE systems are one of the key components for this support.

A key aspect of mobility support to the main effort is maintaining the enveloping force's LOC. In an envelopment, the LOC for the main effort can quickly become extended, shifted in response to the attack, or threatened by bypassed units. Engineer support to the brigade's LOC effort is normally EAD

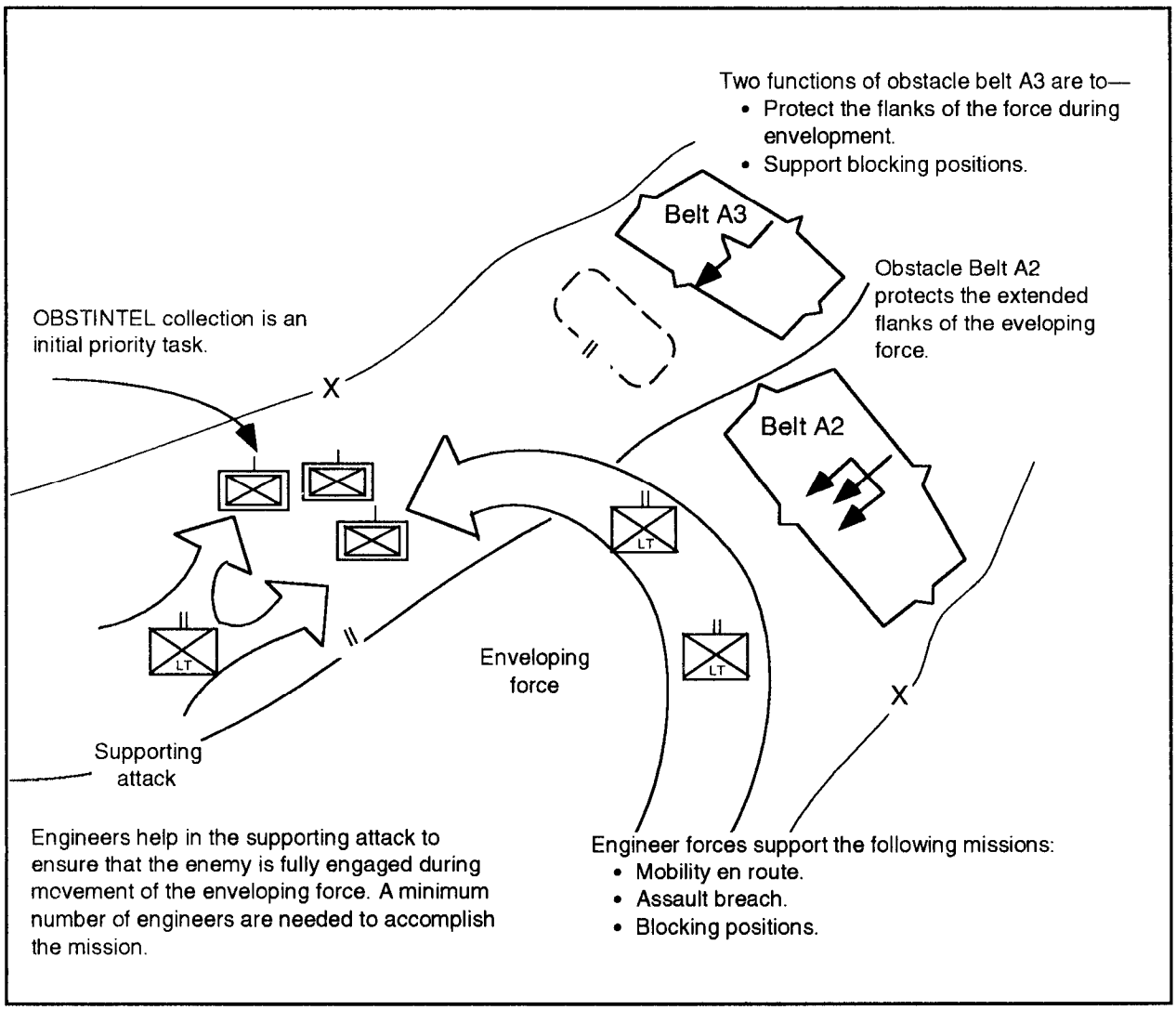


Figure 3-2. Engineer support to an envelopment

assets under brigade control. This allows DIVENs to remain focused on mobility support to the main effort.

Actions-on-the-Objective Considerations

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 and 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.

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 remains mobility. The task organization must provide attacking battalions with assault-breach capability. However, the mission may be to secure key terrain that cuts the enemy's LOC. The enveloping force may then establish

blocking positions. Therefore, engineer support to actions of the objective may also require countermobility and survivability operations. In these cases, the brigade engineer, through war gaming, ensures that the enveloping force has the assets to—

- Maintain its mobility during the attack.
- Establish effective blocking positions.

Supporting-Attack Considerations

Providing the necessary assets to the supporting attack is the brigade the engineer's greatest challenge. While the main effort of engineer support and concentration of the engineer force is with the enveloping force, the supporting attack is too important to discount its engineer requirements. 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.

The engineer 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 breaching TF commanders. The brigade engineer often has to recommend 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.

PENETRATION

The purpose of a penetration is to break through prepared enemy positions by concentrating overwhelming combat power on a narrow front. Units penetrate when—

- Enemy flanks are not assailable.
- Time does not permit some other form of maneuver (see Figure 3-3, page 3-8).

A successful penetration requires the concentration of all combat multipliers, to include the use of night, stealth, and covered and concealed terrain. Penetrations have three stages. They are—

- Initial rupture of enemy positions.
- Roll-up of the flanks on either side of the gap.
- Exploitation to deep objectives.

The brigade commander uses the penetration to—

- Attack through the enemy's principal defensive positions.
- Break the integrity of the defense.
- Defeat the enemy in detail.

The brigade uses its main attack to rupture the enemy's 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.

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

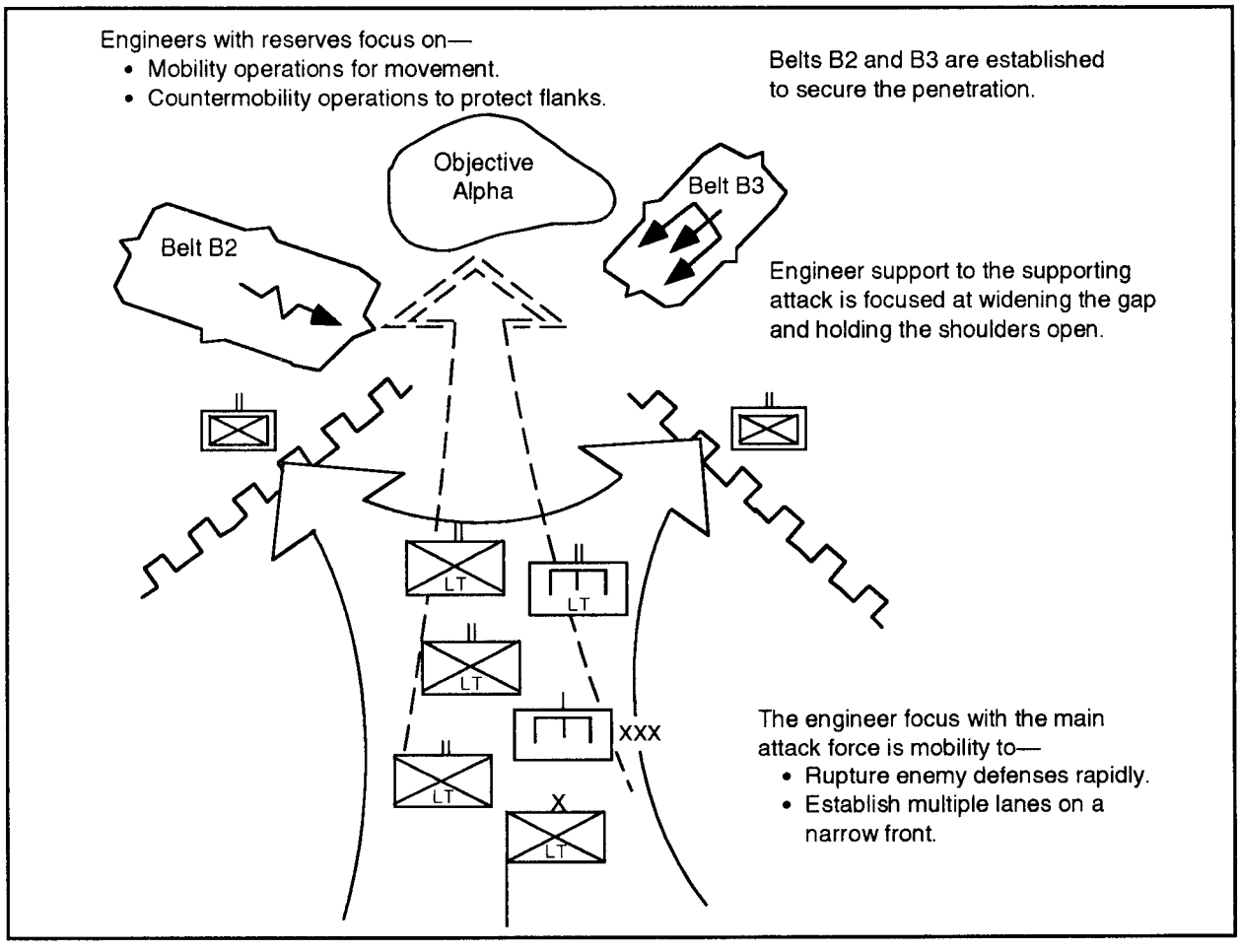


Figure 3-3. Engineer support to a penetration

Main-Effort Considerations

Engineers support the brigade penetration by providing the lead battalion(s) in the main effort with overwhelming mobility to rupture the enemy's obstacles. This remains the engineers' 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 more narrow 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 division and EAD engineers.

When penetration is achieved, the engineers' main effort shifts to providing mobility to forces 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 simultaneously clear the zone and widen the gap, 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 Considerations

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 any counterattacks. Therefore, the brigade engineer and supporting company commanders—

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

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 and responsive obstacle capabilities, such as scatterable and smart mines.

Exploitation Considerations

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 scheme of engineer operations must allow for the rapid development of a lane network within the penetration. The lane network must support both 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. Secondly, the brigade engineer must ensure that the brigade reserve has the engineer task organization necessary to maintain its own mobility as it attacks deep in the enemy's rear area.

FRONTAL ATTACK

The purpose of a frontal attack is to—

- Overrun and destroy or capture a weakened enemy.
- Fix an enemy force in position to support another attack.

A frontal attack is the least desirable form of maneuver. The brigade normally conducts it as part of a larger force. The frontal attack strikes along the enemy's front within the brigade's zone (see Figure 3-4, page 3-10). During the attack, the brigade commander seeks to take advantage of the enemy's position. Subordinate units try to seize their objective from a direction other than the front if the terrain and enemy situation permit.

Mobility Considerations

The challenge to engineers supporting the brigade in a frontal attack is in providing enough mobility support across a wide front on multiple axes. Successful engineer support normally requires multiple division or corps engineer companies. From the brigade perspective, the nature of the mission may prevent the massing of overwhelming mobility support. However, the brigade engineer must ensure that the engineer task organization allows attacking TFs to mass engineers at their level, as required. Quickly attacking a weak or disorganized enemy

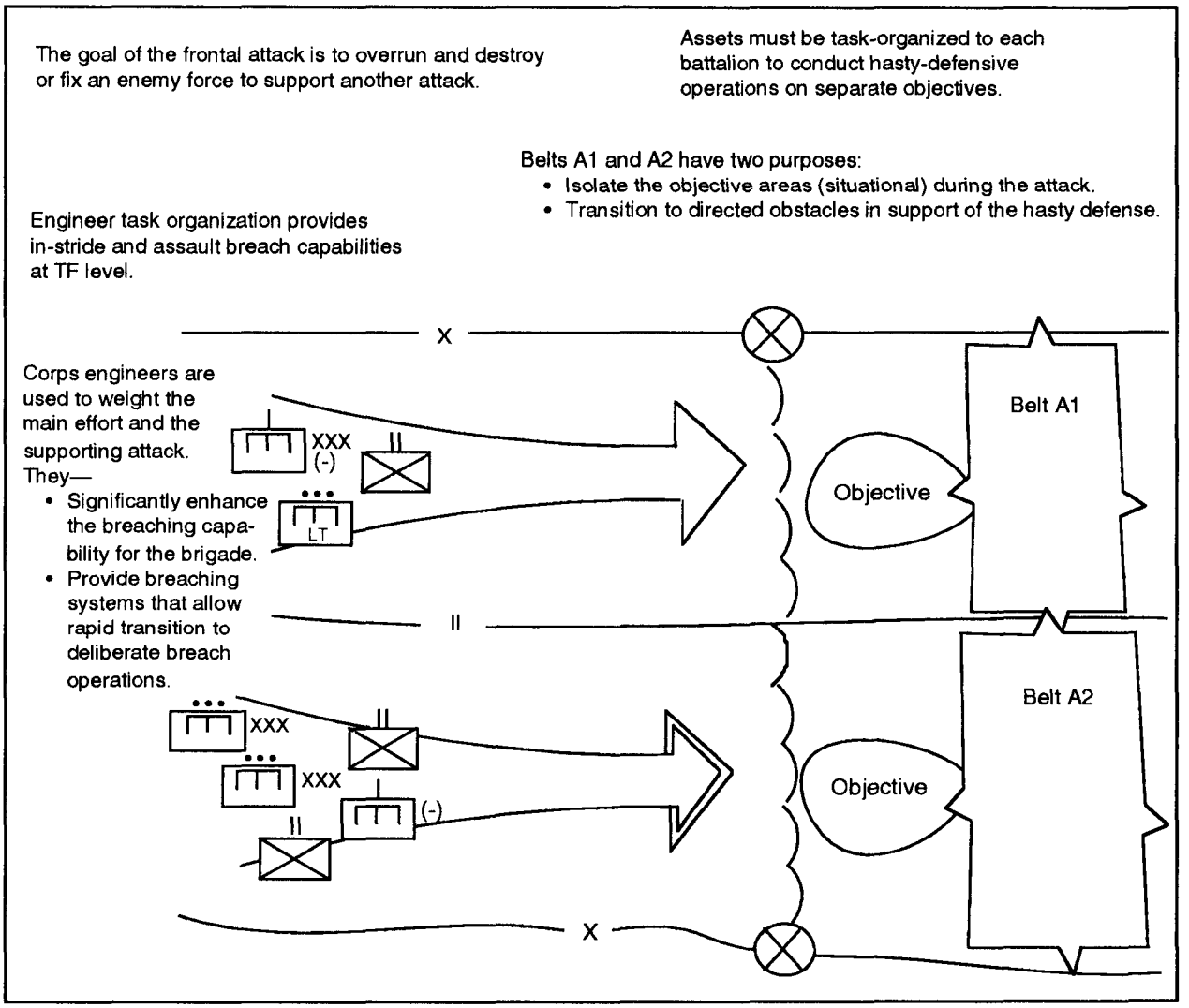


Figure 3-4. Engineer support to a frontal attack

with the situation relatively unclear warrants the consideration of providing an in-stride breach capability at the TF level. The brigade engineer balances division and supporting corps engineers in each attacking TF rather that just one TF.

Follow-and-Support-Force Considerations

The brigade engineer normally uses task-organized EAD engineer units as the engineer follow-and-support force. The mission of the engineer follow-and-support force is to upgrade breaching lanes, to include marking them, and to construct or improve MSRs. The nature of the frontal attack requires a follow-and-support force capable of decentralized operations but under the control of the brigade commander. DIVENs with the TFs create the lanes necessary to seize TF objectives. Therefore, EAD engineer efforts to upgrade lanes in each battalion zone of attack focus on passing sustainment traffic rather than combat power. MSR requirements are also decentralized to sustain multiple axes.

Hasty-Defense Considerations

The brigade engineer and the company commanders must consider the needs of each battalion to establish a hasty defense on its objective. With battalions attacking in zones, each will normally consolidate on separate objectives and establish distinct hasty-defense positions. The brigade engineer and staff must be sensitive to the decentralized nature of the brigade's hasty defense. They must ensure that each battalion has the assets necessary for immediate and responsive obstacle and survivability support. If the brigade plan is to establish a deliberate defense immediately upon consolidation, the brigade engineer must consider task-organizing corps assets to each battalion from the outset of the attack. The brigade engineer must also plan for and coordinate with the S4 to pre-position and push necessary Class IV/Class V (mines) supplies to the battalions.

INFILTRATION

The purpose of infiltration is to move a maneuver force by stealth to a more favorable position to accomplish the mission. This 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. 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.

Infiltrations are normally carried out by foot or air but can be executed by vehicle or watercraft.

IPB Considerations

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.

Reconnaissance assists the commander in determining the method of infiltration and the task organization and size of the infiltrating units. Reconnaissance is also vital in determining whether single or multiple infiltration lanes are used and the actual route(s).

Successful engineer support to the infiltration is predicated by the careful and detailed terrain analysis of the—

- Brigade engineer.
- Company commander.
- Brigade staff.

It is critical that existing gaps in the enemy's defensive system and the locations of its security elements be identified. Natural obstacles and the templated enemy obstacles must also be considered (see Figure 3-5, page 3-12). Engineers infiltrating with the infantry battalion scouts verify, report, and mark (and breach as required) obstacles along the infiltration lane(s).

Engineer planners at the brigade also develop PIR for inclusion in the S2's collection plan. In addition to the PIR developed in support of the infiltration itself, others are identified specifically at the objective area. Examples are the—

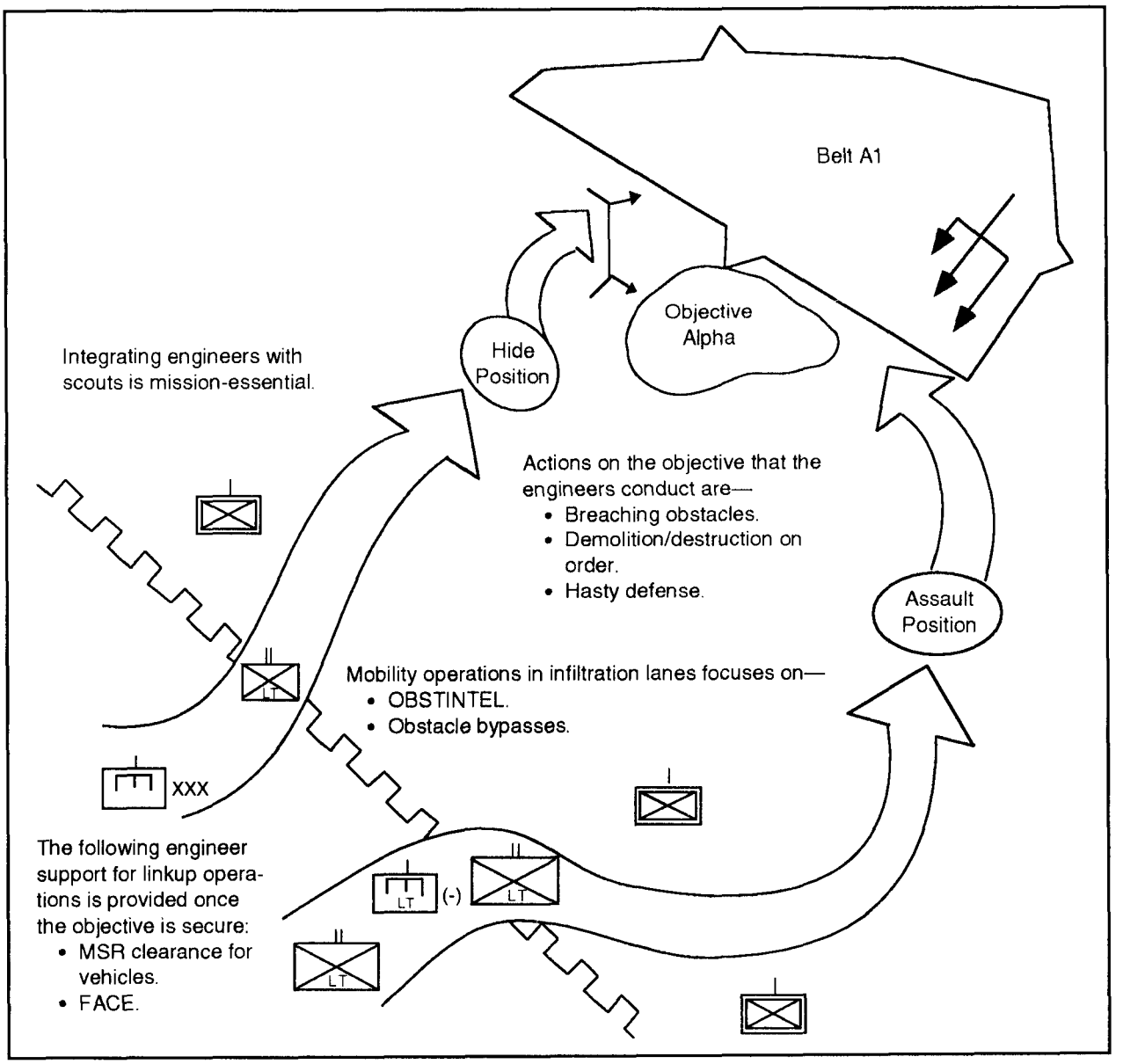


Figure 3-5. Engineer support to an infiltration

- Location, type, density and employment method of obstacles in and around the objective.
- Potential breach lanes for the attacking units. Level of survivability of the enemy forces on the objective.
- Possible enemy counterattack routes in support of the objective.

Mobility Considerations

Mobility support is the main focus of engineer units during the 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 those mobility operations anticipated on the 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 that engineers working with the scouts provide.
- Detailed combined arms rehearsals.

This allows the brigade engineer to recommend the task organization of engineers in such a way as to ensure support to the main effort along the infiltration lane.

Actions-on-the-Objective Considerations

To provide enough support to the maneuver battalions during actions on the objective, detailed engineer planning at the brigade centers on the war gaming of contingencies. Normally, engineers will be task-organized to maneuver battalions in a command relationship during the infiltration and actions on the objective. This ensures the battalion commander's flexibility in further task-organizing the engineers and his absolute control during breaching operations, following 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 the maneuver battalions. This is done to speed up the response of engineer units in support of the main effort and to place the logistical support requirements directly with the FSB.

Sustainment Considerations

Infiltrations often require the clearance of extended MSRs from the line of departure (LD) to the attacking force. *Appendix D,* in conjunction with *FM 20-32, Chapter 10,* details route-clearance considerations. 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 the high-speed AAs. Therefore, the clearance of these MSRs commonly resembles small-scale linkup operations and are planned and resourced accordingly. Breaching operations (predominantly in-stride) are common during MSR clearance, and corps engineer assets task-organized to the brigade normally execute them. The mine-clearing line charges (MICLICs) available in corps engineer units can speed up these operations and can become a critical combat multiplier for a light force conducting breaching operations. Caution must be exercised when using MICLICs on ground LOC. Repair capability must be available to the breaching force to sustain traffic on the LOC.

ENGINEER OFFENSIVE PLANNING

The brigade begins its preparation for offensive operations by receiving a FRAGO/OPORD from higher HQ and then using the military decision-making process. The considerations discussed in the following paragraphs may be applied to all types of offensive operations but must be applied according to the C2 process detailed in *Chapter 2.*

RECEIVE THE MISSION

The engineer estimate and offensive planning process begin with the brigade engineer receiving his mission. This mission is

extracted from the brigade OPORD, engineer annex, graphics, and WARNORD. One of the first critical tasks the brigade engineer accomplishes is ensuring that the BREC and the supporting engineer company receive a WARNORD based on orders received from higher HQ. (This WARNORD does not circumvent the WARNORD that the brigade commander will issue; it only serves to enhance it by providing additional planning and reaction time to the BREC and the engineer company.) This also ensures the company commander's ability to initiate TLP and displace to the brigade main CP to integrate into the brigade's military decision-making process.

DEVELOP FACTS AND ASSUMPTIONS AND ANALYZE THE MISSION

The brigade engineer, with the help of the S2 and the S3, conducts the EBA. The EBA consists of analyzing the terrain and assessing the capabilities of the enemy and friendly M/S.

The brigade engineer and S2 conduct the terrain analysis using the OCOKA framework. The terrain analysis is then used to develop the enemy situation template and the corresponding friendly scheme of maneuver. The brigade engineer focuses his involvement in the terrain analysis on—

- Possible effects the natural terrain imparts on the attacking brigade (or its battalions).
- Likely places the enemy will reinforce or enhance the natural effects of the terrain, as well as identifying how and where the enemy will defend, where the brigade can move while conducting its offensive operation, and where the brigade is vulnerable to flank attacks and enemy counterattacks.

The brigade engineer works with the S2 in identifying the M/S capabilities of the enemy's maneuver and engineer forces. Based on this knowledge, the brigade engineer templates enemy obstacles and their estimated survivability status on the situation template. The brigade engineer develops specific enemy M/S intelligence requirements and nominates NAIs to incorporate into the brigade's reconnaissance plan.

The brigade engineer, with the S3's help, analyzes the friendly engineer capability based on current organic and corps assets available in both the engineer and maneuver organizations. To do this, the brigade engineer must account for all available and mission-capable engineer assets that support the brigade.

The brigade engineer continues the mission analysis by conducting a complete review of the higher command's OPLAN/OPORD, including the operational graphics. He focuses on the offensive considerations of the following:

- Identification of specified and implied tasks.
- Additional M/S assets available in the brigade.
- Specified acceptable risk.
- Time available to conduct the mission.

The brigade engineer determines what engineer tasks are mission-essential on the basis of this analysis. This information is provided to the S3 for inclusion in the brigade's restated mission.

ISSUE THE COMMANDER'S GUIDANCE

Following the development and approval of the restated mission, the brigade commander issues his guidance and intent. The brigade engineer must identify, from the

brigade commander's guidance and intent, the form of maneuver and the type of attack the brigade will employ. Based on this, the brigade engineer confirms specified, implied, and essential engineer tasks and prepares to support the COA development.

DEVELOP COAs

On the basis of each COA, the brigade engineer develops a scheme of engineer operations, focusing on essential offensive engineer tasks. He does this by looking two levels down at the maneuver company. The brigade engineer focuses on mobility support first. He identifies required mobility tasks and the engineer assets needed to perform them using the—

- Brigade commander's intent.
- Terrain analysis.
- Situation template.

Next, the brigade engineer looks at countermobility tasks, concentrating on those required to protect the attacking or moving support forces (such as flank and rear security during movement) and those required to support hasty defenses on the objective. The same process is applied for survivability, general engineering, and force-protection missions.

ANALYZE COAs

The ultimate outcome of this process is the task organization of engineers in support of the brigade. Based on the brigade commander's estimate, the brigade allocates resources to the battalions, as needed, to accomplish the assigned mission. Engineer assets are not distributed on a fair-share basis but are distributed based on the complete METT-T analysis. Normally, task organizations are changed during the operation only if changing conditions dictate.

Having identified the engineer tasks and assets required for a COA, the brigade engineer establishes where the engineer's main effort must be. After reviewing available engineer and maneuver assets, the brigade engineer, with input from the company commander, allocates engineer assets to accomplish mission-critical tasks. He also recommends allocating maneuver assets to accomplish those tasks that engineer assets cannot accomplish. If maneuver assets are not available or skilled in the shortfall tasks, more engineer assets are requested from the division through the brigade S3. If more engineer assets are not available, the brigade engineer focuses on main-effort tasks and reallocates assets to compensate for the shortfall. It is critical to the COA analysis to identify the risk associated with the shortage of engineer forces and to address it during war gaming and the COA comparison.

The brigade engineer coordinates the tracking of large amounts of fired dud-producing munitions in an area. Through the FSO, he tracks the location and type of submunitions used and provides this as a dud-warning report to units preparing to enter this area. The brigade engineer also notifies supporting engineers to provide them the opportunity to deal with this mission.

DECIDE ON A COA AND ISSUE ORDERS

Once COAs have been war-gamed, compared, and recommended, the brigade commander decides how the offensive mission will be conducted and gives his intent and concept of the operation. Based on this, he refines the brigade engineer missions and develops a scheme of engineer operations for inclusion in the execution paragraph of the brigade basic OPLAN/OPORD, focusing on total integration into the brigade scheme of maneuver. To accomplish these tasks, the brigade engineer—

- Finalizes the engineer task organization and the command and support relationships.
- Assigns engineer tasks to the brigade's subordinate units in subunit and coordinating instructions.
- Provides engineer-specific input to the service and support paragraph.
- Develops the engineer annex.

He then briefs the brigade engineer plan to the battalion commanders at the brigade OPORD. On completion of the OPLAN/OPORD, the brigade engineer distributes it to all engineer units working for the brigade and closely monitors mission preparation and execution.

COMPANY COMMANDER'S PLANNING CONSIDERATIONS

Throughout the planning process for offensive operations, the supporting company commander(s) are performing two parallel functions. They—

- Integrate into the military decision-making process with the brigade engineer as outlined in Chapter 2.
- Initiate their TLP.

Once the company commander issues his initial mission-planning guidance to the company, his focus is on integrating into the military decision-making process at the brigade main CP. During the military decision-making process, the company commander remains in contact with his company CP and provides additional guidance and insight to the company leadership regarding the upcoming mission. When the brigade commander decides what COA will be pursued, the company commander departs from the brigade main CP and returns to his company CP to complete and issue his plan, The company commander's responsibilities are discussed in Chapter 2.

The nature of light brigade offensive operations commonly supports decentralized engineer support to the battalions. Platoons, and sometimes companies, normally support the maneuver battalions in a command relationship rather than in a support relationship. This ensures responsive and dedicated support to the maneuver battalions. When the tactical situation allows the company commander to conduct his TLP parallel to the military decision-making process, it helps synchronize key activities for mission support to the brigade. When the brigade OPORD is issue, the engineer company and its platoons already know the task organization of engineers. This allows platoon leaders to initiate their TLP and still be present with their supported battalion to receive the brigade OPORD. This places the three principal echelons of engineer C2 together at one time (brigade engineer, company commander, and platoon leader), facilitating coordination and clearing up discrepancies or changes to the brigade plan.

TYPES OF OFFENSIVE OPERATIONS

The brigade conducts the following types of offensive operations:

- Movement to contact (MTC).
- Hasty attack (HATK).
- Deliberate attack (DATK).
- Exploitation.
- Pursuit.

The brigade is trained and task-organized to pass from one type of offensive operation to another without delay. These operations

may be conducted in sequence in a successful battle, beginning with a MTC to locate the enemy and ending with the destruction of the enemy through pursuit.

Engineer support to brigade offensive operations is characterized by careful mission analysis, detailed plans and preparations, and war-gamed engineer task organizations. Through this process with the brigade commander and his staff, optimum engineer support is secured for the operation.

MOVEMENT TO CONTACT

A MTC is an offensive operation to gain or reestablish contact with the enemy. Forces that are moving but are not in contact with the enemy are said to be moving to contact. Frequently, the goal of the MTC is to develop the tactical situation. To maintain flexibility and security, the brigade attempts to make contact with the smallest element possible. This is extremely important for light infantry brigades due to their limited mobility and their dependence on restrictive terrain. A light brigade MTC is best suited against other light infantry forces. Infantry brigades use one of two techniques to conduct a MTC:

- Approach-march technique.
- Search-and-attack technique.

The primary engineer considerations at brigade level in planning and preparing for a MTC are anticipating—

- Engineer actions during the movement of the brigade.
- Requirements for engineer support when contact is made.

During the advance, the maneuver commander continually analyzes the situation based on current reports and intelligence. Unit positioning in the formation is dictated by the mission, particularly the anticipated employment of maneuver units.

Five principles guide the brigade commander in planning and conducting a MTC. These principles drive engineer task organization and mission support. Therefore, engineer planners must understand them to support the brigade offensive operations. When possible, the brigade commander—

- Leads with a small, mobile, self-contained force to locate and fix the enemy.
- Task-organizes the brigade so they are able to deploy and attack rapidly in any direction.
- Maintains mutual supporting distances to facilitate response.
- Uses aggressive movement.
- Uses decentralized execution.

Approach-March Technique

The approach march is the traditional technique for conducting a MTC (see Figure 3-6, page 3-18). Its goal is to—

- Gain or reestablish contact with the enemy.
- Develop the tactical situation, providing the brigade with a tactical advantage before decisive engagement.

An axis of advance, or zone, is assigned objectives designated to orient movement. Objectives are characterized by terrain that is easily recognizable and at a depth that is sufficient to ensure contact.

The movement formation is normally comprised of three elements:

- Advance guard.
- Flank and rear security.
- Main body.

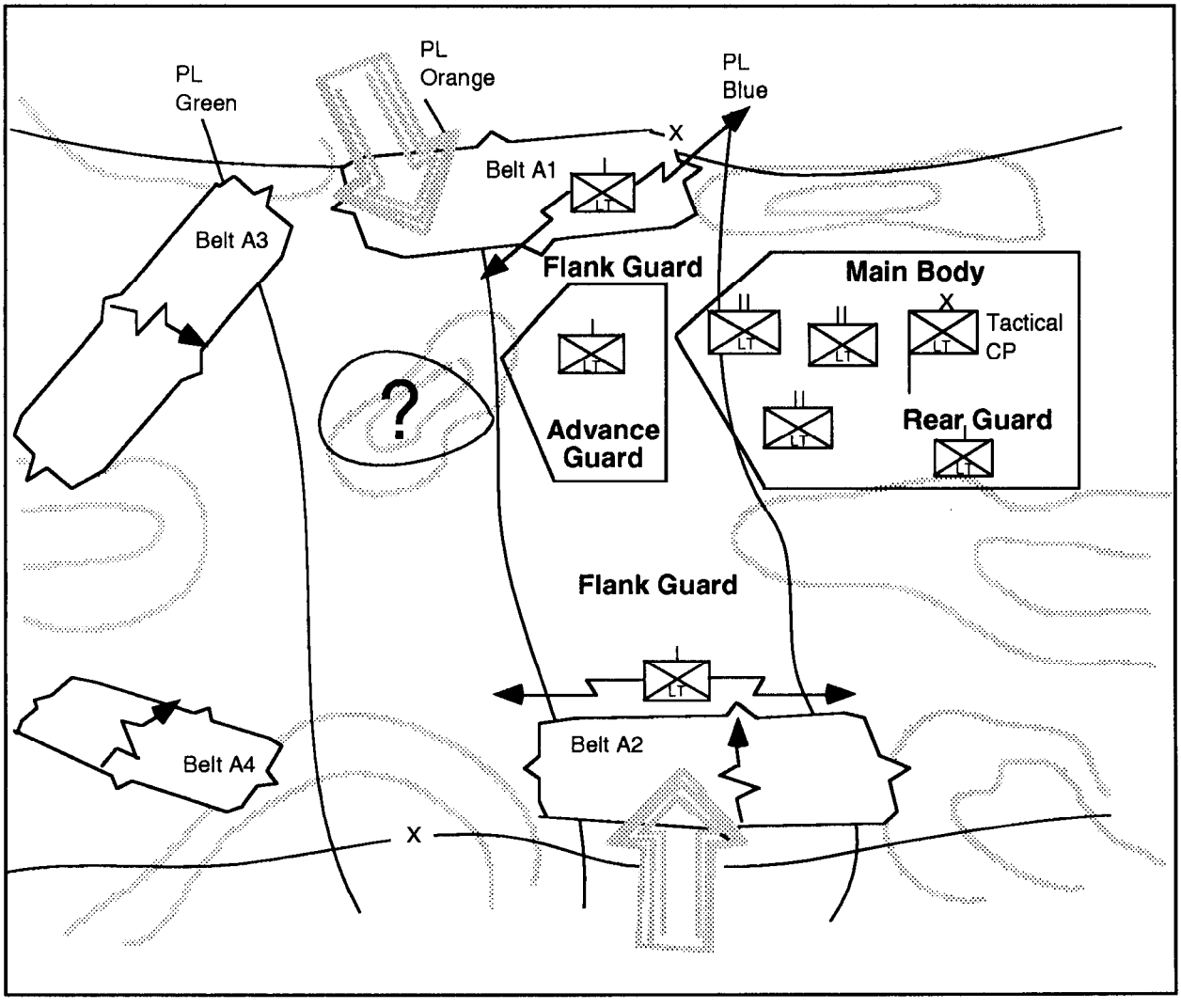


Figure 3-6. Approach march

All elements are mutually supporting during the movement, ensuring the commander's synchronized action at the decisive point and time. The approach march ends when contact is made with the enemy.

Engineer responsibilities during the approach march are divided into two main categories:

- Mobility.
- Countermobility.

Figure 3-7 depicts these responsibilities using the example of battalions on multiple axis in a brigade MTC.

The advance guard operates 1 to 2 kilometers in front of the main body. Its primary mission is to—

- Develop the situation by locating the enemy.
- Ensure the uninterrupted advance of the main body.

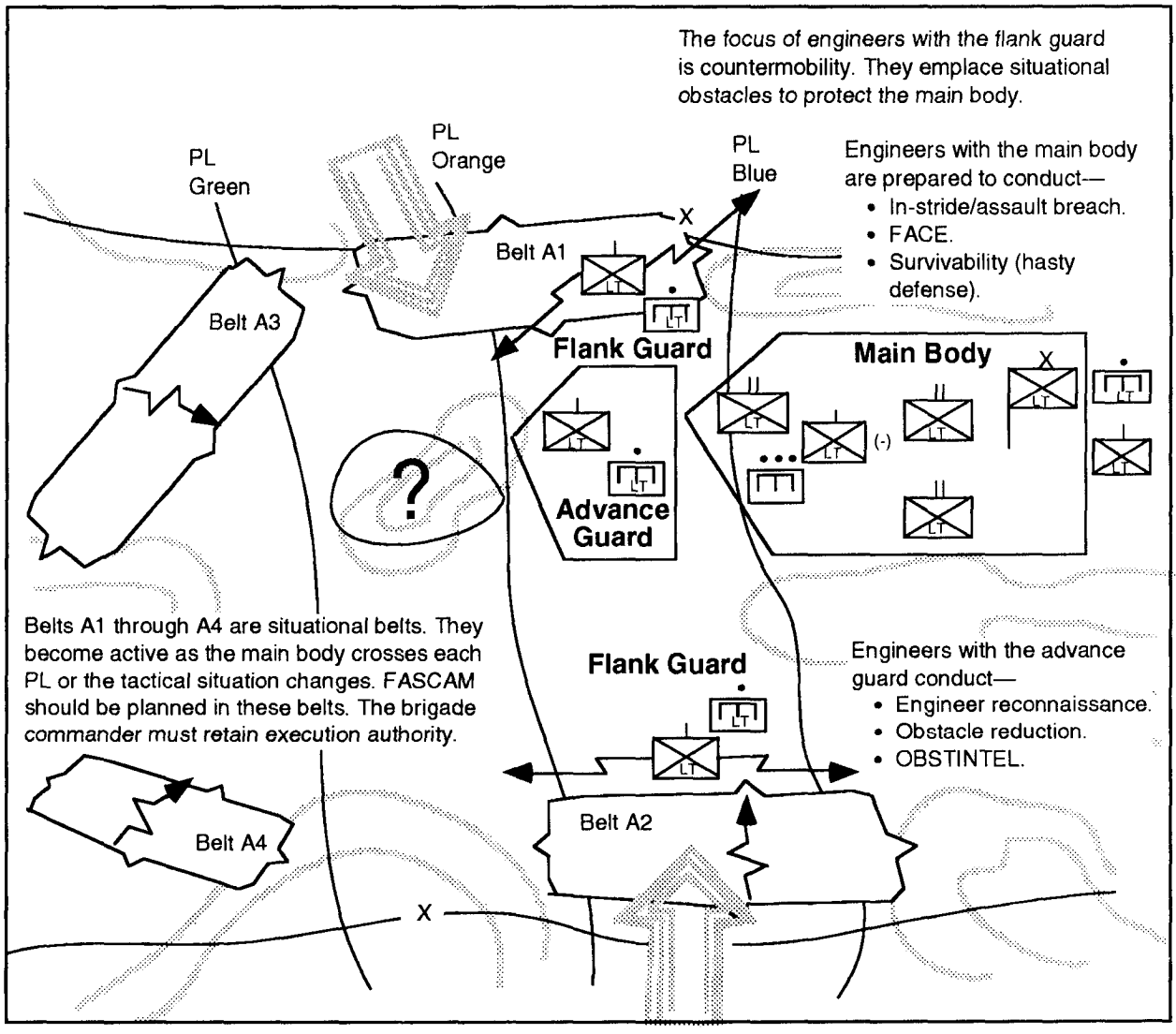


Figure 3-7. Engineer force laydown for an approach march

It is organized to fight through small masses of enemy forces. The advance guard also—

- Conducts reconnaissance.
- Destroys enemy reconnaissance elements.
- Secures key terrain, as required.
- Protects the main body from surprise.
- Covers its deployment into attack formations.

R&S elements and systems are frequently integrated into the advance guard to assist in the early detection of the enemy. Normally, the main body furnishes and controls the advance guard. Engineer support to the advance guard focuses on—

- Engineer reconnaissance.
- Obstacle reduction.
- Location of obstacle bypasses.

Figure 3-6, page 3-18, shows a reinforced rifle company as the advance guard. It was established from forces of the 3d battalion and is under the direct control of the brigade.

Mobility missions are the focus of engineers supporting the advance-guard element. Their principal missions are—

- Engineer reconnaissance.
- Reporting OBSTINTEL to the main body.
- Marking bypasses.
- Breaching obstacles.

When the advance guard is required to fix the enemy, countermobility support may be required. Terrain and enemy information passed by the R&S element to the advance guard ensures a quick response with situational-obstacle execution.

Engineer support to the advance guard is usually broken into two elements by task-organized engineers:

- R&S element support.
- Advance-guard main-element support.

Engineer support to the R&S element is focused on assisting the element in reconnoitering routes or zones over which the battalions and the brigade advance and in locating the enemy. Engineers assist in a number of missions, to include—

- Engineer reconnaissance.
- Obstacle identification.
- Obstacle marking.
- Location of possible bypass routes.

It is important to remember the intent of engineer support to the R&S element. Their primary mission is the collection and dissemination of OBSTINTEL, not physical obstacle reduction. Engineer involvement in the IPB and subsequent collection plan, long-term training relationships, and detailed rehearsals between engineer squads and the R&S elements (normally the scout platoons within the brigade) is critical to enhancing the effectiveness of the R&S element.

Engineers are task-organized to the advance guard based on the number and priority of engineer missions required and the availability of engineers supporting the brigade. While a light engineer platoon is the smallest element to normally support the advance guard, METT-T may dictate a squad.

Flank and rear guards protect the main body from ground observation and surprise attacks. They normally operate about 1 to 2 kilometers from the main body, between the rear of the advance guard and the front of the rear guard. Rear guards operate about 1 to 2 kilometers behind the main body. Both guard elements have enough combat power to defeat enemy forces or to delay an enemy attack long enough to allow the main body to deploy. Flank and rear guards move parallel to the main body and are within supporting range of it.

Countermobility missions are the focus of engineer mission planning and execution for the flank and rear guards. The brigade engineer's primary mission is to plan, synchronize, resource, and control situational obstacle capabilities to protect the brigade's flanks and rear. Situational-obstacle planning is described in *FM 90-7, Chapter 7*. Engineer reconnaissance provides recommendations on locations for the optimal employment of situational obstacles, such as the air and ground Volcano, remote antiarmor mine/area denial artillery munition (RAAM)/(ADAM), and modular pack mine systems (MOPMS). Air and ground Volcano and rapid-obstacle teams are

task-organized to execute situational obstacles in support of flank- and rear-guard forces.

Mobility requirements for the flank guards are based on the method they use to move to key positions on the flanks of the main body. The flank guard's principal methods of movement are by continuous marching or by bounding using vehicles or helicopters. Flank-guard elements bypass obstacles as their first priority, marking and reporting obstacle locations to higher HQ en route. Obstacle breaching is only attempted as a last resort since the momentum of the flank-guard elements must be constant with the main body.

The main body of the approach-march formation contains the bulk of the brigade's combat power. It is organized to conduct either a HATK or a hasty defense. The main body is selected to permit maximum flexibility during movement and upon contact with the enemy. When no enemy contact is made, the approach march ends with the occupation of the objective. However, when enemy contact is made, it ends in a series of meeting engagements and/or HATKs. A meeting engagement is the combat action that occurs when the brigade or elements of the division engage an enemy force, static or in motion, for which it has inadequate intelligence. The action ceases to be a meeting engagement when the enemy's situation is developed and subsequent planned and coordinated operations are undertaken.

Engineer support to the main body primarily focuses on mobility operations. Engineers also provide countermobility and some limited survivability support to the main body during the approach march and the subsequent meeting engagement. Mobility operations in support of the main body primarily consist of obstacle bypasses and in-stride breaches, with the capability to transition to a deliberate breach. Mobility reserves required for the transition to a deliberate breach are maintained either under brigade- or battalion-level control. They are established by weighting the main effort with division or EAD engineers.

Survivability support to the main body normally occurs after the main body transitions to a hasty defense as a result of a meeting engagement. Survivability support is focused on the protection of—

- C2 nodes.
- Fire support.
- AD assets.
- Critical crew-served weapons systems (possibly).

To achieve rapid survivability support, the brigade engineer identifies resource requirements during mission analysis. The BMEC troubleshoots Class IV supply problems, coordinating with the BREC, and tracks the critical status of survivability protection levels at the maneuver battalions.

The transition to the hasty defense requires that the BMEC plan for countermobility support contingencies. Detailed enemy and terrain intelligence help in developing the plan. The hasty defense may be executed after an objective is secured or from the march as a result of or in anticipation of enemy contact. Countermobility operations during a hasty defense center on protection of the main body. The brigade engineer supports hasty-defense countermobililty operations through—

- Planning.
- Developing resource requirements.
- Positioning obstacle belts (tentatively).

Countermobility priorities and missions are established during mission analysis, ensuring compliance with the commander's intent. Operations are planned for execution either once an objective is secured or

from the march. Comprehensive knowledge of the contingency plans, constantly balanced against the developing tactical situation, is imperative since it drives the allocation of engineer resources to the main body.

The time available to conduct countermobility operations will be limited. Once FRAGOs are received to execute countermobility operations, the BMEC immediately focuses its efforts on the positioning of belts, ensuring that they are within the established divisional zones. The BMEC, working closely with the BREC, verifies resource delivery and monitors the progress of the execution. Synchronization with the combined arms team is key during this time. Guidance from the maneuver commanders and coordination with FSCOORDs must be accomplished.

During movement, the brigade normally retains execution authority for obstacles employed in belts. When the brigade is part of a larger MTC, execution authority may be retained at division level. This is done to reduce the potential impacts on future operations. Through this process, the DIVEN and the brigade engineer can ensure the flexibility and freedom of maneuver of the division and the brigade in future operations. The brigade engineer ensures that coordination with the FSB is accomplished for the delivery of obstacle materials in support of these contingency plans.

Search-and-Attack Technique

The search-and-attack technique is a decentralized MTC, requiring multiple coordinated patrols, squad- and platoon-sized, to locate the enemy (see *Figure 3-8).* It is used when the enemy is operating in small, dispersed elements or when the task is to deny the enemy movement in an area.

The battalion is the basic operational unit in search-and-attack operations. The brigade assists by ensuring the availability of supporting fires, transportation assets, timely and accurate intelligence, and reserve forces. The search-and-attack operation has at least one of the following purposes:

- Enemy destruction.
- Area denial.
- Force protection.
- Information collection.

Search-and-attack operations in the brigade can be divided into two areas of operation:

- Brigade rear.
- Brigade forward.

Brigade rear-area operations are focused on sustainment missions for the brigade. These missions are commonly executed on LOC at and around a lodgment area or the BSA. Brigade forward-area operations are characterized by small-unit, decentralized combat operations focused on finding, fixing, massing, and destroying small, dispersed enemy forces. Multiple, coordinated patrols are used to make enemy contact, and then maneuver and fire support are used to concentrate combat power against them. The enemy is either destroyed, fixed, or kept under surveillance until a larger force arrives.

Engineer mission priorities and the resulting task organization frequently change between rear-area and forward-area operations. This is because of the decentralized and ever-changing tactical nature of search-and-attack operations (see *Figure 3-9, page 3-24).*

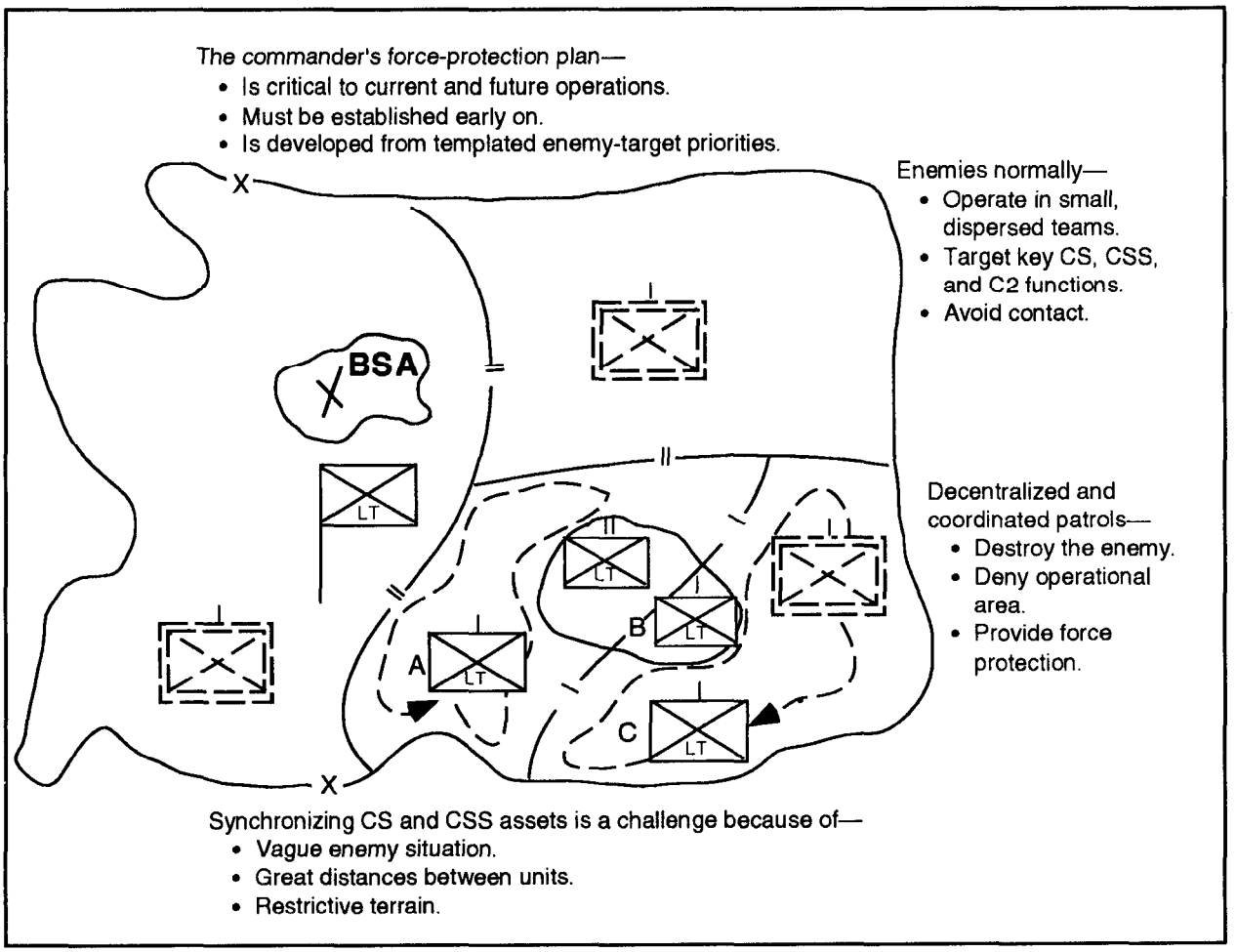


Figure 3-8. Search and attack

Brigade-level engineers influence the brigade's fight by maintaining an accurate picture of the brigade's AO and active cross talk with the entire combined arms staff. For example:

> When it is confirmed that the enemy has limited OMF capabilities, engineer support priorities are usually focused on the brigade rear area. The brigade has centralized control of engineer task organizations. When the enemy has developed its obstacle/mine/fortification (OMF) capabilities or the tactical situation is unclear (such as during initial-entry operations), engineer-support priorities usually shift to providing support to decentralized, committed maneuver forces. Engineer task organizations are very decentralized (at times down to the engineer squad level) during these types of missions.

The brigade engineer, as well as the company commander, must be continuously proactive to this dynamic battlefield. They must support the entire brigade with engineer support that is flexible and sometimes rigid.

Engineer support to the rear area centers on force-protection operations. These operations concentrate on survivability, protective obstacle assistance for CS and CSS units, and countermobility missions around the

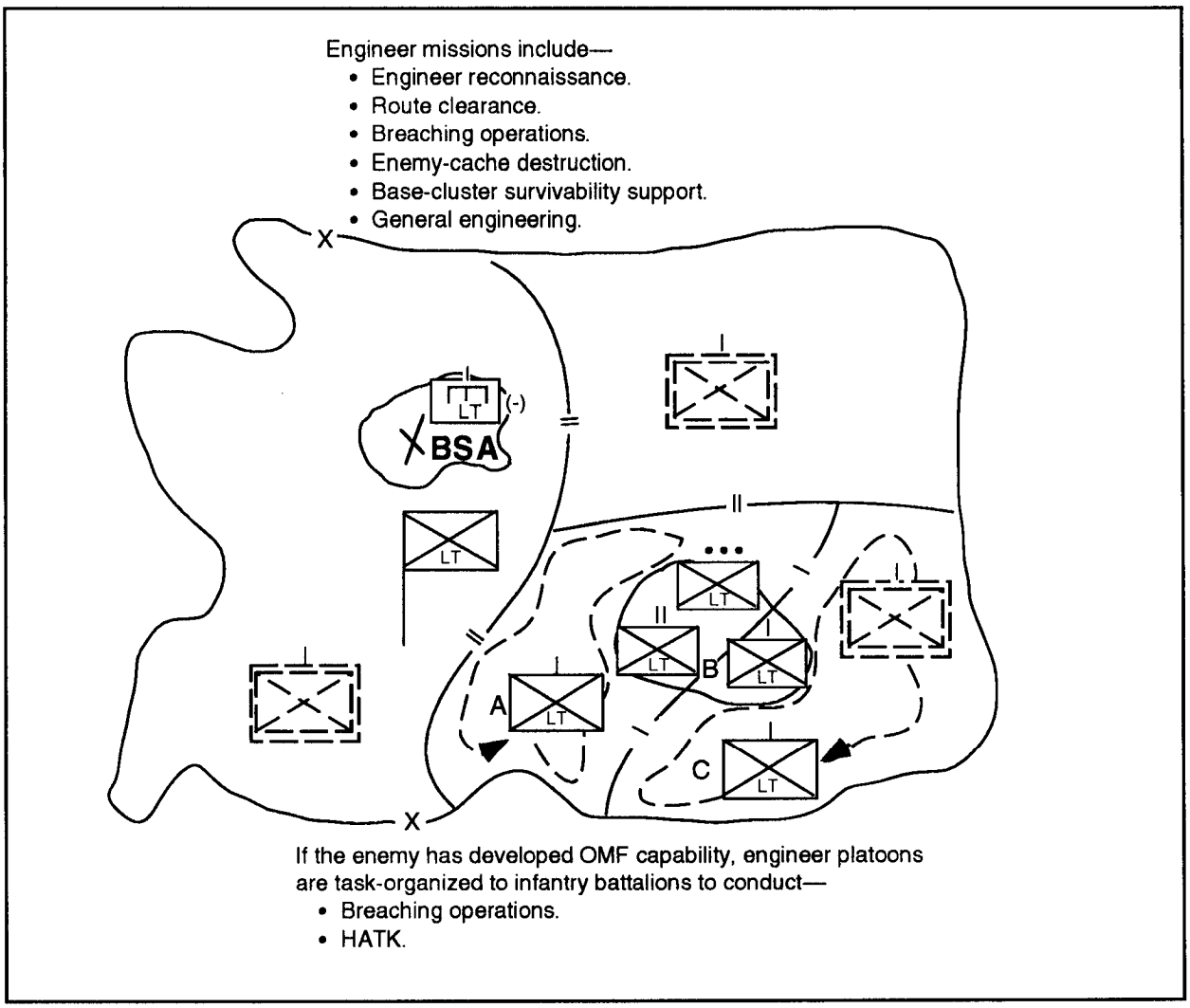


Figure 3-9. Engineer force laydown for a search and attack

BSA. Due to the decentralized nature of its tactics during search-and-attack operations, the enemy routinely focuses its efforts against high-value targets (HVTs), such as C2, CS, and CSS assets. The enemy will use one of the following to strike brigade targets:

- Forced entry.
- Covert entry.
- Standoff weapons attack.
- Exterior attack.
- Terrorist attacks (for example, bombing).
- Stationary-vehicle bomb.

To provide effective engineer support to the brigade rear area, the brigade engineer assists the maneuver commander in developing a comprehensive force-protection plan. The plan focuses on survivability and countermobility efforts based on the threat. *Chapter 5* describes the force-protection planning process. The plan helps determine the attack probability, the consequences of inadequate protection to rear-area units, and the cost (resourcing) of protective measures. The commander's

plan is developed parallel to the military decision-making process and follows these steps:

- Define the threat and attack probability.
- Determine the composition of assets (personnel, equipment, and facilities).
- Determine the level of protection required.
- Design systems and activities to counter the threat.

Engineer effort in the rear areas focuses on the following:

- Survivability of key assets.
- Countermobility efforts (predominantly protective obstacles) around key assets.
- Mobility operations on and around LOC.

The involvement of the brigade engineer and the BREC in the IPB process is the foundation for developing and subsequently executing engineer missions in the rear area. This involvement helps the brigade engineer identify the enemy's capabilities, intentions, and COA. This identification is initially accomplished during the brigade engineer's EBA process and is continually updated based on the current tactical situation. The information helps the brigade develop a list of potential enemy targets, which is used to establish survivability priorities. While the brigade engineer establishes the initial estimate and recommendation of M/CM/S priorities, the BREC is responsible for controlling and tracking the engineer work effort in the rear area. The BMEC provides tactical updates and changes in the brigade mission focus, as required.

CS and CSS units provide survivability and protective-obstacle effort in the rear area except when it is engineer-equipment-intensive. Engineer squads or teams from division or EAD engineer companies provide technical assistance and advice to constructing units on the positioning, construction, and composition of obstacles and unit survivability positions. Tactical obstacles designed and positioned on natural lines of drift or dismounted infiltration lanes into the BSA can be constructed using nonengineer units. Obstacle groups and some force-protection measures require dedicated engineer effort.

Mobility support in the brigade rear area normally focuses on—

- Route clearance for mines and other obstacles (see *Chapter 5* and Appendix D of this manual and *FM 20-32, Chapter 10).*
- Route reconnaissance.
- FACE.

These missions can be continuous and cyclic in nature depending on enemy obstacle/mine activity on the LOC and the rate of the AO expansion. Route-clearance operations require combined arms coordination to provide security to clearance teams and ensure that traffic-control measures are synchronized with clearance plans and operations. Combat-trail construction capability by light DIVENs is limited. Extensive maintenance, repair, or upgrades of MSRs, ground LOCs, or FLSs require corps engineer support. FACE operations are usually associated with the aviation TF supporting the brigade. This requires initial close coordination and mission planning between the brigade engineer and the aviation LO. Because of the location of FARPs during operations other than war (OOTW), the BREC and the aviation TF HQ are responsible for controlling and tracking FACE support.

OOTW routinely require FLSs to support and sustain the force. Airfield operational concerns center on damage repair, maintenance, and improvements. Light DIVEN

assets required to accomplish these missions are limited and require corps engineer augmentation. The brigade engineer has the responsibility of planning, controlling, and executing these missions while the LZ is under brigade control. Because of the logistics and resource impacts on the brigade, FLS responsibility needs to be transferred to the division as soon as possible.

When the enemy has limited OMF in the forward areas, M/CM/S requirements are the responsibility of the maneuver battalions. Engineer equipment support for survivability is allocated, when time permits, to each maneuver battalion. The brigade engineer and supporting company commander develop and constantly update contingencies to provide rapid support to the maneuver battalions in an on-order or a be-prepared status. TF staff engineers enhance this capability by maintaining continuous contact with the infantry battalion commander and staff. This ensures that the engineer company and its platoons, as well as the BMEC and BREC, maintain a current picture of the tactical situation within all of the battalion's AOs.

Mobility of the battalion TFs is the focus of engineer support when the—

- Tactical situation changes.
- METT-T analysis dictates that engineers be task-organized to the maneuver battalions.

The primary form of support to the infantry companies and platoons is assault breaching. It is conducted when a situation is developed to the point where HATKs or DATKs occur. Engineer squads and platoons are then held under battalion control or task-organized to the rifle companies for the attacks.

HASTY ATTACK

A HATK is normally conducted either following a MTC or a meeting engagement. It can be initiated from a defensive posture or employed as an extension of a MTC. *Figure 3-10* depicts a HATK scenario conducted from a MTC.

Maneuver Considerations

When the brigade conducts a HATK, it is trading preparation time for speed to exploit the tactical situation. Decisive advantage is achieved by immediately attacking with available resources to maintain the momentum of the attack. Lead elements of the brigade may bypass obstacles and small pockets of stubborn resistance provided they do not threaten the overall success of the attack.

Engineer Support

The brigade engineer recommends allocating the engineer units required for mobility and countermobility support to the HATK before executing the meeting engagement (see Figure 3-11, page 3-28). The brigade engineer accomplishes several essential tasks parallel to and synchronized with the brigade plan. He—

- Maintains a current and accurate picture of the current close fight and passes timely engineer-specific information to brigade planners and engineer leaders in the sector.
- Develops contingency plans and keeps engineer leaders informed on upcoming tasks.

The planning process focuses on potential engineer responses to future operations through the shifting of assets and priorities.

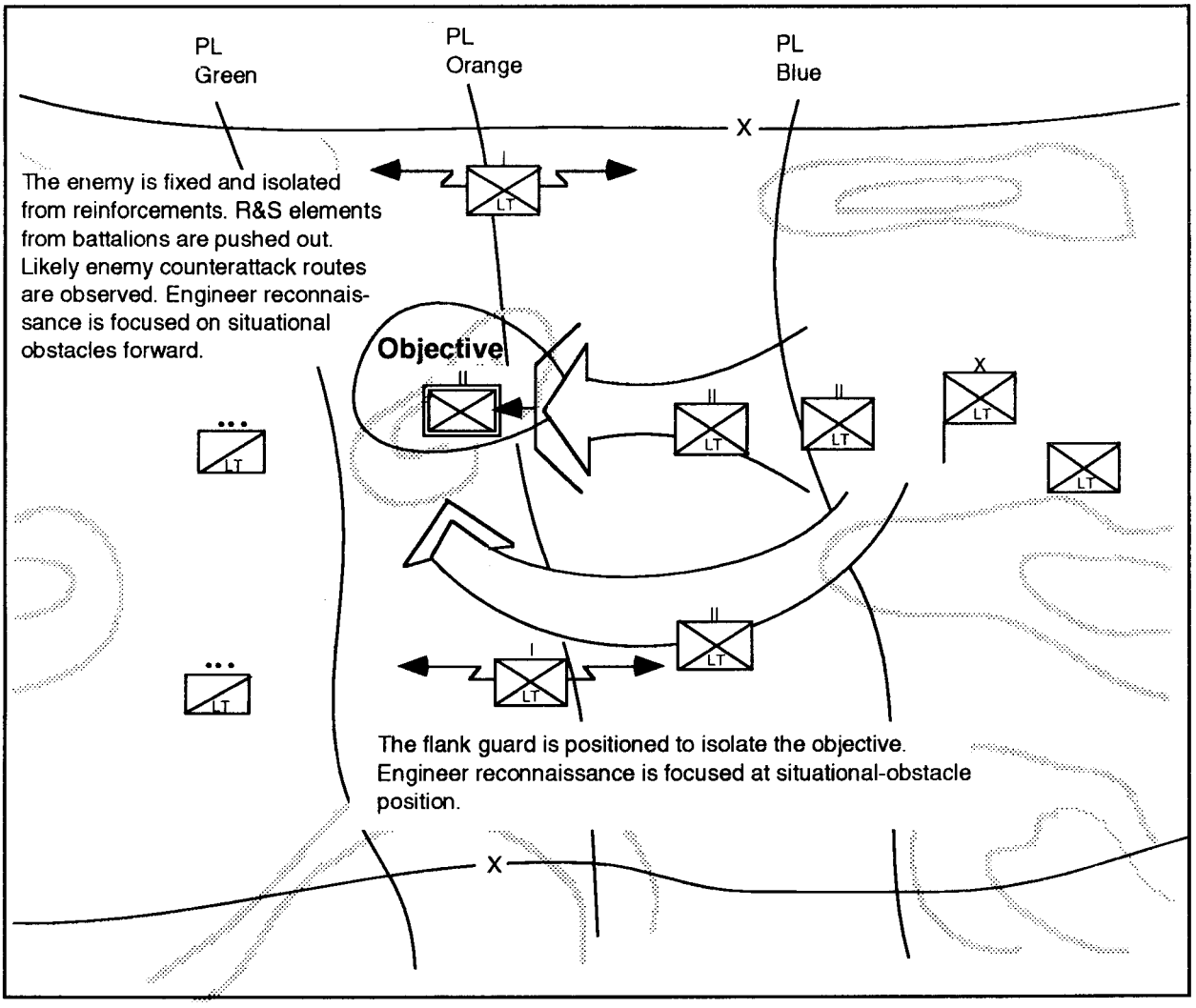


Figure 3-10. Hasty attack

Mobility operations are the primary mission that engineers conduct in support of attacking elements. Engineer reconnaissance operations in the lead elements focus on providing specific obstacle locations, bypasses, and types. This information is needed by engineers with the main and supporting attacks who must reduce these obstacles. As required, in-stride breaching operations are conducted until the assault on the objective. As the attack reaches the objective, mobility operations focus on assault or covert breaching. At the objective, engineers reduce key facilities, structures, and fighting positions, as required. Once the objective is secured, engineer support shifts to countermobility operations against counterattacks.

The brigade engineer plays an important role in recommending obstacle belts that protect the brigade from counterattacks and provide for the continuation of the attack. Countermobility operations are the focus of security and guard elements. These operations help isolate the attack from enemy counterattacks, ensuring the maneuver commander's freedom of action and initiative. These operations are characterized by the full spectrum of the family of scatterable

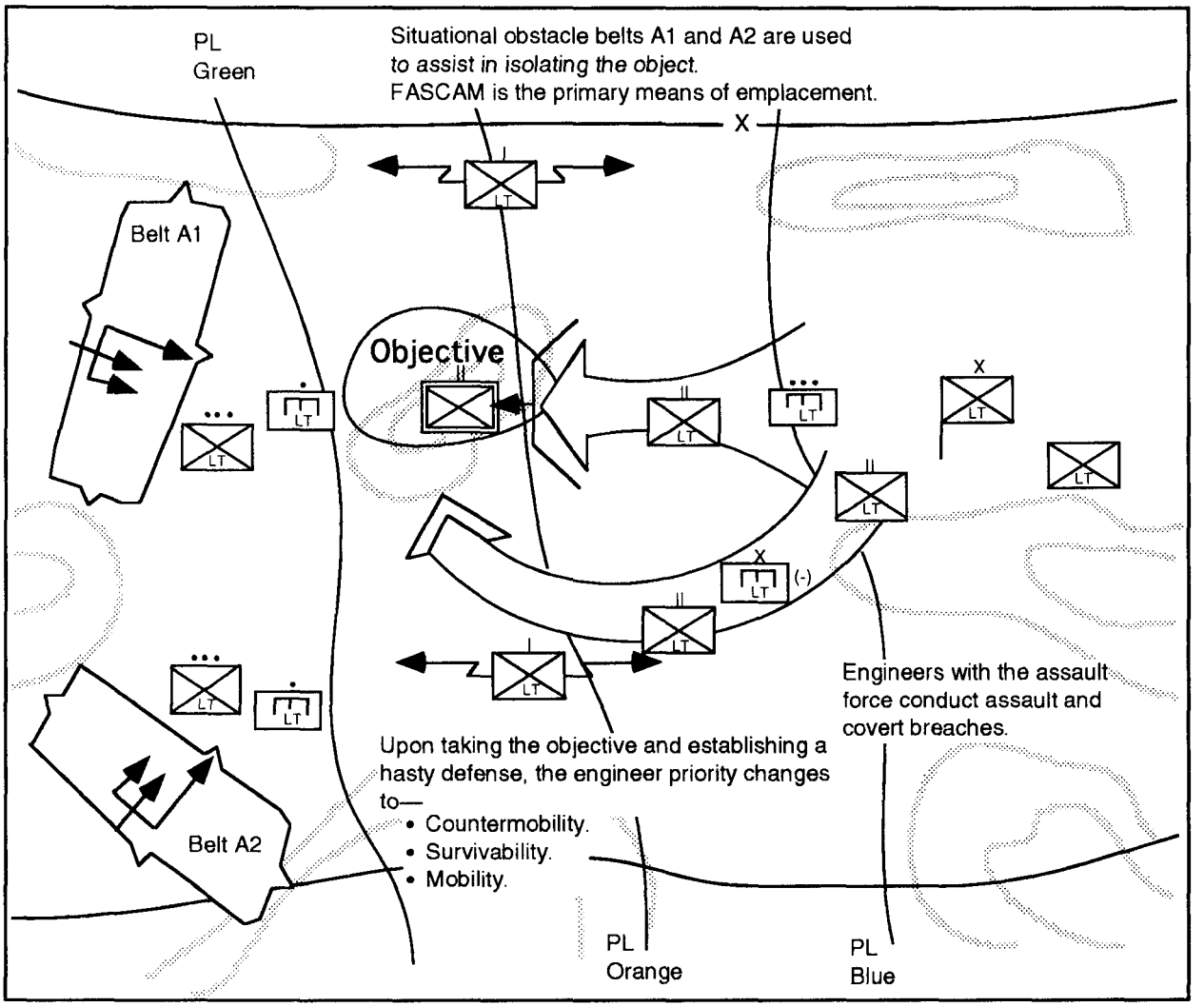


Figure 3-11. Engineer force laydown for a hasty attack

mines (FASCAM) systems and the employment of select conventional obstacles. These obstacles are employed at main choke points on enemy ingress and egress routes and can be applied to either a mounted or dismounted force. Fundamental to these operations is an accurate terrain analysis, verified by ground or aerial reconnaissance, and the synchronization of all fire-support assets available to the brigade. Again, the same logic applies for caution with FASCAM systems as applied in the approach march. These systems must be employed carefully and in a well-coordinated operation to prevent the emplaced obstacles from affecting friendly operations. This ensures that the maximum benefit is realized from these operations.

DELIBERATE ATTACK

The only difference between a HATK and a DATK is the time dedicated to planning, preparation, and coordination before execution. The DATK is characterized by—

- Thorough, detailed planning.
- Rapid concentration of forces.

- Exploiting enemy weaknesses.
- Violent execution.
- Early transition to exploitation.
- Positive, aggressive leadership.

The DATK is conducted to overcome a strong enemy, in prepared positions, that cannot be turned or bypassed. It is only undertaken after—

- A detailed reconnaissance.
- Acquiring and developing targets.
- The integrated analysis of all factors affecting the situation.

Maneuver Considerations

Normally, the DATK employs three elements:

- Main effort.
- Supporting effort.
- Reserve (or follow-and-support forces).

The brigade is organized in depth to ensure flexibility during execution. Indirect-approach methods are commonly used since they serve multiple functions. They protect the force during movement and bypass the enemy's obstacles and concentrated fires.

Various techniques of the DATK may be used when conducting a DATK. Light forces normally use the infiltration. During an infiltration, engineers play a significant role in reconnaissance and covert breaching. See *FM 90-13-1* for more information on covert breaching,

Engineer Support.

Engineer support to the DATK mirrors the HATK except that the brigade engineer has more time for planning.

Key planning time is dedicated to potential subsequent operations as delineated in the commander's intent and mission statements. Follow-on exploitation, pursuit, defense, HATKs, or continued DATKs are war-gamed, planned for, and resourced as required. Similar to the HATK, the plans and preparations completed for the DATK have the biggest impact on subsequent operations. Time will not be readily available to the brigade engineer to significantly influence a continuation of the DATK once underway. Combined arms rehearsals are essential to the success of an attack, especially when time is available.

EXPLOITATION AND PURSUIT

Exploitation and pursuit operations are the rapid continuation of a successful attack to maximize success and take advantage of weakened or collapsed enemy defenses.

Exploitation

This is planned as an integral part of the attack, with tentative objectives, forces, and zones identified for the exploitation. Its purpose is to—

- Prevent the enemy from reconstituting its defenses and forces.
- Deny the enemy's withdrawal.
- Secure deep objectives.
- Destroy enemy forces and C2 facilities.

Minimum control measures are used in the DATK, giving maximum latitude to subordinate commanders. C2 of an exploitation and the planning and preparation that precede it are initiated from the front of the formation rather than from the rear.

Pursuit

This is an extension of the exploitation, resulting in the relentless destruction or

capture of fleeing enemy forces. Light brigades normally conduct pursuits against a similar force, although the brigades or subordinate elements can be part of a division pursuit directed against any type of force. In this role, light forces, especially airborne and air assault, are used to envelop enemy rear guards and to expedite its destruction. Pursuits are comprised of two forces: the direct pressure and the encircling.

Engineer Support

Exploitation and pursuit operations require decentralized command and a clear intent to be successful. The brigade engineer best supports these operations through detailed planning subsequent to their execution. Once exploitation and pursuit are underway, the brigade engineer is limited in his ability to shift engineer assets or change task organizations. The previous task organization of the majority, if not all, of his assets to the forward elements significantly reduces any flexibility to support other missions.

Contingency planning and logistics resourcing is a significant part of the brigade engineer's influence on these operations. The brigade engineer must understand the brigade commander's intent for the attack and the subsequent exploitation and pursuit to address and resource engineer support. Continual monitoring of the current close fight of both forces indicates where resourcing priorities can change, allowing the brigade engineer to influence immediate future operations. For example, once the pursuit force has completed its encirclement and is in a position to transition to a defensive posture, the resourcing of situational obstacles and survivability assets to the force are developed and executed on order.

Mobility is the primary mission of engineer assets with the direct-pressure forces. These forces must maintain contact with the enemy to deny it the ability to disengage. They must have the capability to use all available roads, trails, or corridors. Generally, any obstacles encountered will be hasty in nature unless the pursuit follows through a previously prepared defensive area. At every opportunist y, direct-pressure forces envelop, cut off, and destroy enemy elements. The destruction of enemy equipment and materials, if not used by the attacking forces, are primary engineer missions during these operations. This prevents bypassed enemy forces from using any of these assets.

To be effective, the encircling force must have a greater mobility then the retreating enemy. The encircling force must maintain a rapid rate of advance to allow it to get behind the enemy and block its escape so it can be destroyed. Air-assault and airborne forces are particularly effective in this role. The encircling force advances parallel to the enemy's line of retreat to secure defiles, communications centers, bridges, and other key terrain ahead of the enemy's main force. This is an excellent method to use to block or to emplace obstacles along an enemy's retreat route. Mobility efforts are used only to clear enough zone to allow the force to advance.

CHAPTER 4

Defensive Operations

The ultimate purpose of any defense is to create conditions favorable to assuming the offense. The immediate purpose is to cause an enemy attack to fail. In addition, defensive operations are conducted to—

- Gain time.
- Concentrate forces elsewhere.
- Control key or decisive terrain.
- Wear down enemy forces.
- Retain tactical objectives.

The defender arrives first on the battlefield and, with the help of the engineers, molds it to his advantage. Based on the commander's intent, engineers site and emplace tactical obstacles to produce specific effects on the enemy. Fortifications allow fires from positions that best disrupt and destroy the attacker. Because of his survivability, the defender can postpone the commitment of major forces until the attack develops and then strike the extended enemy over selected and prepared terrain.

Engineers provide essential survivability and countermobility support to the light brigade defense. With this support, the force can position itself and fight from terrain where it otherwise could not survive, while simultaneously attacking the enemy's freedom of maneuver.

On a nonlinear battlefield, enemy forces will be bypassed, penetrated, or encircled without the overall loss of a defense's integrity. Providing support to defensive operations on a nonlinear battlefield is the biggest challenge facing engineers. The defender must identify the enemy's 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 arrayed throughout the depth of the brigade's AO.

Engineer defensive doctrine and considerations for airborne, air-assault, and light infantry brigades are discussed in this chapter. It serves as an extension of *FM 7-30*. The purpose of this chapter is twofold. It-

- Details how brigade engineers integrate into the brigade's decision-making process to plan defensive operations and to track and control the current battle.
- Defines the role of the company commander (and his company) in executing engineer missions in support of the brigade defense.

DEFENSIVE CHARACTERISTICS

The mission of the brigade engineer and the company commander is to plan and execute engineer missions that enhance the brigade's 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 the understanding of the following characteristics:

- Preparation.
- Disruption.
- Concentration.
- Flexibility.

PREPARATION

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 his defense with a mixture of both direct-fire and indirect-fire weapons (directed at the enemy's main threat). The capabilities of these weapons are enhanced by the terrain.

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 to allow the brigade to sustain the fight.

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 of the total defensive framework: deep, security, MBA, reserve, and rear operations. He has to know and understand the capabilities of engineers on the battlefield. The brigade engineer also needs to know how much Class IV/Class V supplies are available and when resupply can be expected.

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

DISRUPTION

Disruption in the defense is achieved by—

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

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

- Force the enemy to fight in more than one direction.
- Fix the enemy in position under direct and indirect fires.
- Block the enemy's penetrations.

The method by which the brigade commander chooses to achieve this varies with the situation, but his ultimate goal is to spoil the attacker's coordination. The brigade's engineer planners and executors work closely with the brigade staff to ensure that M/S and engineer functions are integrated into the brigade's disruption activities. 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 to cause the enemy to turn into a desired area. This prevents the enemy from concentrating irresistible strength against any portion of the defense.

CONCENTRATION

In the defense, the brigade commander concentrates forces 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 combat power during the battle, the brigade may—

- Economize in some areas.
- Retain a reserve.
- Maneuver repeatedly.

Engineers support the concentration of combat power 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 the defender's fires to disrupt, turn, fix, or block enemy forces. This facilitates the brigade commander's concentration of combat power. These efforts, combined with the construction of fortifications and protective obstacles, enhance the brigade's defense. The defender must be able to direct his 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.

FLEXIBILITY

The brigade commander maintains his flexibility through—

- Detailed planning.
- Sound preparation.
- In-depth organization.
- Reserve retention.
- C2.

Ultimately, flexibility requires that the brigade commander see the battlefield to detect the enemy's 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 in the MBA.
- Task-organizing for rapid transition to the offense.
- Improving or maintaining routes needed to shift forces.

Situational obstacles in the MBA are designed to provide the commander with time and space, enabling him to react to an enemy attack. They can be employed in a reinforcing mode, applied to an existing effort, or emplaced by themselves. Mobility requirements are a fundamental component of flexibility. Engineer planners at the brigade must address mobility requirements of the reserve and counterattack forces. This requirement is met through the task organization of engineers to these forces and through positive control of brigade obstacle efforts in anticipation of a rapid transition to offensive operations.

DEFENSIVE PATTERNS

Brigade defensive operations generally take one or two traditional patterns: mobile and area. The fundamental difference between these patterns is their focus-and-defeat mechanism. The focus of light engineer effort, unit missions, and task organization are all inseparably linked to the focus-and-defeat mechanism of each type of defense.

MOBILE DEFENSE

The focus of the mobile defense is the destruction of the attacker within the depths of the defensive sector through envelopment by a counterattacking force. The 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. The 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. Divisions or higher HQ normally conduct a mobile defense, with brigades being used to hold strongpoints in restrictive terrain. While armored forces retain the required mobility to conduct the mobile defense, air-assault forces are also well suited for these operations. Frequently, during mixed operations in restrictive terrain, light forces conduct the delaying action, setting the conditions for the armored force to counterattack.

Engineer support to the mobile defense focuses on—

- Using obstacles to attack enemy maneuver.
- Providing mobility to reserveor counterattacking forces.

To facilitate this support, obstacle-zone planning received from the division and obstacle-belt planning received from the subsequent brigade are directed at the enemy's most likely COA rather than the terrain. Belts are aimed at the enemy's maneuver in the brigade sector to supports its destruction by the counterattack. Therefore, obstacle-belt planning is more restrictive. It reduces the flexibility of the battalions and allows the brigade commander to concentrate 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.

Survivability effort is closely tailored to a force-oriented defense. To create the conditions for a counterattack, the 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 the enemy penetration must be stopped to allow the counterattack to take place.

The defeat mechanism of the mobile defense is the counterattack by a large reserve with mobility superior to the enemy force. The brigade engineer supports this mobility requirement in two ways. He—

- Uses obstacle-control measures to ensure that battalion obstacle efforts do not affect the brigade reserve's freedom to maneuver.
- Ensures that the reserve has the required engineer support to maintain its mobility during the counterattack.

AREA DEFENSE

The area defense is the principal defensive pattern employed by the light forces. Its focus is on denying the enemy access to specific terrain. The area defense is organized to absorb the enemy into an interlocked series of positions from which it can be destroyed. The area defense differs from

the mobile defense in that the bulk of defending forces deploy 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 the defensive positions, seeking to destroy enemy forces with interlocking fires or local counterattacks.

The focus of 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 the area defense, engineer involvement in the terrain analysis becomes vital. They identify key and decisive terrain that supports the commander's concept of the operation. During obstacle planning, the brigades use obstacle-control measures to give maximum flexibility to the battalions while focusing tactical-obstacle effort on the retention of terrain. The brigade engineer must ensure that the battalions are resourced to employ turn, fix, and block belts. They are the principal obstacle effects in the area defense.

Survivability effort in the area defense must accomplish the following:

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

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 the battalion's requirements for not only survivability but also 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. He must ensure that the tactical-obstacle effort of adjacent brigades is coordinated and mutually supporting and that it achieves an interlocking defense. The brigade engineer accomplishes this by closely monitoring the efforts of the maneuver battalions. He uses the battalion's planned groups and the status of obstacle and survivability effort to ensure a focused effort and to deconflict potential problems.

ENGINEER PLANNING AND PREPARATION

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 military decision-making process. The military decision-making process is molded to fit the situation, whereas the engineer-estimate steps focus on considerations that are peculiar to engineers supporting a defensive mission. *Figure 4-1, page 4-6,* shows some examples of engineer-estimate considerations in the defense, principally focusing on obstacles and survivability.

OBSTACLE FRAMEWORK

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

Engineer Estimate	Actions to be Taken	Engineer Estimate	Actions to be Taken
Receive the mission	Sources of Information: • Enemy situation • Mission paragraph • Task organization • Logistics paragraph Determines: • Type of operation • Current intelligence picture • Time available (initial estimate)	Analyze the engineer mission	Sources of Information: • Staff estimates • Higher commander's intent Determines: • Specified and implied tasks • Limitations • Assets available • Risk • Time analysis • Restated mission
Conduct IPB/EBA	Sources of Information: ***Higher Engineer Cell*** Determines: • Engineer task organization • Higher commander's guidance on obstacles • SCATMINE systems available • Obstacle control from higher HQ ***Intelligence Estimate*** Determines: • Terrain analysis. Where can the enemy go? Where can we go? • The probable enemy COA • NAIs/targeted areas of interest (TAIs)/decision points • Enemy vulnerabilities. Are there any vulnerable points? Where does the enemy have to make decisions? What are the enemy's breaching capabilities? ***Logistics Estimate*** Determines: • Who will move the material • What material is available • Where the material is • How the material will be moved • When the material will be moved ***Engineer Estimate*** Determines: • Terrain analysis • Enemy mission and M/S capabilities	Develop the scheme of engineer operations	Source of Information: • Commander Determines: • Authority to emplace different types of obstacles • Situational-obstacle planning (employment of ADAMs/ RAAMs versus artillery on firing targets of opportunity) • Use of blades (survivability versus countermobility) • Use of maneuver forces in the obstacle effort • Guidance on lane closure
		War-game and refine the engineer plan	Sources of Information: • Commander • Staff Determines: • Use of obstacles to support the scheme of maneuver • Requirements for reserve obstacles • Priority of obstacle emplacement
		Recommend a COA	Sources of Information: • COA • Estimates Determines: • Requirements for obstacle restrictions • Requirements for lanes and gaps • Use of situational obstacles • Use of reserve obstacles • Resource requirements
		Finalize the engineer plan and issue orders	Source of Information: • Commander Determines: • Scheme of obstacles overlay

Figure 4-1. Engineer estimate considerations

process of integrating the actual obstacle location with fires is bottom-up driven (initiated by the company commander and TF engineers).

FM 90-7 defines and details obstacle doctrine. Its comprehension and application is a prerequisite to planning engineer support for the brigade in the defense.

OBSTACLE CLASSIFICATION

An obstacle is any physical characteristic of the terrain—natural, man-made, or cultural—that impedes a force's mobility. Obstacles are inherent to the battlefield as one of the military aspects of terrain; however, obstacles are not just terrain features. Friendly forces can use obstacles to modify the terrain to support the commander's scheme of maneuver. Obstacles are classified into two categories:

- Existing.
- Reinforcing.

EXISTING OBSTACLES

Existing obstacles are obstacles that are present on the battlefield as inherent aspects of the terrain. The types of existing obstacles are—

- Natural.
- Cultural.

Natural obstacles are terrain features, such as rivers, forests, or mountains. Cultural obstacles are man-made terrain features, such as towns, canals, or railroad embankments. Natural and cultural terrain features are analyzed based on such characteristics as hydrology, slopes, soil and rock, elevation, vegetation, and built-up areas.

Terrain features are affected by the weather. This must be considered when analyzing the terrain for existing obstacles. Weather conditions can impact mobility by influencing trafficability. For example, farmland could offer excellent mobility during dry-weather conditions; however plowed farmland could impede mobility during wet-weather conditions.

The analysis of natural and cultural terrain features and the effects of weather are consolidated and graphically coded based on the effects they have on a force's mobility. The graphic codes are—

- Unrestricted.
- Restricted.
- Severely restricted.

FM 34-130 provides examples of the unrestricted, restricted, and severely restricted terrain criteria. The analysis of existing obstacles is presented (along with other OCOKA analysis) graphically in a MCOO.

When evaluating existing obstacles, the brigade engineer should review the compiled MCOO. This helps determine what effect (disrupt, fix, turn, or block) the terrain (independent of friendly fires and maneuver) has on the attacker. This facilitates the entire brigade's planning process, especially when determining COAs and allocating resources.

REINFORCING OBSTACLES

Reinforcing obstacles are any obstacles specifically constructed, emplaced, or detonated by enemy or friendly forces. The categories of reinforcing obstacles are—

- Tactical.
- Protective.

Tactical Obstacles

Tactical obstacles are used to directly attack the enemy's ability to maneuver, mass, and reinforce. All tactical obstacles are designed to produce a specific obstacle effect. They are integrated into the force's scheme of maneuver and direct- and indirect-fire plans. Types of tactical obstacles are—

- Situational.
- Directed.
- Reserve.

Situational Obstacles. A situational obstacle is a tactical-obstacle-emplacement capability held in reserve; it is a "be-prepared" obstacle. Situational obstacles provide the commander flexibility for emplacing tactical obstacles based on the battlefield development. Execution is triggered by friendly or enemy actions or a combination of the two. Situational obstacles can be shifted to different locations. However, they must be within the executing maneuver unit's obstacle-control measure. *FM 90-7, Chapter 7,* covers situational-obstacle doctrine.

Situational obstacles contain three components of obstacle intent (obstacle effect, a defined target, and a relative location) and require integration into the decision support template (DST) to be executed effectively. The situational-obstacle plan must identify the trigger action and execution criteria at a specific decision point and the necessary subunit instructions to emplace and cover the obstacle. There are three possible ways for the brigade engineer to employ situational obstacles. He can—

- Plan and execute the obstacle at the brigade level.
- Identify the obstacle intent and allocate the resources to a subordinate unit for execution.
- Allocate the resources for the obstacle to a subordinate unit for planning and execution.

Directed Obstacles. The higher commander directs these obstacles as specified tasks to a subordinate unit. *FM 90-7, Chapter 6,* covers directed-obstacle planning. The brigade obstacle must be within an obstacle zone. The maneuver battalion commander can authorize obstacles anywhere in his directed-obstacle belt. This control procedure ensures the control of the entire tactical-obstacle effort.

Reserve Obstacles. Reserve obstacles are obstacles for which the commander restricts the execution authority they are "on-order" obstacles. Reserve obstacles are located at specific locations and deny the enemy the use of a small area. Only the division commander can authorize directed or reserve obstacles outside an obstacle zone. In turn, only the brigade commander can authorize directed or reserve obstacles outside an obstacle belt. The commander usually specifies the unit responsible for obstacle emplacement, guarding, and execution. The commander must clearly identify the conditions under which the obstacle is to be executed. *FM 90-7, Chapter 7,* covers reserve-obstacle planning.

Protective Obstacles

Protective obstacles are a key component of the brigade's survivability operations. They are employed at the small-unit level (platoon and company team) to protect the defending force from the enemy's final assault. The authority to emplace protective obstacles is normally delegated to the company. Unless specifically stated, protective obstacles are not restricted by obstacle-control measures. Emplacing units remove

protective obstacles before departing the area. A unit must report protective obstacles. *FM 90-7, Chapter 8,* details protective-obstacle planning.

OBSTACLE PRINCIPLES

Commanders use obstacles to—

- Attack enemy maneuver.
- Multiply the effects and capabilities of firepower.

Obstacles alone cannot shape the brigade battlefield. They are used to reinforce existing obstacles, to shape an engagement area (EA), or to enhance fires. Fires cannot be massed everywhere; therefore, the battlefield must be shaped to ensure that the enemy is at the decisive point of our scheme of maneuver. It is the combination of fires and obstacles that shapes the brigade battlefield to mass combat power at the decisive point. *FM 90-7, Chapters 4, 5, and 6,* covers obstacle planning.

To assist in focusing the engineer estimate toward defensive operations, critical obstacle and survivability principles must be reviewed. They are—

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

OBSTACLE INTEGRATION

It is the process of planning, preparing, and executing obstacles with fires and maneuver to achieve a desired effect. The purpose of obstacle integration is to—

- Establish a clear link between the brigade's force allocation, direct- and indirect-fire plans, maneuver, and the obstacle plan.
- Ensure that weapons capabilities and obstacle effects are compatible.
- Provide obstacle control.
- Ensure that obstacles are designed to achieve the specified effect.

For obstacles to have a dynamic impact on the brigade battle, the following must be considered:

- Intelligence.
- Obstacle intent and graphics.
- Fires and obstacle effects.
- Obstacle-control measures.

Intelligence

The brigade's success on the battlefield depends largely on the ability of the commander to see the battlefield. Through the assistance of his S2 and the engineers supporting him, the commander must identify how the enemy may use the existing terrain to gain an advantage. This is particularly true when looking for the enemy's vulnerability. The maneuver commander does this through the IPB process. The IPB process helps the commander to—

- Decide where to kill the enemy.
- Define the decision point based on the terrain, enemy tactics, and vulnerabilities.

Terrain analysis is the first step for any operation. Obstacles are one of the five military aspects of terrain. They are normally existing obstacles; however, reinforcing obstacles may be present in some situations. The identification of mobility corridors (MCs) and AAs help the commander to—

- Determine where the enemy can maneuver.

- Identify any limitations on friendly maneuver.

The brigade engineer assists in this step by identifying the effects that the terrain (independent of fires and maneuver) imparts on the attacking force. This greatly assists the brigade commander in seeing where the enemy will go and how he will attack.

The next step is to determine the size of the enemy force that each AA can support so friendly forces can be properly allocated. An important consideration is to identify any terrain that may cause the enemy to change formation. This terrain is identified by the brigade engineer while evaluating the MCOO.

In the last step, the commander and staff consider where the enemy is vulnerable. Attacking the enemy at the point of vulnerability with fires and obstacles can lead to a decisive victory. Obstacles should be designed against an enemy's breaching vulnerability. If they can be easily breached by the enemy, they may be ineffective to use to shape the battlefield.

Obstacle Intent and Graphics

Obstacle intent and its related supporting effect graphics convey how the brigade commander wants to use obstacles, integrated with fires, to support his scheme of maneuver and to affect enemy maneuver. His obstacle intent provides purpose and unity of effort to the obstacles planned or emplaced by subordinates. Obstacle intent identifies the following:

- Target (enemy force).
- Obstacle effect.
- Relative location.

The brigade commander must understand that it is not obstacles that create the obstacle effect but the combination of fires and obstacles. All tactical obstacles produce one of the following obstacle effects:

- Disrupt.
- Turn.
- Fix.
- Block.

FM 90-7, Chapter 3, provides details on obstacle intent and *Appendix C* of that manual provides details on obstacle resourcing.

Commanders use obstacle-effect graphics to convey the specific effect they want the obstacles to have on the enemy (see *Figure 4-2).* TF commanders use them to indicate the general location of TF obstacle groups. Obstacle-effect graphics can be used to indicate the desired effect of zones and belts. The inclusion of obstacle-effect graphics is not a requirement for brigade obstacle belts.

Fires and Obstacle Effect

Obstacle integration creates an inseparable link between the brigade's fires and obstacles. Neither fires nor obstacles employed by themselves can match the effectiveness achieved by both when they are integrated. The brigade commander, with the brigade engineer's help, establishes his obstacle intent concurrent with organizing and developing the fire plan. Each component of obstacle intent directly impacts the fire plan. Fire-control measures are required to maximize obstacle effect. Obstacle planning does not drive fire planning. Obstacles and fire-control measures must be planned, adjusted, and executed to meet the commander's intent. For more information on fires and obstacle effects, see *FM 90-7, Chapter 3.*

Obstacle-Effect Graphic	Application	Examples Conveying Intent	[1]Resource Factor
Disrupt	Short arrow indicates where enemy is attacked by obstacles. Long arrows indicate where bypass is allowed and attacked by fires.		0.5
Turn	Heel of arrow is anchor point. Direction of arrow indicates desired direction of turn.		1.2
Fix	Irregular part of arrow indicates where enemy advance is slowed by obstacles.		1.0
Block	The ends of the vertical line indicate the limit of enemy advance. The ends of the vertical line also indicate where obstacles tie in to severely restricted terrain.		2.4

[1] See *FM 90-7, Appendix C,* for an explanation of how to use the resource factor.

Direction of Enemy Attack

Figure 4-2. Obstacle-effect graphics

Obstacle-Control Measures

Obstacle control is a tool that commanders use to assign responsibility and provide control for obstacle emplacement. To achieve obstacle control, commanders use obstacle-control measures and graphics. Obstacle-control-measure graphics allow a commander to graphically define the area in which subordinates can plan and emplace tactical obstacles (see *Figure 4-3, page 4-12).*

Obstacle-control measures are specific measures that simplify granting obstacle-emplacement authority and providing obstacle control. Obstacle-control measures are—

- Zones.
- Belts.
- Groups.
- Restrictions.

The divisions and the corps HQ establish zones for the brigades, and the brigades establish belts for the battalions.

Zones. Obstacle zones are a graphic control measure the division uses to limit the area where subordinates are authorized to emplace tactical obstacles. Obstacle zones are planned for at the division and assigned to brigade-level forces. Obstacle zones do

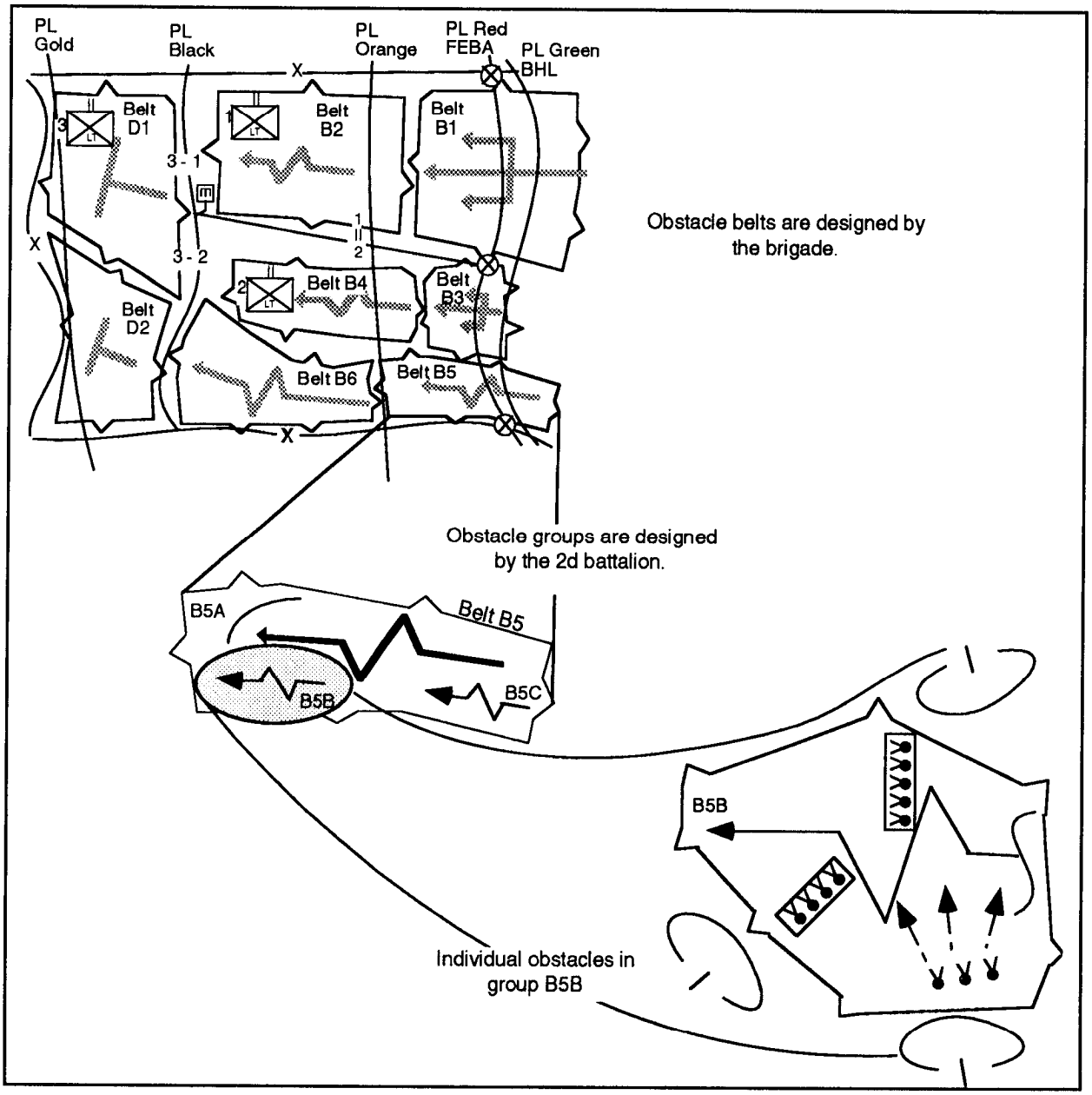


Figure 4-3. Obstacle-control-measure graphics

not cross brigade boundaries. By not crossing brigade boundaries, obstacle zones enhance C2, establish specific responsibilities for the subordinate commanders, and facilitate future operations. Obstacle zones drive the initial flow of obstacle material to the brigade. The division commander may or may not assign an intent to his zones. If he assigns an intent to a zone, he is relating the criticality of that zone and its intent to the division operation. The brigade will normally only see turn or block intents assigned by the division commander.

Belts. Obstacle belts are a graphic control measure that brigade commanders use to constrain tactical-obstacle employment.

They plan obstacle belts within assigned obstacle zones to grant obstacle-emplacement authority to subordinate units. The brigade uses obstacle belts to allow TF commanders the maximum flexibility to emplace tactical obstacles.

Brigade commanders use obstacle belts to focus countermobility effort and fire planning. Obstacle-belt intent specifies to TF commanders what effect the combined results of fires and obstacles must have on the enemy's ability to maneuver.

The brigade commander designates obstacle belts to his subordinate maneuver battalions based on the division's obstacle zone(s) and the brigade's scheme of maneuver. These belts focus and synchronize the brigade's obstacle effort. Obstacle belts generally straddle the enemy AA that the maneuver battalions are allocated against.

The brigade may assign an obstacle intent to an obstacle-control measure or obstacle belt (see *Table 4-1).* A sample obstacle intent would be: "The intent of obstacle belt D3 is to fix the enemy's motorized rifle battalion (MRB) on AA 3 in EA Fox." The supporting obstacle-effect graphic and obstacle intent facilitate the throughput of Class IV / Class V (obstacle) supplies to the maneuver battalions. The brigade engineer resources obstacle belts based on the—

- Intent.
- Standard obstacle-planning factors.

Table 4-1. Obstacle-control measures

Obstacle-Control Measure	Echelon	Specific Obstacle Effect	Size of Enemy Avenue of Approach/Mobility Corridor	
			Armored	Light
Zone	Division Corps	Optional, not normal	Division/ Brigade	Brigade/ Battalion
Belt	Brigade	Optional, but normal	Brigade/ Battalion	Battalion/ Company
Group	Task Force Brigade Division Corps	Mandatory	Battalion/ Company	Company/ Platoon
Restrictions	Corps Division Brigade Task Force	Not applicable	Not applicable	Not applicable

- Sum of MCs that the belt straddles.

This provides an initial estimate of the linear obstacle effort needed to achieve the belt's intent. Obstacle belts do not cross maneuver battalion boundaries for the same reasons that zones do not cross brigade boundaries.

Groups. Obstacle groups are one or more individual obstacles grouped to provide a specific obstacle effect. Obstacle groups are only permitted within the confines of the obstacle belt. The battalion commander designates obstacle groups to focus individual obstacle effort and indirect and direct fires. Obstacle groups directly target the enemy formation against which the maneuver companies (or teams) are allocated.

The maneuver battalion commander allocates groups within the obstacle belts based on the obstacle intent and the TF scheme of maneuver. The summation of the obstacle groups that the battalion directs must accomplish the obstacle-belt intent. In other words, if the battalion is given the responsibility for a belt that requires the enemy maneuver to be turned south, the TF commander is not limited to turn groups only. For example, the battalion commander could target a first-echelon enemy company with a disrupt obstacle group, followed by a turn obstacle group that denies a specific MC, and ending with a block obstacle group against other enemy battalions. The total effect of the obstacle groups turn an attacking dismounted enemy regiment to the south.

If the MC is restricted, point obstacles can be used to disorganize the force. Point obstacles are of irregular sizes and shapes and include all types of materials, such as antitank (AT) and antipersonnel (AP) mines and antihandling devices. They are used to add to the effects of existing and reinforcing obstacles or to rapidly block an enemy counterattack. One point obstacle in a platoon or smaller MC could achieve a disrupt effect, while several point obstacles in depth along the same MC can achieve a fix effect. This is extremely useful in restrictive terrain and for antiarmor ambushes. However, to achieve a block or turn, individual obstacle norms must be used.

Restrictions. Commanders may use obstacle restrictions to limit certain types of obstacles inside an obstacle-control measure (such as a belt). These restrictions ensure that subordinates do not employ obstacles with characteristics that impair future operations. It also allows the higher commander to focus the use of limited resources for the main effort by restricting their use elsewhere. Subordinate commanders have the right to be more restrictive than the higher commander; however, subordinate commanders cannot relax the higher commander's restrictions. Commanders can attach obstacle restrictions to each obstacle-control measure.

OBSTACLE CONTROL

In general, obstacle planning in support of brigade defensive operations is guided by three obstacle-control concepts. These concepts help shape the engineer countermobility effort for the brigade. They—

- Support the brigade's scheme of maneuver and the commander's intent.
- Balance maximum flexibility while providing focus to the obstacle effort.
- Facilitate future operations.

Support Current Operations

The brigade engineer and the company commander must understand the brigade commander's vision of the operation and the brigade's—

- Defeat mechanism.

- Main effort and when it changes.
- Synchronization requirements across the battlefield framework (close, deep, and rear).

These elements ensure that obstacle belts support the brigade's scheme of maneuver and commander's intent.

The defeat mechanism guides the brigade engineer in determining general areas that require obstacle effort and areas that must be free of obstacles or have restrictions. It also drives the type and amount of engineer support to the subordinate units.

The brigade commander's vision of the operation describes how the brigade will achieve the desired end state relative to friendly forces, the terrain, and enemy forces. This vision, along with the defeat mechanism, provides a general framework that brings together the elements of obstacle intent, target, effect, and relative location. The brigade engineer uses this framework to generally envision how subordinate maneuver commanders will fight. This is critical in anticipating the needs of and pushing resources to the maneuver battalions.

The brigade's main effort and when it changes, gives the brigade engineer a guide for determining obstacle-belt priorities and weighting the main effort with engineer resources (manpower and materials).

Certain synchronization requirements impact obstacle-belt planning across the defensive framework. The brigade engineer must consider brigade control and synchronization measures as he develops the obstacle-belt design.

Maximize Subordinate Flexibility

Designing obstacle belts is a balancing act between providing maximum flexibility and focusing tactical-obstacle employment for the subordinate maneuver commander. Maneuver battalions are normally given sectors to defeat the attacking enemy but may be given a BP or strongpoint. The BP and strongpoint are examples of restrictive control measures. Defending in sectors gives the battalion commanders the freedom to maneuver and also decentralizes fire planning, whereas the BP dictates where the majority of the battalion's combat power must be positioned. Even with the more restrictive control measures, battalions still require flexibility in tactical-obstacle employment. The strongpoint is the most restrictive control measure; obstacle-belt flexibility is greatly reduced and focused.

The brigade engineer provides the required flexibility with obstacle-belt graphics through two dimensions: width and depth. The obstacle belt permits the battalion commander to employ tactical obstacles to complement his fire planning and his allocation of maneuver companies, whether in sector or BP. The maneuver battalion is normally assigned a sector or BP based on the attacking enemy's combat power along a specific AA. At a bare minimum, the assigned obstacle belt must encompass the AAs. The maximum flexibility for an obstacle belt width is the entire subordinate's sector. Two exceptions for not providing this flexibility are facilitating future operations and identifying severely restricted terrain, which prevents the enemy from maneuvering. Care must be taken when identifying severely restricted terrain as to its applicability for mounted or dismounted maneuver.

The depth of the obstacle belt is tailored to the brigade's scheme of maneuver and the commander's intent. Specific phase lines (PLs) normally aid in tailoring the depth of the obstacle belt. For example, one battalion might be given the mission to defend well forward in the sector. The obstacle belt would facilitate this intent by allowing less depth. Typical graphics that aid in focusing the depth of an obstacle belt are—

- On-order boundary changes.
- Battle handover lines (BHLs).
- Rear boundaries.
- Forward edges of the battle area (FEBAs).
- Lines of departure.
- Fire-control lines.
- No-fire areas.
- Coordinated fire lines.
- Passage lanes and corridors.
- PLs controlling friendly force positioning.

Facilitate Future Operations

To facilitate future operations, the brigade engineer uses obstacle belts as a restriction of tactical-obstacle employment. The brigade's need for future mobility drives the need for tactical-obstacle restriction. The restrictions fall into two categories:

Decreasing Flexibility. This involves reducing the size of individual belts. Shaping obstacle belts so that they do not overlap the routes needed for future operations ensures freedom of movement.

Restricting Obstacles. This limits the employment of obstacles. Typical examples are allowing surface-laid mines only, restricting the use of antihandling devices, and specifying a no-later-than self-destruct time for SCATMINEs. These obstacle restrictions facilitate future occupation and obstacle clearance by friendly forces.

OBSTACLE PLANNING

Obstacle planning is organic to the brigade's military decision-making process. Its goal is obstacle integration into the commander's intent for the operation and the scheme of maneuver. Obstacle planning must remain flexible to accommodate changes during the planning and the subsequent preparation for the execution of the defense.

Although this chapter focuses on obstacle planning for the defense; the process can be equally applied to offensive operations.

Obstacle-Planning Steps

The echelons of obstacle-planning and obstacle-control principles provide the foundation for the obstacle-planning process. The brigade engineer and brigade staff plan obstacle-control measures to control and focus obstacle effort for subordinate units. Like the engineer estimate, obstacle-planning steps are conducted concurrently as the scheme of maneuver is developed. The obstacle-planning steps are—

- Situation analysis.
- Organization of the operation.
- Mobility and future operations requirements.
- Obstacle resourcing.
- Scheme-of-obstacles overlay.

Of the five obstacle-planning steps, obstacle resourcing is the only one that will be discussed.

Figure 4-4 shows the components of the obstacle-planning process as a parallel process to the military decision-making process. *Figure 4-5, page 4-18,* provides details on the obstacle planning process.

Obstacle Resourcing

There are two techniques that the brigade engineer and staff use for estimating resource requirements for obstacle-control measures. They are—

- Requirement-based resourcing.
- Capability-based resourcing.

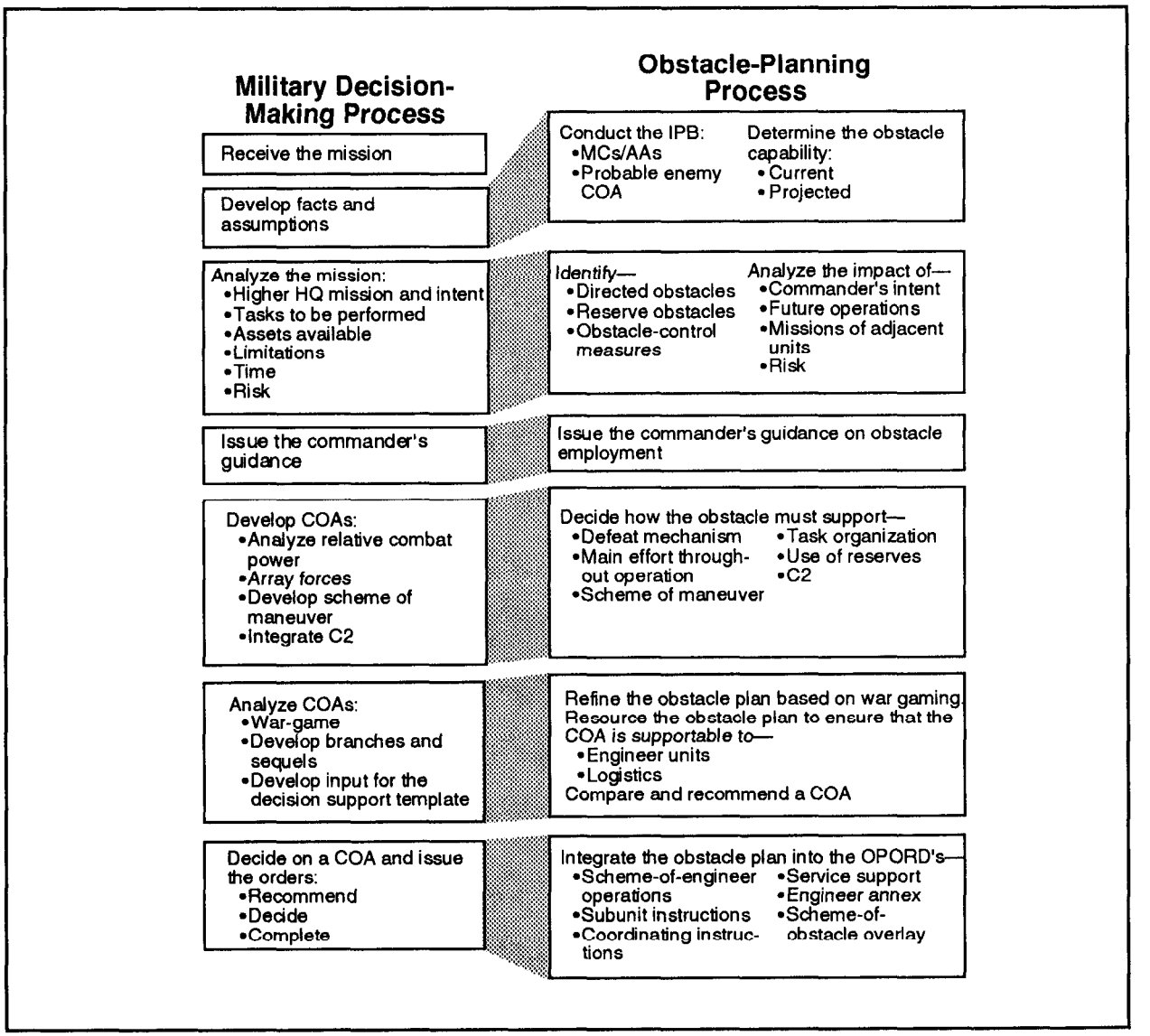


Figure 4-4. The obstacle-planning process as a parallel process to the military decision-making process

For more information on these techniques, see *FM 90-7, Appendix C.*

Requirement-Based Resourcing. One technique is for the brigade to develop tentative obstacle-control measures one level down (battalion), group the control measures into a higher control measure, and resource the higher control measure based on the projected subordinate control measures. For example, the brigade would tentatively array obstacle groups against tentatively arrayed companies in the scheme of maneuver, combine the groups into belts, and resource the belts with obstacle capability based on the tentative groups.

Capability-Based Resourcing. Another technique available to the brigade engineer and staff is to develop the obstacle-control measure based on the scheme of maneuver and resource the obstacle- control measure

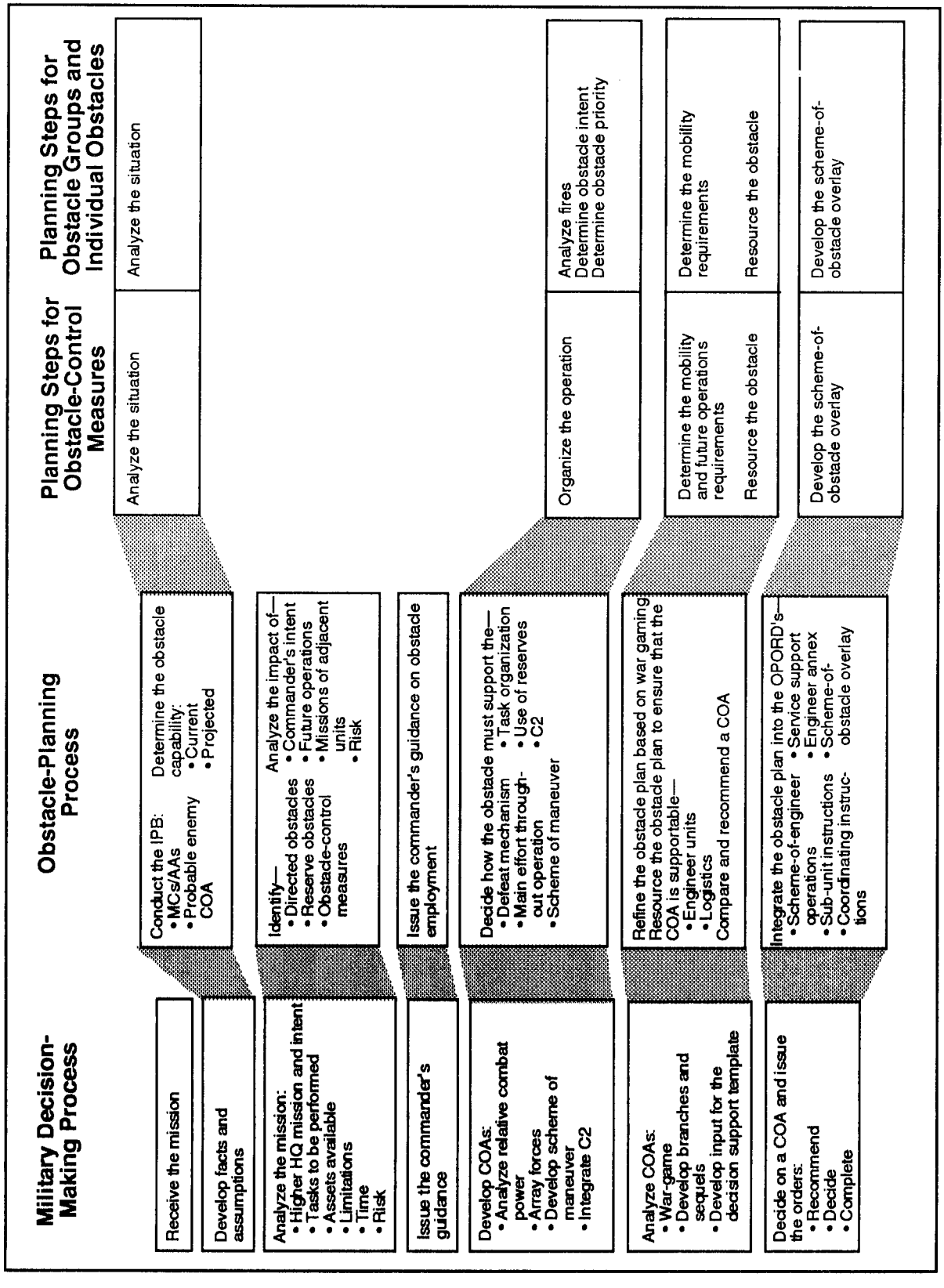


Figure 4-5. The obstacle-planning process

with obstacle capability based on the main effort, priorities, and task organization.

SURVIVABILITY PLANNING

The brigade commander establishes his survivability intent for critical weapons, vehicles, and positions within the brigade. This intent is analyzed by the brigade engineer during the engineer estimate process. The brigade engineer determines the number and type of positions needed to meet the commander's intent. Frequently, at brigade level, this process is used to allocate survivability resources to the battalions rather than to individual systems. During the estimate process, this allocation is balanced with countermobility requirements that may cause problems with the two missions competing for the same equipment resource. Exceptions to resource allocation occur when the brigade commander establishes a strongpoint or an armored unit under brigade control. In these cases, the brigade engineer normally determines BP/EA survivability priorities.

A planning technique that can be used is through aligning the commander's obstacle effects against survivability requirements to conduct initial survivability resourcing. *Figure 4-6* shows an example of this method using a tube-launched, optically tracked, wire-guided (TOW) AT missile launcher mounted on high mobility, multipurpose wheeled vehicles (HMMWVs) for position estimates. The survivability levels shown in this figure are not fixed and are only shown as an example. It is the commander's decision (based on METT-T, balanced against desired obstacle effects) that drives the different survivability levels. In the end, it is the brigade engineer's responsibility to deconflict any potential resourcing problems for the battalions when countermobility requirements of assigned belts conflict with the brigade-directed survivability levels.

Obstacle Effect	Survivability Positions		
	Primary	Alternate	Supplementary
Disrupt	Chassis/Launcher	NA	NA
Turn	Launcher	NA	Chassis
Fix	Launcher	Chassis	NA
Block	Launcher	Launcher	NA

Notes:
1. Construct a "Launcher" survivability position with a TOW AT missile launcher mounted on a HMMWV, in a two-tiered position. This allows the HMMWV to move up to a "launcher" position, fire, and then return to a complete defilade position.
2. Construct a "Chassis" survivability position with only a TOW AT missile launcher exposed while in position. The HMMWV chassis is in defilade.

Figure 4-6. Assigning the commander's obstacle effects against survivability requirements

BATTLEFIELD FRAMEWORK

Brigades may perform a variety of missions within the battlefield framework. Normally, brigades defend within the MBA or serve as a division reserve. The battlefield framework consists of—

- Deep operations.
- Security operations.
- MBA operations.
- Rear operations.
- Reserve operations.

DEEP OPERATIONS

Deep operations support the commander's basic scheme of maneuver by conducting operations against the enemy in depth. Light engineers can be used to conduct cross forward line of own troops (FLOT) reconnaissance and engineer raids. Light engineer missions prevent the enemy from concentrating overwhelming power against the brigade's MBA forces. They accomplish this by separating the enemy's echelons and disrupting its command, CS, CSS, and LOC. Effective execution depends on careful planning and the IPB. Air-assault units are particularly suitable for this type of operation.

SECURITY OPERATIONS

Security operations are essential to the success of the brigade defense. They are characterized by aggressive reconnaissance to reduce terrain and enemy unknowns. This is achieved by gaining and maintaining contact with the enemy. Engineers have the ability to upgrade routes and survivability. They should not be used to construct protective obstacles. All combat units have this task as part of their mission.

MBA OPERATIONS

Forces at the FEBA, or within the MBA, fight the decisive defensive battle. The forces are positioned so that they can control or repel enemy penetration. The brigade commander adjusts the initial defensive plan based on information received during security operations. He assigns the battalion sectors, BPs, strongpoints, or a combination of all three based on METT-T. They usually coincide with a major AA. Engineers put in obstacles based on the desired effect:

- Disrupt.
- Turn.
- Fix.
- Block.

Engineers should also be ready to support the counterattack. The brigade commander and staff must recognize the likelihood of penetrations of the MBA when they are fighting a large mobile force. When this occurs, engineers should be deployed to that area.

REAR OPERATIONS

Corps and division commanders normally direct rear operations, although the brigade's tactical operation may include rear operations. When this occurs, engineers could be called on to—

- Upgrade/repair MSRs.
- Repair FLSs.
- Perform survivability missions.
- Build FARPs.

Corps engineer assets are usually requested to perform these missions.

RESERVE OPERATIONS

Reserve forces in the defense preserve flexibility. Engineers can be used to support counterattacks by performing mobility missions, reinforcing forward defensive positions to block enemy forces that penetrate the brigade's defense, or reacting to a rear-area threat.

LIGHT BRIGADE DEFENSIVE OPERATIONS

The principles and considerations presented at the beginning of this chapter are relevant to all types of "light force" defensive operations (airborne, air assault, light). Defensive preparations for a light brigade (especially when defending against a force of greater mobility and firepower) require EAD engineer support beyond that which can be provided by task-organized DIVENs.

BRIGADE SCENARIO

The division commander has positioned the brigade in an economy-of-force mission in restrictive terrain. The brigade has been given the mission to defend in sector, denying the enemy use of multiple high-speed AAs into the division and joint task-force (JTF) rear. The brigade sector is composed of very restrictive terrain with two battalion-sized MCs that will support a mounted attack. Enemy forces facing the brigade are a motorized rifle regiment (MRR) variant with two MRBs and one light dismounted battalion. Enemy forces have the mission to attack and destroy the division lodgment (rear). *Figure 4-7, page 4-22,* shows the brigade scheme of maneuver.

The brigade's combat power consists of its three organic infantry battalions, in addition to combat units task-organized to the brigade. These units could include—

- A task-organized aviation TF.
- An M8 light tank company.
- Other supporting units.

Engineer assets task-organized to the brigade are a—

- Light DIVEN company (augmented by a division assault and barrier (A&B) platoon slice).
- Corps light engineer company.
- Combat support equipment (CSE) horizontal platoon.

This level of engineer support for a light brigade will take the existing engineer C2 system to its operational limits. Without the total synchronization and integration of all engineer forces in the brigade sector, engineer support to the brigade is at risk. Any higher density of engineer support to the brigade requires that a C2 package be established and task-organized to the brigade by the DIVEN. After the light DIVEN company deploys into the operational area, it is task-organized to the brigade. It augments the engineer C2 system and establishes the BREC. The corps light engineer company ties into the established engineer C2 system and augments existing C2 systems capabilities. The brigade engineer retains functional control, through the brigade commander, of all engineer forces in the brigade sector. The company commanders maintain unit C2 of their companies and any additional forces task-organized to them.

BRIGADE SCHEME OF MANEUVER

The brigade will conduct the operation in the following:

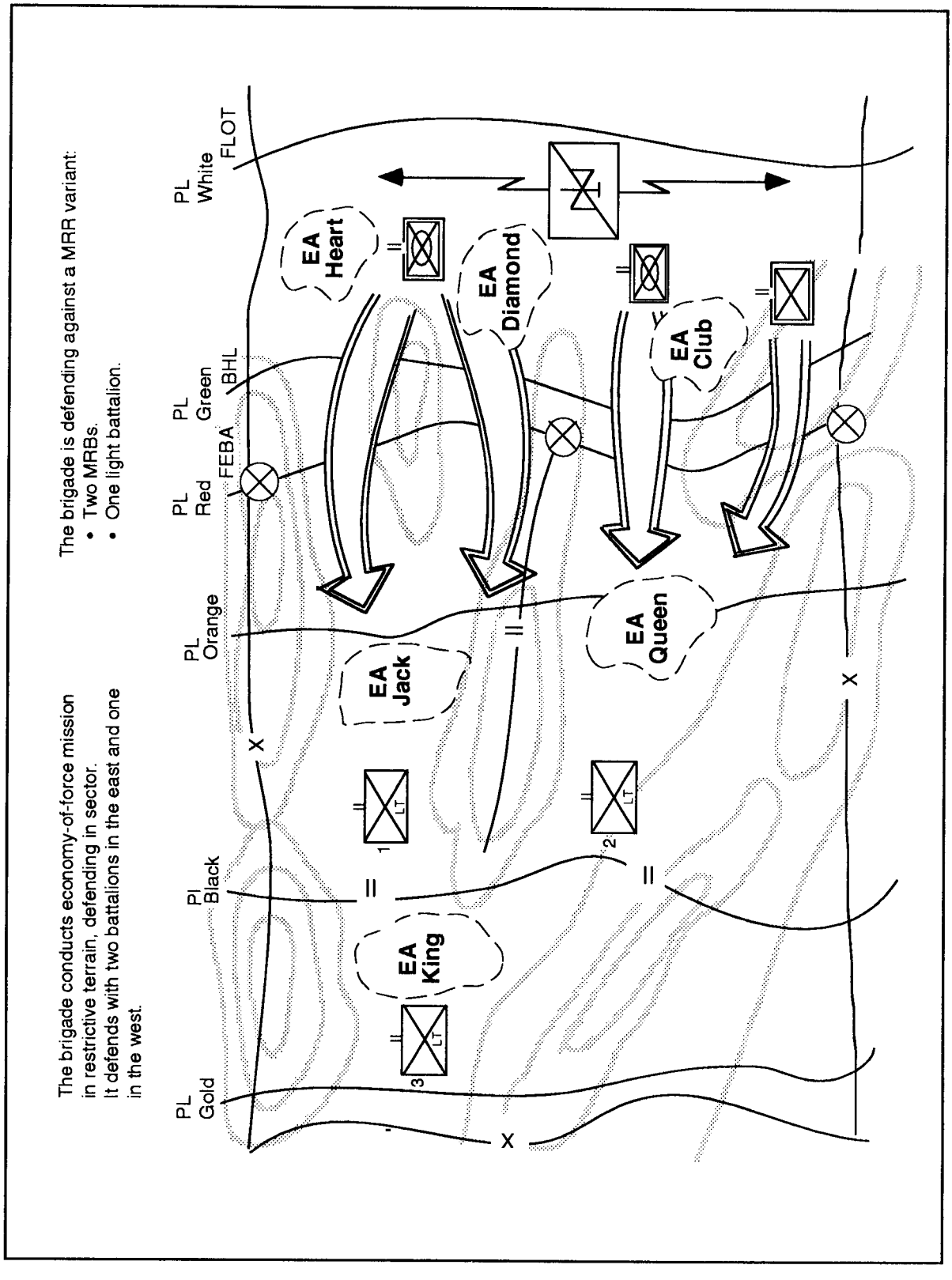


Figure 4-7. Brigade scheme of maneuver

- Phase 1- Preparation and counterreconnaissance.
- Phase 2- Security area battle.
- Phase 3- MBA battle.

1st Battalion

The battalion defends in the sector forward of PL Black, allowing no penetration larger than a company (-); conducts battle handover early with the aviation TF well forward of the BHL, PL Green; and prepares to receive support from the light tank company.

2d Battalion

The battalion defends in the sector forward of PL Black, allowing no penetration larger than a company (-); conducts battle handover with the aviation TF at PL Green; receives OPCON of the light tank company (on order, the light tank company is OPCON to the 3d battalion); and is the brigade's main effort during phase 2.

3d Battalion

The battalion defends in the sector forward of PL Gold (brigade's no-penetration line) against remaining enemy forces; does not allow enemy penetration of PL Gold by platoon-sized or larger elements; on order, receives OPCON of the light tank company from the 2d battalion; establishes company-sized elements as the brigade reserve; prepares to support the forward battalions by air assault; and is the brigade's main effort during phase 3.

Aviation TF Commander

The commander initially screens along PL White; conducts battle handover with the division cavalry troop; destroys enemy reconnaissance assets and identifies the main body; performs the guard force mission with the priority to destroy enemy C2 and breaching equipment upon contact with the main body; on order, conducts battle handover with the 1st and 2d battalions; prepares to support the lst, 2d, and 3d battalions with attack helicopter (AH) support; and assumes the brigade reserve after battle handover.

Light Tank Company

The company defends in the sector; initially is OPCON to the 2d battalion; assists the security area fight by providing fires into EA Club; on order, is OPCON to the 3d battalion; and prepares to support the 1st battalion.

DEEP OPERATIONS

The division is conducting all operations forward of the FLOT. PL White is also the division's fire-support coordination line. Vital information (enemy's formation and composition) will be passed from the cavalry squadron to the brigade. This will aid in high-payoff target nominations and selections for the attack helicopter battalion (AHB) in the security area fight. The brigade engineer must also receive any information relating to planned obstacle zones or belts employed forward of the brigade sector that will be used during division security operations. This will facilitate the integration of planned obstacle intents between the division and the brigade and the transition from division security operations to brigade security operations. *Figure 4-8, page 4-24,* shows some mission considerations for brigade deep operations.

SECURITY OPERATIONS

Security operations are characterized by reconnoitering aggressively to reduce terrain and enemy unknowns. This is achieved by gaining and maintaining contact with the enemy to ensure continuous information and by providing early and accurate reporting of information to the main body.

Battlefield Area	Mission Considerations
Deep Area	**Plan and Prepare:** • Determine who/what type of element is conducting the deep operations in front of the brigade. • Determine what obstacle zones/belts are in front of the BHL with the division. What type of obstacles? What is their intent? • Determine if there are any reserve obstacles forward of the BHL that might not get executed. • Determine what effect/impact that deep-area obstacles have on attacking forces once the BHL is accomplished. (What will the enemy look like at the BHL?) **Execute:** • Ensure that the location/limits of zones/belts in front of the brigade are verified. • Verify any fire-support coordination line established by higher HQ and its impact on situational obstacle safety boxes in the brigade security area.

Figure 4-8. Mission considerations checklist for deep operations

The aviation TF is the security force for the brigade (see *Figure 4-9).* Their mission is to—

- Initially screen along PL White.
- Conduct battle handover with the division.
- Destroy enemy reconnaissance forces.

The security-area fight for this operation will be characterized by the following:

- Centralized planning.
- Decentralized execution.
- Rapidly developing fight.

To accomplish its missions, the aviation TF must have security-area forces in position as soon as possible. To provide the maximum amount of support for the security-area fight, planning is conducted centrally by the brigade with the aviation TF commander and staff. Only after planning is completed (as an extension of the estimate process) can the early initiation and completion of work in the security area begin. This planning ensures that the aviation TF commander has the maximum latitude for execution and yet is in agreement with the brigade commander's intent and concept of the operation. This planning also ensures that the execution of missions in support of the security-area battle can begin before the brigade OPORD is issued or soon after.

The brigade will take control of the battle from the division, with an air cavalry troop screening for the brigade. Upon contact with the attacking first echelon, the aviation TF commander will assume the guard force mission, committing his attack assets in conjunction with both indirect fires and tactical, air sorties. With the main effort of enemy effort templated to be in the southern sector, the aviation TF will conduct

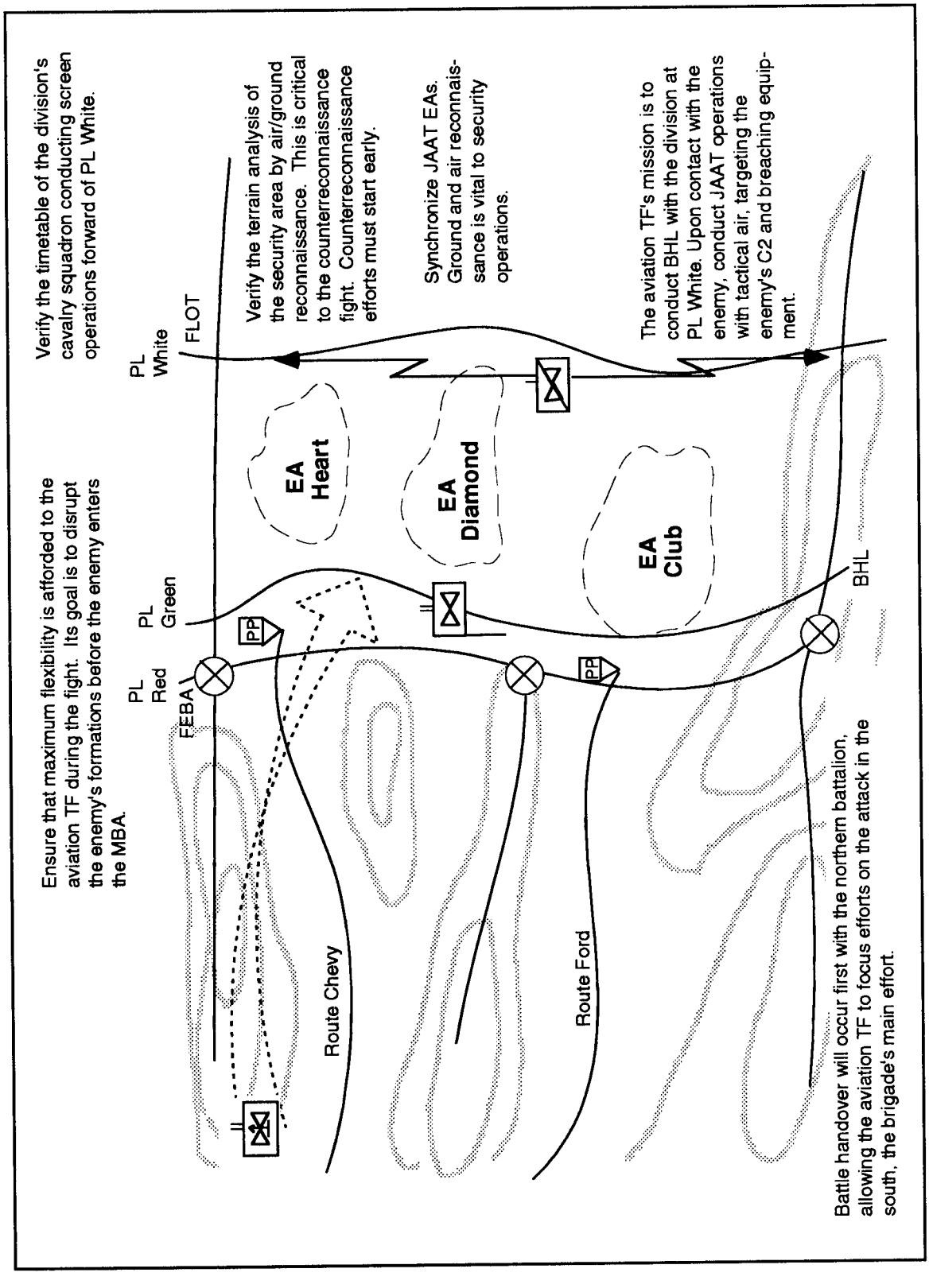


Figure 4-9. Security operations analysis

battle handover early with the 1st battalion in the north. This will allow the aviation TF to focus its antiarmor efforts on EA Diamond and EA Club.

Integrated delay actions are planned in the southern portion of the security area. The light tank company (-) will position forward of the FEBA (PL Red) and behind PL Green to fire into EA Club. Once the light tank company (-) initiates fires into EA Club, attack elements of the aviation TF will engage the enemy from the flanks and rear, allowing the light tank company (-) to displace to its subsequent position. The brigade engineer and the supporting company commanders must fully understand the significance and the intent of the aviation TF's screen mission and its transition to the guard force. Because of the importance of timely and synchronized engineer support, an engineer planner is sent to the aviation TF's CP.

A combined ground and aerial reconnaissance by company commanders and key security-force leaders is critical to effective engineer support in the security area. The execution of engineer missions supporting the security-area fight must begin early so that engineer forces working in the security area do not impact MBA preparations. *Figure 4-10* shows both light engineer companies task-organized to the brigade and working in the security area. When the MBA TFs are ready to begin their planning process, an engineer planner (from the company that will be supporting that battalion during MBA preparation) is sent to the TF CP. Engineer forces are then echeloned into the MBA preparation as security-area preparation is complete and MBA TF missions are available.

The brigade commander's early commitment of the majority of his engineer forces will require detailed coordination for their security. Enemy forces will frequently target friendly engineer forces and Class IV/Class V supply points. This is especially true-for a light force defending in restrictive terrain where obstacles can have a significant impact on the enemy's maneuver. The brigade engineer coordinates security requirements for engineer forces to provide protection from both ground and air threats. He also coordinates with the brigade air defense artillery officer (ADAO), ensuring that the air defense artillery (ADA) weapons coverage plan is synchronized with the engineer work plan. To effect adequate coverage, stinger teams may be required to link up with and deploy into the security area with engineer forces. The brigade engineer also coordinates with the brigade S3 for ground security. Coordination with the aviation TF commander may also allow ground security from the aviation TF ground cavalry troop. A ground-defense plan must also be addressed by the company commanders, encompassing protection against any templated ground threat during the preparation phase.

Obstacle belts established to support security operations must facilitate decentralized combat operations. While one belt could have been established for the entire security area, two were developed to facilitate resourcing. Belt Al encompasses EAs Heart and Diamond, and belt A2 includes EA Club. One of the first steps taken by the brigade engineer is to verify with the division any obstacle restrictions linked to the division's fire support coordination line (FSCL) (PL White). In this example, the ability to engage targets forward of PL White would facilitate the brigade's acceptance of the fight from the division. Once the sites for obstacle belts Al and A2 (forward of PL White) have been approved by the division, plans are made by the brigade engineer, company commanders, the brigade aviation LO, and TF staff for the aviation TF to employ three disrupt obstacle

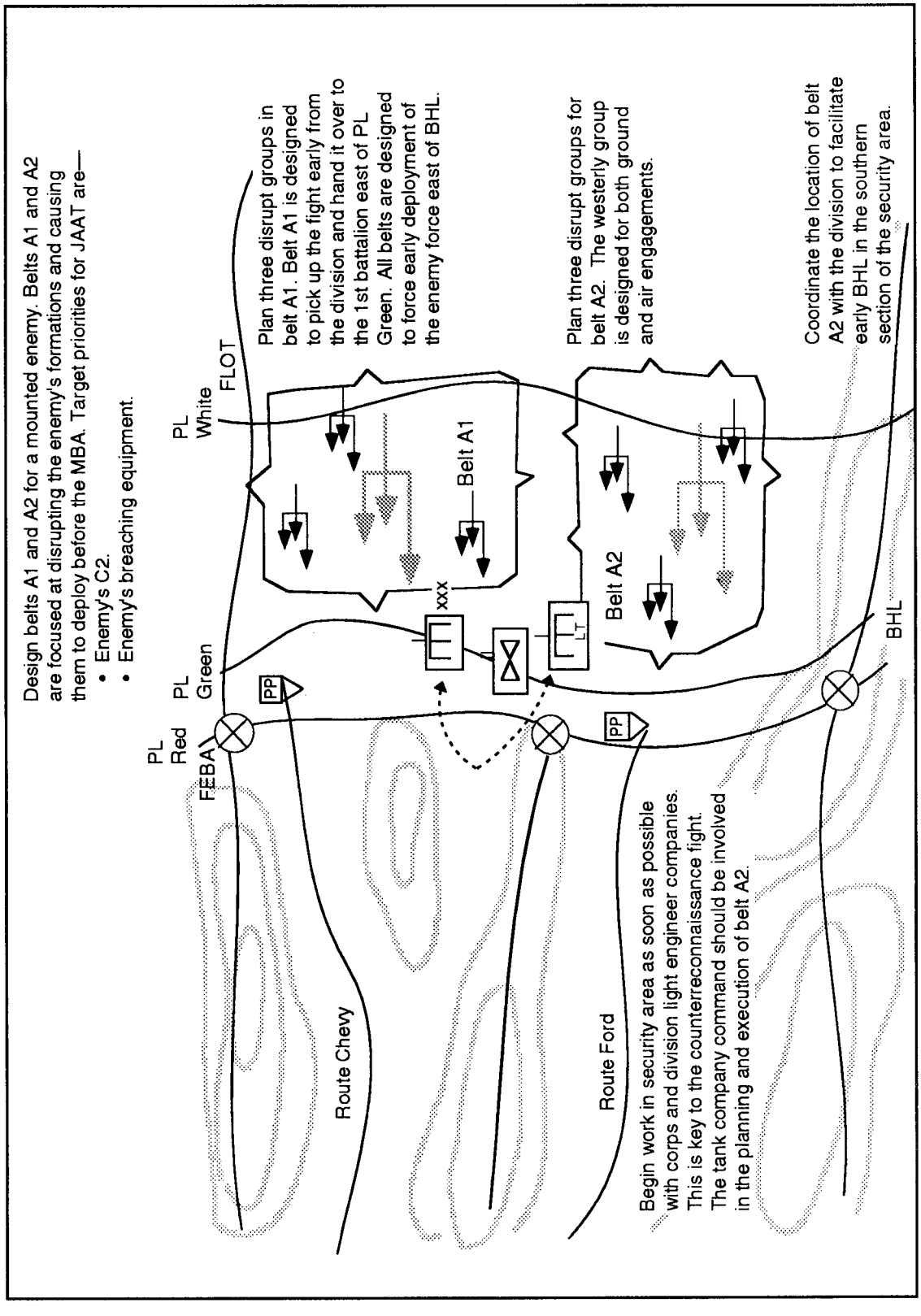


Figure 4-10. Security operations and engineer functions

groups (point obstacles) within each belt. While these groups are not normally dictated to the aviation TF, they might be in this situation to help in quickly assuming control of the security area. The initial location of the groups is a result of careful and detailed analysis of METT-T, reinforced by reconnaissance. It is detailed enough to preclude any significant changes in the intent and location of the groups. The groups are designed to facilitate the aviation TF's ability to gain early contact with the enemy and to maintain pressure on it through the security-area fight. Group planning is also vital to support initial logistics and engineer resourcing for the belts. Conventional obstacles, along with air and ground Volcano, MOPMS, ADAMs and RAMMs, can all be resourced for these belts.

Detailed planning conducted at the brigade and subsequently with the aviation TF may allow lift assets to haul and place Class IV/ Class V (obstacle) supplies at obstacle-group locations. These same lift assets may also be able to sling engineer equipment forward, as required. The aviation TFs have two primary missions during phase 1. They are—

- Early warning of the main body.
- Destruction of enemy reconnaissance forces.

For a light force, the destruction of enemy reconnaissance elements is especially critical. Such destruction significantly degrades the enemy's ability to develop an accurate picture of the MBA. The aviation TF's initial obstacles should focus on the destruction of enemy elements and, ultimately, the disruption of the its lead echelons. Detailed ground and air reconnaissance, detailed obstacle planning conducted at the brigade, and the S2's templating of the enemy's reconnaissance and first-echelon elements aid in the final positioning of obstacles. Initial engineer effort is directed at supporting the counterreconnaissance fight. This effort can consist of point obstacles integrated with remote-sensor devices from military intelligence assets available in the brigade. These obstacles serve to destroy enemy reconnaissance elements and provide early warning to the aviation TF of its presence in the brigade's sector, allowing AHs to quickly respond.

M/S responsibilities in the security area also encompass elements of the light tank company. The brigade commander directs two platoons of the light tank company to be positioned just forward of the FEBA (in the 2d battalion's sector), controlling PL Green and the BHL for the 2d battalion. They will engage enemy targets in belt A2 (EA Club) and then disengage to subsequent positions in the 2d battalion's sector. Obstacles in belt A2 must not only enhance indirect fires and AH fires but also main-gun fires from the light tank platoons. Integrating these three levels of fires with the desired obstacle effects in restrictive terrain is ultimately the responsibility of the aviation TF commander. It requires detailed coordination between the aviation TF commander, the light tank company commander, the brigade engineer, and the supporting company commander. The plan is for the light tank platoons to fire into EA Club at the enemy's first-echelon elements. The aviation TF's AHs then use their combat power to distract and disrupt the attack so the light tank platoons can disengage and displace to subsequent positions. The brigade engineer and the aviation TF commander consider situational obstacles in belt A2 to assist the light tank platoon and aviation TF in providing time and space for the battle handover with the 2d battalion.

The brigade commander wants turret-defilade positions for the two light tank platoons to ensure their survivability for the MBA fight. *Figure 4-11* shows some mission considerations for security operations.

Battlefield Area	Mission Considerations
Security Area	**Plan and Prepare:** • Determine what type of element is conducting the brigade's security-area operations. (Consider sending an engineer planner to that CP during its planning process.) • Evaluate the commander's counterreconnaissance plan and intent. What type of obstacle will best support it? • Consider the early use of point obstacles with remote sensors to assist the counterreconnaissance fight. (A key factor in restrictive terrain is to defeat enemy reconnaissance before the MBA.) • Plan for a security element (threat based) for engineers working in the area, such as ADA coverage and ground security. • Ensure that ground/air reconnaissance is conducted by the engineer planner; it confirms the MCOO. • Determine survivability requirements for any ground forces in the security area. • War-game and rehearse decision points for situational obstacles with the S2, the engineer company commander, and security-area units. • Address protective-obstacle requirements for ground security-area units (dismounted enemy attack against any task-organized armor). **Execute:** • Start execution as early as possible. Ensure physical linkup with ground forces in the security area. • Rehearse the timings of decision points developed in the plan. • Use the aviation lift assets to sling Class IV/Class V supplies into the AO. • Verify situational-obstacle locations developed in the plan with ground reconnaissance. • Verify mobility requirements for division and brigade security-area forces that must pass through the area: lane closure, obstacle handover, and obstacle C2. Ensure that rehearsals are conducted. • Ensure that there is staff engineer respresentation for TF planning during security-area preparation. • Maintain flexibility because security-area operations are dynamic. • Verify obstacle and direct-fire integration of EAs on the ground (critical for AHs and close area support.)

Figure 4-11. Mission considerations checklist for security operations

MBA AND RESERVE OPERATIONS

The decisive battle to defeat the enemy will be fought in the MBA (see *Figure 4-12, page 4-30).* Forces are positioned in the MBA so that they can control or repel enemy penetrations. The brigade engineer and company commanders dedicate the majority of their planning time to the MBA fight. Each of the three battalions require different engineer planning and execution considerations

1st Battalion

The 1st battalion's area is characterized by restrictive terrain with two company-sized mounted MCs that converge at about the

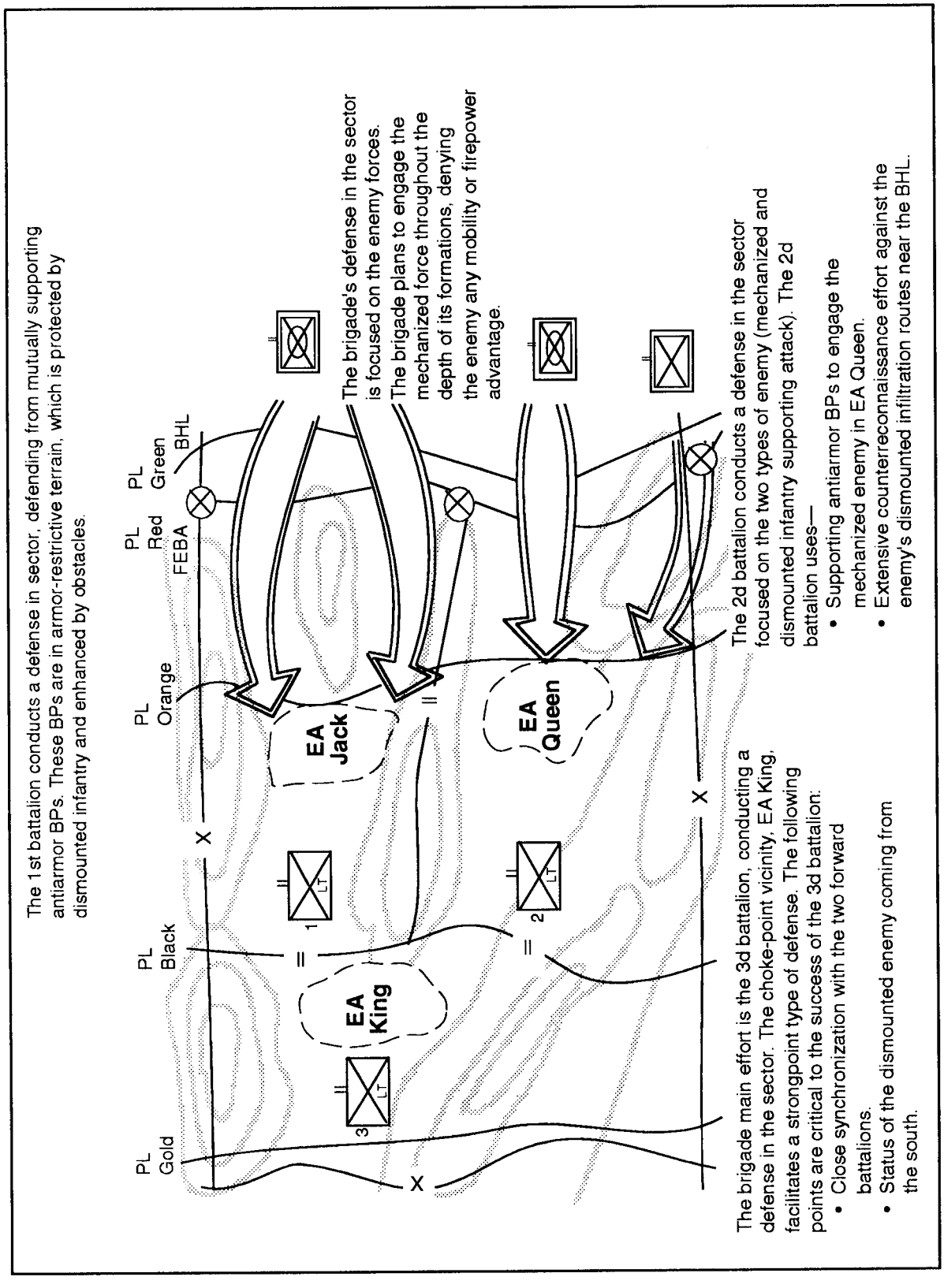


Figure 4-12. MBA operations analysis

midpoint of the sector into a single battalion-sized corridor. The primary concern for the battalion is the templated MRB, primarily BMP- 1s, moving through its sector and into the brigade rear.

The 1st battalion commander will conduct a defense in the sector, exercising the option to begin his engagement of enemy forces at long range. The battalion will accept early battle handover with the aviation TF well forward of the BHL (PL Green). EA Heart and EA Diamond are designed to facilitate the BHL. An AH and indirect and tactical-air fires will initially service the EAs. These fires are intended to breakup the continuity of the enemy attack as it approaches the BHL. As the aviation TF assets conduct battle handover with the 1st battalion and shift its efforts to the south, indirect and tactical-air fires continue into the two EAs. As the enemy moves within range of the battalion's heavy antiarmor weapons (TOW AT missile launchers mounted on HMMWVs) at the western edge of the two EAs, these weapons further disrupt the enemy's synchronization, keying on HVTs. As the enemy approaches the BHL where the terrain splits the sector into two company-sized mounted MCs, the TOW AT missile launchers disengage to subsequent positions. When the enemy is within range of the battalion's organic weapons systems, antiarmor weapons engage it from multiple directions. Finally, as the enemy enters EA Jack, all the battalion's antiarmor systems are directed at the destruction of the enemy, with AHs from the aviation TF on call.

A corps light engineer company, given the mission of emplacing belt Al in the security area, is task-organized in DS to the 1st battalion. This allows the corps light engineer company commander to provide the 1st battalion with detailed information on the terrain, the obstacles, and the plan for conducting the security-area fight immediately forward of the battalion. This task organization is effective when the corps light engineer company's work in the security area is completed.

The planning and execution of engineer operations in support of the 1st battalion are facilitated through the company commander that is task-organized to the battalion involved in the planning process at the brigade. This allows his company to remain proactive to the entire operation, especially during the company's transition from supporting operations in the security area to supporting the 1st battalion in the MBA. While the company is conducting operations in belt Al, the 1st battalion will begin planning for their defense in the sector. The company commander is responsible for sending an engineer planner to the 1st battalion CP during its planning. It is preferable for the company commander to conduct this planning. However, many factors help determine who is actually sent, such as the—

- Current status of engineer work in belt Al.
- Current enemy situation in the brigade sector.
- Fact that the predominance of engineer effort will be expended in the MBA where the decisive battle will be fought.

As the plan develops and engineer missions are generated, engineer elements are echeloned out of the security area into the 1st battalion's sector to begin work. This transition is monitored closely by the company commander to ensure the completion of work in the security area and the rapid shift of engineer effort into the 1st battalion's sector. The current status of the transition must be reported to the brigade engineer.

A detailed terrain analysis by engineer planners and executors is critical to the 1st

battalion's defense. This analysis will influence two key elements of engineer support:

- Obstacle-belt location (and intent).
- Engineer resource allocation.

An important component to the terrain analysis is the detailed information on the terrain and obstacles in the security area forward of the 1st battalion's sector. This information is important to the commander. It allows him to know how the enemy's maneuver will be affected before entering the MBA. The corps engineer company commander is the main source for this information.

The brigade engineer and the company commanders develop two belts to support the 1st battalion. A disrupt belt (B1) and a fix belt (B2) were developed using the requirement-based technique. Groups were planned through the war-gaming process to determine the components of the belts, but the groups were not dictated to the battalion. *Figures 4-13, and 4-14, page 4-34,* show obstacle belts and defensive considerations for the 1st battalion.

Engineer planners developed belt B1 in anticipation of the battalion employing two disrupt groups. These groups are aimed at breaking up the enemy's C2 and forcing it to piecemeal its attack. The locations of the group are tied to the terrain where the enemy's maneuver formations will be forced into company MCs. These groups are also intended to support early battle handover with the aviation TF and to initiate the battalion's long-range fires in and around the area where its TOW AT missile launchers can effectively engage.

The fix belt (B2) is resourced for three fix groups. These fix groups are aimed at holding the enemy in the narrow portions of the MCs and in EA Jack, forcing it to breach repeatedly. This significantly slows the enemy's mounted movement. The groups are also balanced against the antiarmor capabilities of the battalion in that portion of the sector. This enhances the tracking time available to and the maximum standoff range of the weapons systems.

Battle handover will occur first with the 1st battalion. To facilitate this, the 1st battalion must receive detailed information on the terrain and obstacles in the security area forward of its sector. This information is vital to allow for an early, seamless transition of the fight from the aviation TF to the 1st battalion. This information also allows the battalion commander to understand what impact it will have on his defensive sector. The corps light engineer company supporting the 1st battalion is the base for this information. During war gaming with the brigade staff, the engineer planners determine that the battalion's TOW AT missile launchers can effectively engage targets in the two westerly groups planned in belt Al. The decision on whether the battalion commander uses these groups to facilitate the early battle handover will be his to make, but guidance is issued in the brigade order. However, the disrupt groups in belt B1 are planned to support and synchronize defensive measures with the two adjacent groups in belt Al.

Engineer planners direct their efforts at the mounted enemy coming into the 1st battalion's sector, but they are also alert to the possibility of a dismounted enemy coming into the sector using the restrictive terrain. Initial planning is conducted, and assets are resourced by the brigade to assist the battalion in countering the enemy. Detailed planning will be conducted by the corps light engineer company commander with the battalion during its planning process.

Survivability efforts must begin in the sector as soon as possible due to the enemy's templated indirect-fire capabilities. Since

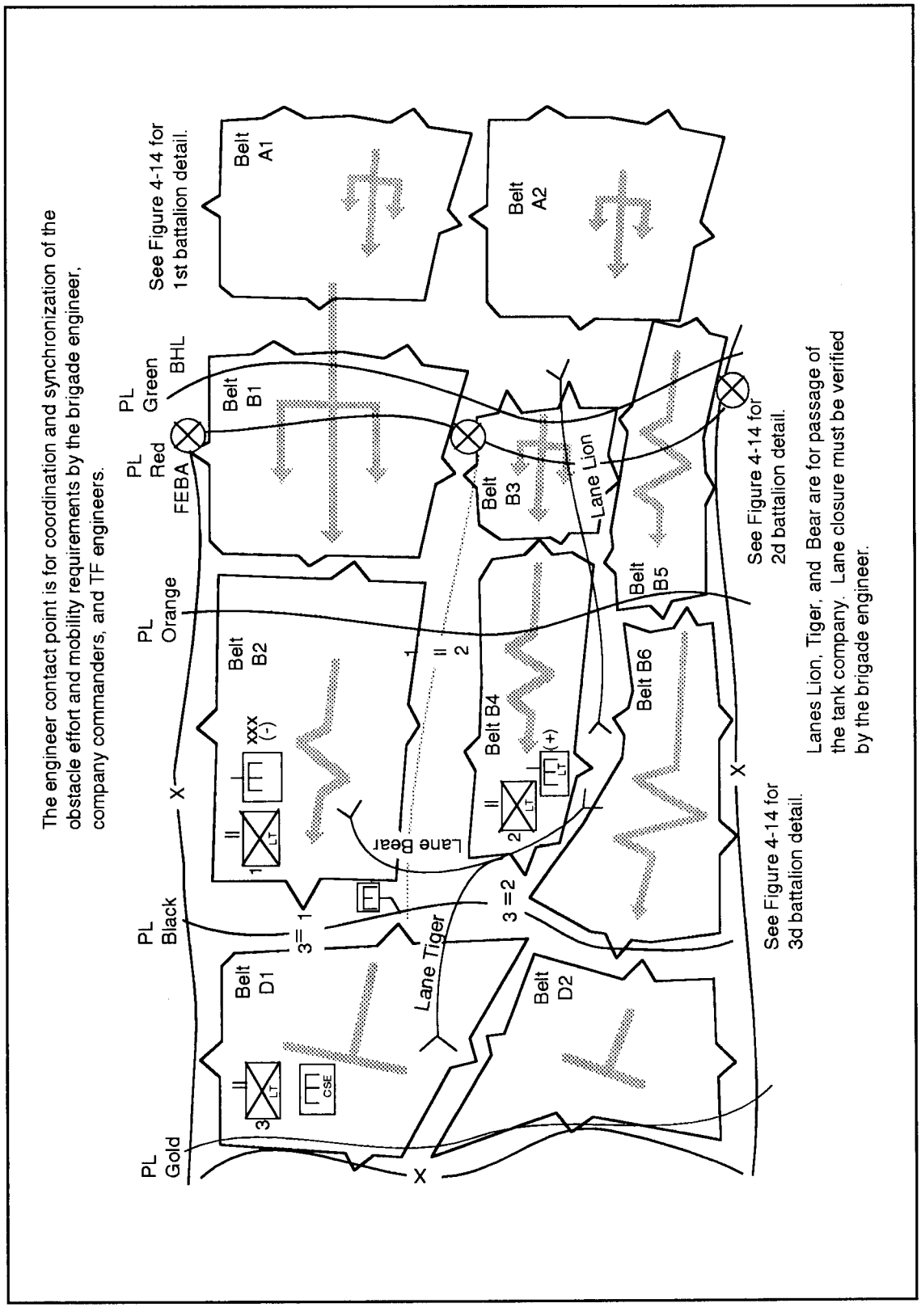
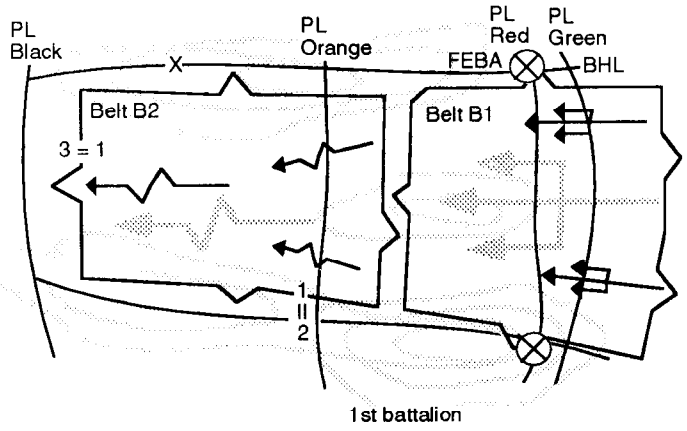
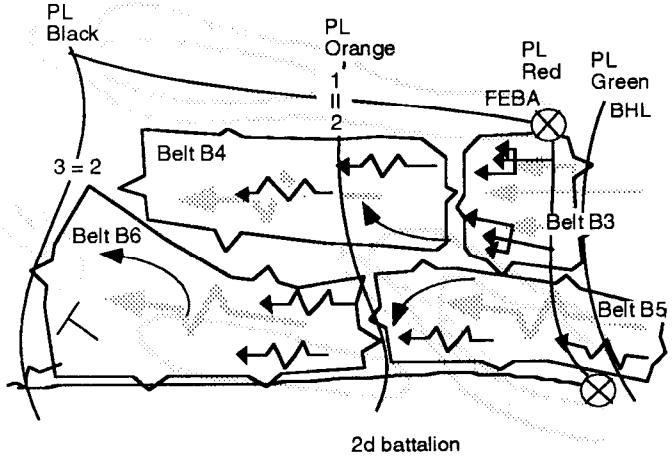


Figure 4-13. MBA operations and engineer functions



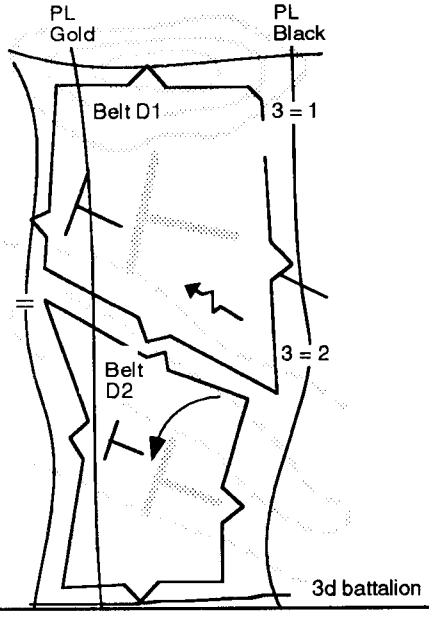
Belt B1 is focused at supporting early battle handover with aviation TF. Belt B1 is resourced to support early initiation of long-range fires, breaking up the continuity of the enemy attack.

Belt B2 is resourced to fix enemy formations in and around EA Jack.



Belt B3 is designed to allow enemy formations into the depth of the sector. Belt B4 is designed to turn and fix enemy formations in EA Queen.

Belts B5 and B6 are focused at the dismounted threat. B5 is designed to pick up the infiltration early before it enters the MBA and turn it away from the antiarmor forces. B6 acts as an extension of belt A2, denying the enemy a synchronized attack at the choke point in the brigade rear.



Belt D1 is resourced for block intent. With the block intent—

- Protective obstacle resourcing around block will be high.
- Time management of additional engineer assets to work with the 3d battalion will be critical.
- Lane closure in the southeastern portion of belt D1 may require brigade control to allow the tank company to move to subsequent positions.

Belt D2 is focused on the dismounted enemy coming from the 2d battalion's sector. Belt D2 is resourced for a block intent, with obstacle groups supporting the no-penetration line, PL Gold. A turn group is planned in the north to deny the enemy the high ground overwatching belts D2 and D1.

Figure 4-14. Obstacle belts and defensive considerations

all engineer equipment will not be required to support security-area preparation, some can be echeloned to the battalion's sector early and begin work on battalion assets in position.

Protective-obstacle effort by the maneuver forces is also vital, especially around EA Jack. Because the battle will be conducted at close range (combined with the brigade commander's concept of the operation around EA Jack), the likelihood of an enemy dismounted attack to eliminate the antiarmor BPs is very strong. The brigade engineer and the company commanders address this Class IV/Class V (obstacle) requirement and plan resources accordingly. Care is taken to ensure that those materials required for protective-obstacle effort do not compete for resources allocated to tactical obstacles. Guidance is issued in the brigade order, as required, to control these resources.

Mobility support is directed at providing egress routes for the TOW AT missile launchers mounted on HMMWVs to allow them to move to subsequent positions. The light tank company has a be-prepared mission to provide support to the 1st battalion.

2d Battalion

The 2d battalion is positioned in the enemy's templated main effort in the southern portion of the brigade's sector. This sector is characterized by a battalion-sized mounted MC in the north and a battalion-sized dismounted AA in the south. Cross-country movement of tracked or wheeled vehicles in the dismounted AA is restricted to a very limited trail network. It is templated that a dismounted supporting attack will use this AA to attack antiarmor positions in the 2d battalion's sector and to secure the choke point in the 3d battalion's sector. A detailed terrain analysis. verified by ground and air reconnaissance, is fundamental to maximize engineer effort in the 2d battalion's sector.

War gaming with the brigade staff reveals that the battalion will most likely conduct a defense in the sector against both the mounted and dismounted enemy. The defense against these two types of enemy forces will require significant, yet varied, levels of engineer support. One DIVEN company with A&O platoon assets will support the 2d battalion (see *figure 4- 14).*

Engineer support will begin early in the security area forward of the 2d battalion's sector in and around belt A2, paralleling the efforts of the corps light engineer company in the north. This support will be executed by the light DIVEN company. When the 2d battalion begins its planning process, the company commander is responsible for providing an engineer planner to integrate with the battalion staff. The company commander normally fulfills this responsibility (METT-T dependent).

To augment the combat power of the battalion against the mounted enemy, the brigade commander task-organizes the light tank company OPCON to the battalion. During the security-area battle, two platoons of the light tank company will be placed in a position to control PL Green and will be cleared to fire into the westerly disrupt group of belt A2. Their direct fire must be synchronized with the AH fires from the aviation TF. This is the responsibility of the aviation TF commander. However, it is facilitated through the efforts of the light DIVEN company commander and the light tank company commander during the brigade planning process and during actual obstacle emplacement.

Because of the two types of enemy in this sector, engineer planners at the brigade develop four belts. Two of the belts are focused and resourced against the mounted enemy, and two are focused and resourced against the dismounted enemy infiltration.

Belt B3 is resourced for two disrupt groups. Its intent is to—

- Ensure that the enemy's mounted formations deploy before entering the MBA
- Allow initial flank-and-rear antiarmor engagements from the battalion.

Belt B3 is also positioned to facilitate the seamless transition of forces from the security-area battle to the MBA.

Belt B4 is resourced for two fix groups and a turn group. Its intent is to turn and hold the enemy force in EA Queen. This can enhance the fires of both light tank companies—

- From their subsequent positions.
- From the battalions' antiarmor BPs located in restrictive terrain around EA Queen.

The dismounted enemy's infiltration will probably begin early to synchronize its attacks with the mounted enemy's attacks within the MBA. Identifying and gaining contact with the dismounted enemy's infiltration early (forward of PL Green), and disrupting the timing of its attacks with the timing of the mounted enemy's attacks, is vital to the 2d battalion's defense. Through guidance issued in the brigade order and the brigade commander's approval of positioning belt B5 forward of PL Green, the battalion will be able to gain early contact with the dismounted enemy while it is still in the security area. The battalion conducts extensive counterreconnaissance and uses combat patrols (closely linked to AP obstacles), early warning devices, and limited visibility devices to gain early contact with the enemy and to destroy them.

Belt B5 is resourced for two fix groups and one turn group. The initial fix group is planned to allow the battalion to hold the enemy in order to establish a tactical advantage and to allow for an air-assault HATK using lift assets from the aviation TF. When executed, these actions disrupt the timing of the dismounted enemy's attack. This allows the battalion to focus its efforts and resources separately and fighting the two different enemies simultaneously. The turn group is planned to isolate antiarmor BPs from the dismounted enemy, while the second fix group has the same purpose as the first and acts as its extension. Situational obstacles are also planned within belt B5 to assist in rapidly developing a very decentralized battle. These obstacles are primarily AP SCATMINEs (ADAM and Volcano AT and AP mix). The execution of situational obstacles is closely linked to the—

- Decision points verified by the battalion's extensive counterreconnaissance efforts.
- Execution timings rehearsed by the battalion.

The brigade engineer's major concern while light DIVENs establish obstacle belt B5 (forward of PL Green) will be fratricide deconfliction with both indirect and AH fires. Extensive coordination, initiated, directed, and monitored by the brigade, between the 2d battalion and the aviation TF must be conducted to minimize fratricide risks. The brigade engineer ensures that some AT obstacles are resourced (predominantly point type) to allow the engineers to restrict mounted movement on trails in the belt.

Belt B6 is resourced for two fix groups, a turn group, and a block group. Belt B6 was developed as a separate belt from B5 for three principal reasons:

- It was war-gamed that the operational tactics by the battalion will be closely linked to the terrain,

specifically terrain features to the south of EA Queen.

- The dismounted AA is constrained forward of PL Orange, possibly impacting the maneuver formations of the enemy force.
- Initial resourcing and positioning of Class IV/Class V supply points in the battalion sector was simplified by the establishment of the separate belt.

The turn and block groups planned for belt B6 are of key importance to the brigade. The turn group is directed at denying the dismounted enemy access to the light tank company's subsequent positions forward of PL Black. The block group is aimed at denying enemy penetration into the 3d battalion's sector. To ensure synchronization and integrity of the obstacle belts and the maneuver plan, the brigade engineer conducts detailed coordination with his counterpart in the southern brigade. This validates the commander's intent and concept of the operation, helping to ensure that the two brigades are complementing each other's efforts. This coordination may be directed by the DIVEN.

Survivability support for the 2d battalion must be initiated early, with assets from the attached A&O platoon constructing turret-defilade positions for the two light tank platoons forward of PL Red. The initial positioning of these elements is directed by the brigade; therefore, this work can begin parallel to the engineer company's effort in the security area. Coordination as to the actual location and status of survivability work for the light tank platoons will be conducted with the 2d battalion. Survivability work in support of the light tank company's subsequent positions in the sector must begin as early as possible. This depends on guidance from the battalion commander. The battalion may also choose to position its TOW AT missile launchers mounted on HMMWVs forward as well, allowing them to dig in at the same time. Survivability support for the antiarmor BPs will also be extensive. Because the antiarmor BPs are positioned along the enemy's AA, they must be prepared with sufficient survivability efforts to survive significant enemy preparatory indirect fires. To provide additional survivability support, the corps light engineer company commander is issued a be-prepared order to provide additional blade teams (from the OPCON CSE platoon) to support the 2d battalion. Protective obstacles are emplaced by the maneuver forces around the antiarmor BPs primarily along the dismounted AA. Protective-obstacle resourcing is initially done by the brigade engineer. Modifications to his estimates are completed by the TF engineer in conjunction with the 2d battalion support platoon leader, as required. These efforts will be substantial as they must protect against the possible infiltration attack and expected dismounted assaults from the BMP battalions around EA Queen.

Mobility support will be centered on the ability of the light tank company and the TOW AT missile launchers mounted on HMMWVs to displace to subsequent positions throughout the battalion's sector. In addition to its move from forward of the BHL to its subsequent position in the battalion's sector after battle handover (Lane Lion), the light tank company will move on order back to the 3d battalion (Lane Tiger). It also has a be-prepared mission to support the 1st battalion (Lane Bear). Lane closure and marking and identification procedures should be initiated by the brigade to ensure consistency throughout its sector. The brigade engineer must ensure that detailed coordination (in reference to lane status) occurs between the three battalions and the light tank company commander as they cross battalion boundaries.

3d Battalion

The 3d battalion is positioned to the rear of the 1st and 2d battalions. Its focus is on denying the enemy the high-speed AA into the brigade rear. The 3d battalion's sector is characterized by a mounted battalion (+) sized AA in the north that passes through a choke point in the depth of the sector. The southern portion of the sector consists of very rugged and restrictive terrain that supports a dismounted AA of at least battalion strength. It is templated that surviving enemy forces from both the 1st and 2d battalion's fight will attack to secure this choke point. The light tank company, along with AHs from the aviation TF, will be available to the 3d battalion for the fight. The CSE platoon (less its road graders) is task-organized to support the 3d battalion from the beginning of the operation. The CSE platoon remains under brigade control.

War gaming by the brigade staff shows that the combination of the terrain, the brigade commander's mission for the 3d battalion, and the establishment of the no-penetration line supports a strongpoint-type defense around the choke point. The brigade engineer and the other engineer planners realize that a significant amount of manpower, time, and assets must be expended for this type of defense. Early and detailed estimates for Class IV/Class V supplies and engineer assets are critical to the operation. The resources must be closely monitored by the brigade engineer to ensure that critical time and effort are not lost. As engineer assets are available from the 1st and 2d battalion's sectors (and on order from the brigade commander), they will be echeloned into the sector to begin work.

Planning and work by the 3d battalion must begin as early as possible. The brigade engineer must decide early in the brigade planning process who will—

- Provide the 3d battalion staff engineer input during planning.
- Have overall execution responsibility for engineer efforts.

In this scenario, it is war-gamed that the corps light engineer company will complete its efforts in the 1st battalion's sector first. Another key factor is that the battalion commander and the supporting engineer unit commander(s) must conduct a ground reconnaissance. This is important so that work priorities can be established within all sectors. The first priority is to make the position impassible to mounted forces. The second priority is to protect the battalion's antiarmor positions from a dismounted attack. The third priority is to protect the infantry forces that are guarding the antiarmor weapons.

Engineer planners at the brigade developed and resourced two block belts in support of the 3d battalion's defense (see *Figure 4-14, page 4-34)*. Because of the no-penetration line established by the brigade, the intent of belts D1 and D2 may be dictated by the brigade commander. Belt D1 is resourced for two fix groups and one block group. Its focus is on an enemy mounted attack. Belt D1 is positioned to facilitate the transition of the MBA fight to the 3d battalion. It is aimed at initially fixing the enemy's mounted formations in EA King and then at blocking enemy formations forward of the choke point and PL Gold (the brigade's no-penetration line).

To facilitate the transition of the fight between the battalions, an engineer-specific contact point is established at the common boundary of the three battalions. *Figure 4-13, page 4-33,* shows this contact point. By establishing a contact point, the brigade engineer can ensure that the battalion's TF engineers have coordinated and synchronized their efforts, especially in the area

where the two main enemy AAs merge. Specific requirements for the time and type of information to be transferred at the contact point are outlined in the engineer annex.

Belt D2 is resourced for a turn and a block group. It is focused on the dismounted enemy coming from belt B6. Similar to belts B5 and B6 in the 2d battalion's sector, the turn group's objective is to isolate the antiarmor systems in and around the choke point from the dismounted enemy. Contact with the dismounted enemy must be established early around PL Black, and engineer efforts in belt D2 must facilitate this. The dismounted enemy must not be allowed to get behind the 3d battalion's forces at the choke point if PL Gold is to remain intact. To enhance the effectiveness of belt D2, detailed terrain and obstacle information and its potential impact on the dismounted enemy must be passed from the 2d battalion's TF engineers to the 3d battalion's TF engineers.

Survivability support for the 3d battalion will be the most intense in the brigade sector and must begin early to ensure that a sufficient level of protection is achieved. The choke point and the positions controlling it will receive intensive artillery attacks. Therefore, survivability must be ensured for C2 nodes, crew-served weapons, antiarmor weapons, and the light tank company. To support the block intent established by the brigade commander, turret-defilade positions are required for the light tank company and the TOW AT missile launcher mounted on HMMWVs. This level of survivability will require early coordination with the 3d battalion's TF engineers, the battalion commander, and the light tank company commander. Dismounted attacks are templated to be intense and frequent as the enemy attempts to gain control of the choke point. Protective obstacles constructed by maneuver forces around the antiarmor BPs and any positions established on the dismounted AAs in belt D2 will be critical. Engineer planners at the brigade will conduct the initial resourcing for this effort early, ensuring that tactical and protective-obstacle efforts do not create resourcing conflicts.

Mobility support will again focus on the light tank company that will be supporting the 3d battalion when it falls back to its subsequent positions. Lane-closure plans and information on the status of lanes Tiger and Bear will be exchanged at the engineer contact point. Because the light tank company will be moving into the 3d battalion's sector during the MBA fight, lane closures affecting its displacement may require brigade control. Lane closure also affects the light tank company's mobile reserve mission. The reserve force is usually held back until the enemy has committed itself and has become disrupted and extended. The brigade commander determines when to commit the reserve forces. This commitment will require that the light tank company be able to rapidly move to any of the three battalion's sectors. The brigade engineer is ultimately responsible for monitoring the lane-closure plan and must work closely with the TF engineers and the light tank company commander to ensure successful execution. Engineer involvement in the combined arms rehearsals for the light tank company's movement on the battlefield is vital.

From an engineer standpoint, the reserve force must survive long enough to become committed. Once the reserve force is committed, it must have the mobility to perform its counterattack. This may require some survivability support initially and then some mobility support in the form of improving combat trails, ford sites, and so forth. During the preparation of the battlefield, flank obstacles can be emplaced or situational obstacles can be planned to support the counterattacking force if the counterattack route is known. This requires that the

brigade engineer conduct extensive coordination with the reserve force to prevent fratricide and to ensure that its mobility is not affected. *Figure 4-15* shows some mission considerations for MBA defensive operations.

REAR OPERATIONS

The objective of rear-area operations is to ensure that maneuver units receive continuous support from the support units of the brigade (see *Figure 4-16, page 4-42).* These operations consist of force protection and area damage control (ADC) actions that are taken by all combat, CS, CSS, and HN units. They work singly or in a combined effort to secure the force or to neutralize or defeat enemy operations in the rear area. Rear-area operations represent a critical fight for the brigade commander and the brigade engineer. DIVENs are not equipped to handle the diverse, equipment-intensive tasks involved in rear operations. Therefore, the light infantry brigade relies heavily on corps support for general engineering in the brigade rear.

In this scenario, the light DIVEN company has established the BREC in the brigade rear, and it is tied in to the brigade rear CP (see *Figure 4-17, page 4-43).* The corps light engineer company ties in with the established BREC. It augments the BREC's capability to monitor, track, and control engineer support to the brigade rear and monitor and track engineer support in the MBA. The collocation of the two company CPs greatly enhances this capability. The brigade engineer assigns the CSE platoon the missions of maintaining the LOC (within the brigade rear and to the battalions' trains, as required) and supporting the FSB and the BSA. Specific details on mission assignments will come from the brigade's rear CP. Engineer missions in support of the brigade rear should be close to completion before missions in support of the MBA and rear area are started because of the level of engineer support required.

Survivability support is essential in maintaining combat operations. Engineer survivability support is provided through fortifications and protective obstacles. The brigade S4 is responsible for the protection of the BSA. The brigade engineer working with the BREC plans for the survivability of all units in the brigade rear area. Initial guidance for determining the priority of engineer support for base and base-cluster support operations is laid out in the brigade OPORD. This guidance is based on the brigade engineer's evaluation (in conjunction with the brigade staff and the input received from the brigade rear CP) of the current and expected level of threat activity in the rear area. The priorities are based on the following factors balanced against the threat level:

- Vulnerability of the base cluster.
- Self-defense ability of the base-cluster units.
- Criticality of the unit to the success of the brigade mission.
- Recuperability of the unit and its assets in the base cluster.

Once the priorities are established, the threat level must be understood, and the base-cluster defense must be designed to counter the threat's most probable COA. Obstacle recommendations to support rear-area operations are also based on the three threat levels (see *Table 4-2, page 4-44).*

Coordinating, tracking, and moving Class IV/Class V (obstacle) supplies forward to the battalions is a principal concern for the brigade engineer and the BREC. Preconfigured packages of Class IV/Class V (obstacle) supplies can greatly simplify planning and execution of logistics operations. *Chapter 6*

Battlefield Area	Mission Considerations
Main Battle Area	**Plan and Prepare:** • Determine what the enemy will look like after the security-area fight. How will he appear in the MBA and in the battalion TF sector? What are the terrain and friendly maneuver impacts? • Ensure that a ground reconnaissance of the MBA is done. It is critical to the development of the engineer plan. • Design the plan using the commander's intent, the concept of the operations, and the main effort. • Consider centralized control of engineer units (for example, DS platoons to TFs). Greater flexibility keeps the logistical burden on the FSB. • Identify mobility requirements for security elements passing into/through the MBA after battle handover. • Determine mobility requirements during the MBA preparation and during and after the fight (for example, resupply, casualty evacuation, and counterattack). • Ensure that tactical/protective-obstacle requirements do not compete for the same resource (threat based). • Verify that engineer planners are at the battalion TFs. • Use idle blade time during TF planning to dig in field artillery (FA), ADA, and other brigade elements. • Establish an engineer coordination point between the battalions at key terrain points for the commander's obstacle plan. Ensure that coordination is conducted within the brigade and with adjacent units. • Secure assistance in operating Class IV/Class V supply sites in the MBA. Maneuver units will require training in mine-dump procedures. Ensure that forward supply points are operational. **Execute:** • Link up early with the maneuver unit in the sector to verify unit positions and obstacle-group locations. This impacts obstacle logistics and material handling. • Ensure that the brigade commander's intent for the defense is understood and maintained through obstacle/direct-fire/indirect-fire integrations. • Ensure that the integration/synchronization of adjacent battalion's obstacle plans are in line with the brigade commander's intent. • Ensure that Class IV/Class V supply sites are operational. • Maintain positive control of engineer equipment (such as operational status, location, and fuel level). • Ensure that security is provided and maintained for engineers during the MBA preparation. Engineers are a HVT for both ground and air attacks. • Keep the brigade main CP informed on the status of engineer missions. • Begin survivability as early as possible. Consider echeloning equipment out of the security area early so that mortars, unit trains, and equipment can be dug in as soon as possible.

Figure 4-15. Mission considerations checklist for MBA operations

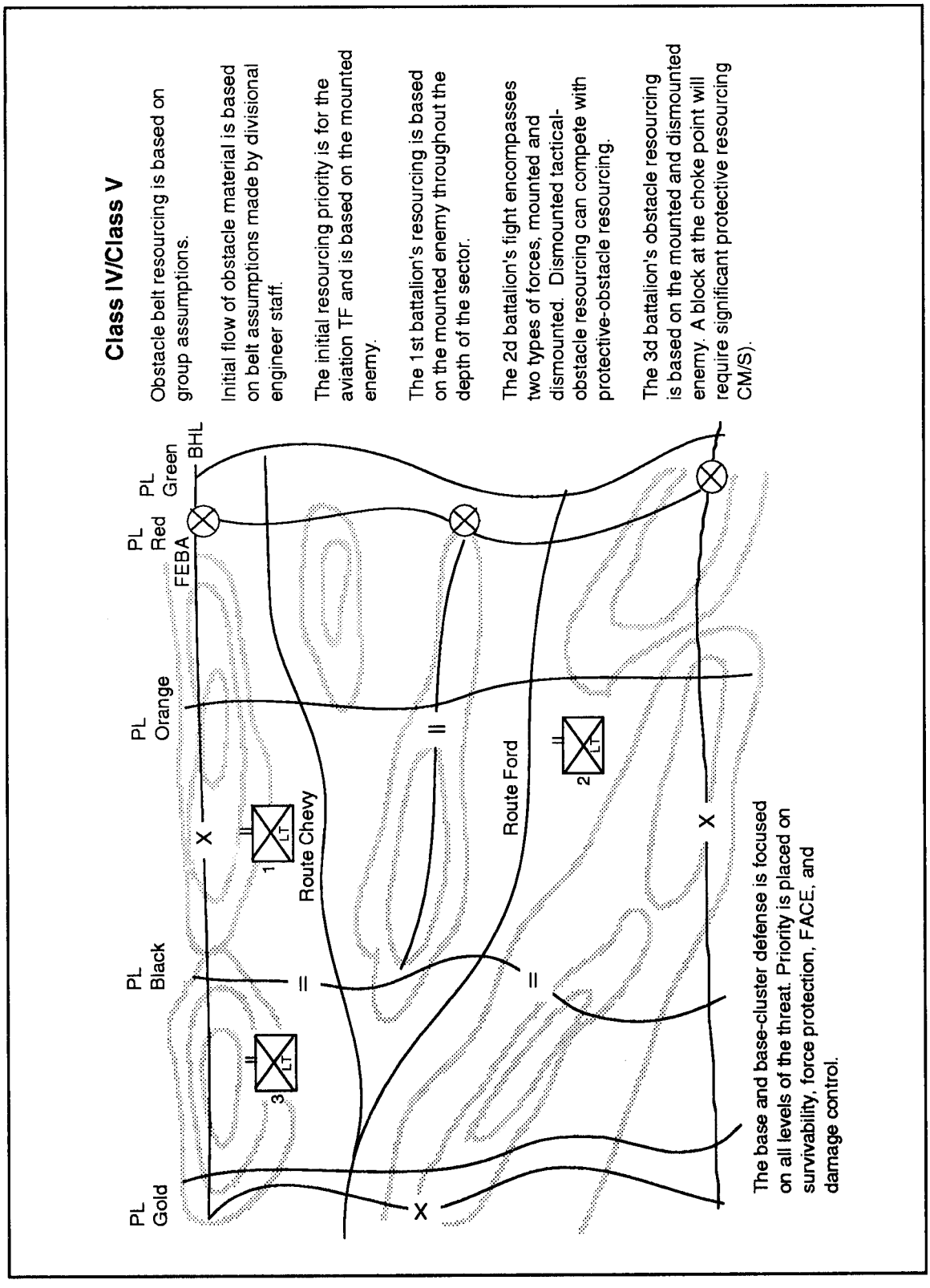


Figure 4-16. Rear-operations analysis

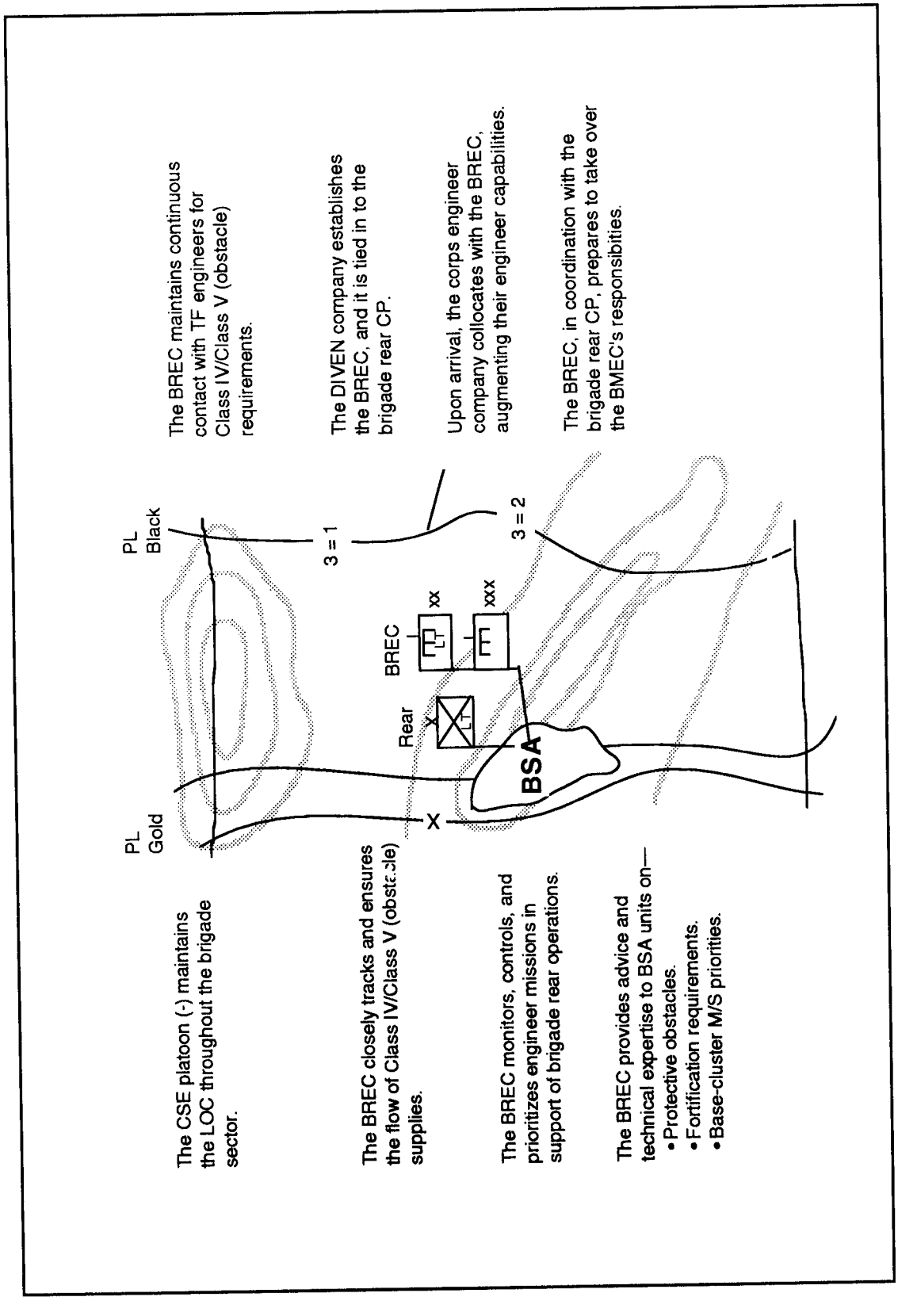


Figure 4-17. Rear operations and engineer functions

Table 4-2. Obstacle recommendations based on threat levels

Threat Level	Characteristics	Obstacle Recommendations
Level 1	Enemy-controlled agent activities, sabotage by enemy sympathizers, and terrorist activities	Protective wire, AP mines integrated with remote sensors and ground surveillance radar (GSR), cover-from-view screens, predetonation fences, blast zones, and antivehicular barricades
Level 2	Diversionary and sabotage operations conducted by unconventional forces, and raids, ambush, and reconnaissance operations conducted by small combat units	Same items as level 1; increased densities of initial protective measures
Level 3	Heliborne, airborne, amphibious, ground-force deliberate, and infiltration operations	AT mines, berms, wire, and ditches; FASCAM (and conventional obstacles) planning for potential LZs and DZs; and infiltration route denial around base and base clusters

provides details on the CSS process for engineers supporting the light brigade. The brigade engineer's goal is to get divisions or higher assets to throughput the material to the TF sector and coordinate dedicated haul support for moving the supplies once delivered. Transportation assets in the FSB are vital. In restrictive terrain, the lift assets in the aviation brigade provide rapid and flexible haul support.

Other rear-area missions the brigade engineer plans for are as follows:

- Rear ADC.
- HN support.
- Tactical support to the combat force.

Synchronized and integrated engineer support and planning for rear-area operations require dedicated engineer input to the brigade rear CP. Although the MBA consumes the majority of the brigade engineer's planning effort and engineer resources, support to rear operations is essential to ensure the commander's freedom of maneuver and the success of the close operation. *Figure 4-18* shows some mission considerations for rear operations.

ENGINEER DUTIES AND CONSIDERATIONS

This chapter covers the basics of an extremely complex operation using the defensive framework as a tool to analyze the process. It is important to remember that the scenario is only a tool to bring out important concepts and procedures for engineer support. To establish the engineer framework and to plan engineer support for the brigade, the brigade engineer uses the engineer estimate, the scheme of engineer operations, subunit instructions, and the brigade engineer annex. Company commanders integrate these tools with their unit orders to prepare and execute the plan.

BRIGADE ENGINEER IN THE DEFENSE

The brigade engineer's main responsibilities in planning and controlling defensive operations are—

- Identifying engineer missions.

Battlefield Area	Mission Considerations
Rear Area	**Plan and Prepare:** • Maintain continuous involvement with the BREC in the planning process. • Ensure that the commander's force-protection plan encompasses the entire brigade area. The plan must be reevaluated regularly thoughout preparation and execution. • Plan for full employment of engineer assets in support of the brigade's support elements during TF planning (BSA, initial MSR clearance, and FARPs). Once the MBA preparation begins, it will consume all available engineer effort. • Request EAD engineer support for use in the rear area, as well as the MBA. This is critical to the LOC upgrade and maintenance. • Ensure that redundancy is planned for the transport of Class IV/Class V (obstacle) supplies forward (for example, sling load, CDS, and ground haul). Transportation is coordinated with the brigade rear CP. • Consider using personnel from the engineer company HQ to help track and monitor the movement of logistics out of the BSA. • Preconfigure Class IV/Class V (obstacle) supplies into packages for haul. They should be configured into complete kits for haul in the brigade's smallest haul vehicle (HMMWV or $1^1/_2$-ton trailer). This ensures that the kits can be hauled by any other means. Attempt to have the Class IV/Class V kits delivered to the brigade from the division or corps. • Plan for continuous MSR clearance requirements during the MBA preparation phase. Use all available assets in the brigade. **Execute:** • Continually monitor the execution of the commander's force-protection plan, keeping the brigade main CP informed. • Maintain an accurate status of obstacle emplacement to ensure that the commander's intent is met. Balance the obstacle requirement against logistical throughput deliveries to prevent shortages. • Monitor equipment use, and pre-position Class III and Class IX supplies and contact teams for planned maintenance during the preparation phase. • Preconstruct survivability positions for refuelers in the MBA. • Maintain positive C2 over situational obstacle capabilities (such as air/ground Volcano and MOPMS). Closely track the positioning and status of assets against the event template.

Figure 4-18. Mission considerations checklist for rear operations

- Recommending the allocation of engineer and engineer-mission-related resources.
- Planning, tracking, and synchronizing engineer battlefield functions.
- Understanding threat composition and doctrine.
- Understanding friendly composition and doctrine.
- Determining what engineer resources are needed by using the engineer work estimate.
- Requesting additional resources from the division, if necessary.
- Synchronizing the obstacle plan with the maneuver commander's intent and scheme of maneuver.
- Recommending engineer task organization to the maneuver commander.
- Coordinating fire support to cover brigade obstacles.
- Coordinating with the aviation LO, Air Force liaison, and the fire-support element for FASCAM.
- Monitoring obstacle reports.
- Assisting the S2 in the IPB process.
- Continually updating the maneuver commander on the status of obstacles.
- Providing the brigade S4 with the estimate of Class IV / Class V supplies required for tactical obstacles.
- Providing a terrain analysis of the brigade's sector.

COMPANY COMMANDER IN THE DEFENSE

The company commander is the executor of engineer missions in support of the brigade's defense. He must clearly understand the maneuver commander's intent. Additionally, the commander must do a mission analysis of his sector. The company commander—

- Works closely with the brigade engineer during the planning phase.
- Provides the brigade engineer with the realistic work capabilities of his company.
- Helps foresee problems based on his knowledge of the company.
- Aids the brigade engineer in developing the obstacle plan.
- Conducts a reconnaissance of the assigned sector.
- Issues orders to the company.
- Supervises platoon leaders (TF engineers) on—
  - Developing the TF obstacle plan.
  - Covering critical points (for example, FASCAM, obstacles covered by observation and fire, and engineer Class V supplies).
  - Handling problems brought up by the maneuver battalions.
- Keeps the brigade engineer informed as to the status of survivability effort, obstacle emplacement, and logistics.
- Becomes familiar with friendly and threat weapons systems and must know which ones are most likely to be seen.

CHAPTER 5

Other Tactical Operations

Airborne, air-assault, and light infantry brigades conduct other tactical operations to support both offensive and defensive operations. In many cases, these operations are an inherent part of an offensive or defensive plan. In all cases, they require special engineer considerations during planning and execution. 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 3 and 4*. Furthermore, the principles of engineer C2 outlined in *Chapter 2* still apply during planning and execution.

FORCE PROTECTION

Protection conserves the force's fighting potential so that it can be applied at a decisive time and place. Protection focuses on two areas:

- Conserving the force's ability to generate combat power.
- Denying the enemy the ability to generate combat power against the force.

Commanders implement force protection with a force-protection plan. A force-protection plan addresses all components of protection, including fortification, deception, countermobility operations, and protective obstacles. This plan includes both active and passive protective measures. While frequently applied in OOTW, force protection must be addressed in all levels of war, throughout the battlefield framework and during all types of operations. *FM 5-114* outlines actual force-protection measures that the brigade and supporting engineer units may employ.

The brigade engineer and supporting company commanders are involved in the brigade's force-protection measures from two perspectives. They—

- Provide input to the brigade's force-protection plan.
- Assist in the critical aspects of execution and the actual monitoring of the implementation of the commander's plan.

FUNDAMENTALS

The brigade's force-protection plan is developed in line with the brigade's decision-making process outlined in *Chapter 2*. The force-protection plan is—

- Developed by the combined arms brigade staff.
- Derived from force-protection guidance from the brigade commander.

- Based on the combined arms execution.
- Updated and revised continuously.

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, intelligence requirements (IR), and PIR.

THE THREAT

Force-protection planning is threat based, keying on IPB/EBA. 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 attack probability against the consequences of inadequate protection, with the cost (time and resources) for adequate protection (risk level).

Before developing the force-protection plan, engineer planners and executors must fully understand the threat as it applies to force protection. Only when the threat is understood by the brigade engineer and the company commanders can engineers play a significant role in protecting the brigade. 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.

The threat's tactics and methods are different, based on the regional AOs, the operational tempo (OPTEMPO), and the area within the battlefield framework. The threat and the process used to evaluate it, must be understood by the engineer.

The threat template developed during the S2's IPB is used as the foundation for the force-protection planning process and must be continuously reevaluated. This reevaluation occurs at either a set time (for exampie, every two hours) or a critical event (a change in the threat's tactics and 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 the threat's attacks.

Aggressor Types

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 that engineers must understand so they can provide input to the brigade's force-protection plan. They are—

- Criminals.
- Protectors.
- Terrorists.
- Subversives.

See *Figure 5-1* for a description of each type.

Aggressor Tactics

The threat employs a variety of tactics against the brigade. Any one or any combination of these tactics may be used. Also, the brigade may be faced with an evolving threat, employing tactics not listed in this chapter. *Figure 5-2, page 5-4,* lists various aggressor tactics.

Aggressor Attack Methods

The attack methods (weapons, tools, and explosives) 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

Aggressor Types	Description
Criminals	Categories of criminals. • Unsophisticated criminals – Are unskilled in the use of weapons and have no formal organization. – Attack targets that meet immediate needs: 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.
Protestors	Protestors– • Must be a concern of the brigade. • Are normally politically or issue oriented and act out of frustration, discontent, or anger. • Destroy and seek publicity. Categories of protestors. • Vandals and activists. – Are unsophisticated and superficially destructive. – Normally do not intend to hurt people. • Extremists. – Are moderately sophisticated and more destructive. – Are commonly overt in their actions. – May involve individuals as targets.
Terrorists	Terrorists • Are oriented on ideology, political cause, or 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.
Subversives	Categories of subversives. • Saboteurs (include guerrillas and commandos). – Are very sophisticated and highly skilled and employ meticulous planning. – Commonly operate in small groups and have an unlimited arsenal. – Kill and destroy. – Target mission-critical personnel, equipment, or operations. • Spies. – Are highly skilled and very sophisticated. – Are usually foreign agents. – Target military information and attempt to avoid detection. – May use the same activities as activists or other aggressors.

Figure 5-1. Aggressor types

Aggressor Tactics	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. The moving-vehicle 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 type of bomb may be detonated by time delay or remote control. This 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 kill or injure its occupants. This attack is at close range of 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 kill or injure its occupants. These attacks are executed using military or improvised direct- and indirect-fire weapons, such as AT weapons and mortars.
Ballistic attack	Used when an aggressor's goal is to kill or injure a facility's occupants. Using small arms at varying distances or using a vehicle to carry out the attack, the aggressor attempts to inflict death.
Forced entry	Used when an aggressor's goals are 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 goals are identical to those listed for the forced-entry tactic. The difference in these entries is that the aggressor attempts to enter the facility covertly using false credentials. The aggressor may attempt to carry weapons or explosives into the facility.
Insider compromise	Used when an aggressor's goals are similar to those listed for the forced-entry tactic. An 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 (using a listening device) to monitor voice communication and other audible information.
Visual surveillance	Used by aggressors employing ocular and photographic devices to monitor facility, installation, and mission operations.
Mail bombs	Used when the 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.
Supplies bombs	Used when the aggressor's objective is to kill or injure people or destroy facilities. Bombs or incendiary devices, generally larger than those found in mail bombs, are incorporated into various containers and delivered to facilities or installations.
Airborne contamination	Used when the aggressor's objective is to kill people. The aggressor uses chemical or biological agents to contaminate the air supply of a facility or installation.
Waterborne contamination	Used when an aggressor's objective is to kill people. The aggressor uses chemical, biological, or radiological agents to contaminate the water supply of a facility or installation.

Figure 5-2. Aggressor tactics

normally used in forced-entry operations to breach protective components or barriers. Explosives are commonly used to destroy facilities and kill personnel. *Figure 5-3* lists some of the attack methods and describes their potential employment.

PLANNING PROCESS

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

- Step One: Define the threat and attack probability.
- Step Two: Determine the composition of assets (personnel, equipment, and facilities).
- Step Three: Determine the level of protection required for each asset.
- Step Four: Design systems and activities to counter the threat.

Figure 5-4 shows how the force-protection planning process parallels the military decision-making process.

Aggressor Attack Methods (Weapons/Tools/Explosives)	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 facility's exterior or to damage other assets within the brigade. Weapons include hand-held torches and improvised incendiary devices, such as a "Molotov cocktail".
Firearms	Used in the ballistic tactic to attack facility assets from a distance and in the forced-entry tactic to overpower security personnel. Weapons include all forms of military and civilian firearms.
Antitank weapons and mortars	Used in standoff attacks of assets. The Soviet RPG-7 and the US light antitank weapon (LAW) are the most common weapons of this type. Use of these types of weapons enhance the aggressor's ability to damage a facility and to kill and injure personnel. Mortars include both military and improvised versions.
NBC agents	Delivered as airborne gases, liquids, aerosols, or solids. They are very powerful chemical, biological, and radiological agents that can be manufactured or secured with relative ease from commercially available products and waste world wide.
Improvised explosive devices	Used in the exterior-attack, mail- and supplies-bomb-delivery, forced-entry, covert-entry, and insider-compromise tactics to destroy assets and to injure or kill people. They are commonly "homemade" bombs made of plastic explosives or trinitrotoluene (TNT). Plastic explosives are preferred by aggressors because they are easily molded, stable, and difficult to detect.
Hand grenades	Used in exterior attacks to injure or kill people. These include the full range of military offensive and defensive grenades.
Vehicle bombs	Used to destroy facilities and to kill personnel. They contain large quantities of explosives and have the potential to cause catastrophic damage.

Figure 5-3. Aggressor attack methods

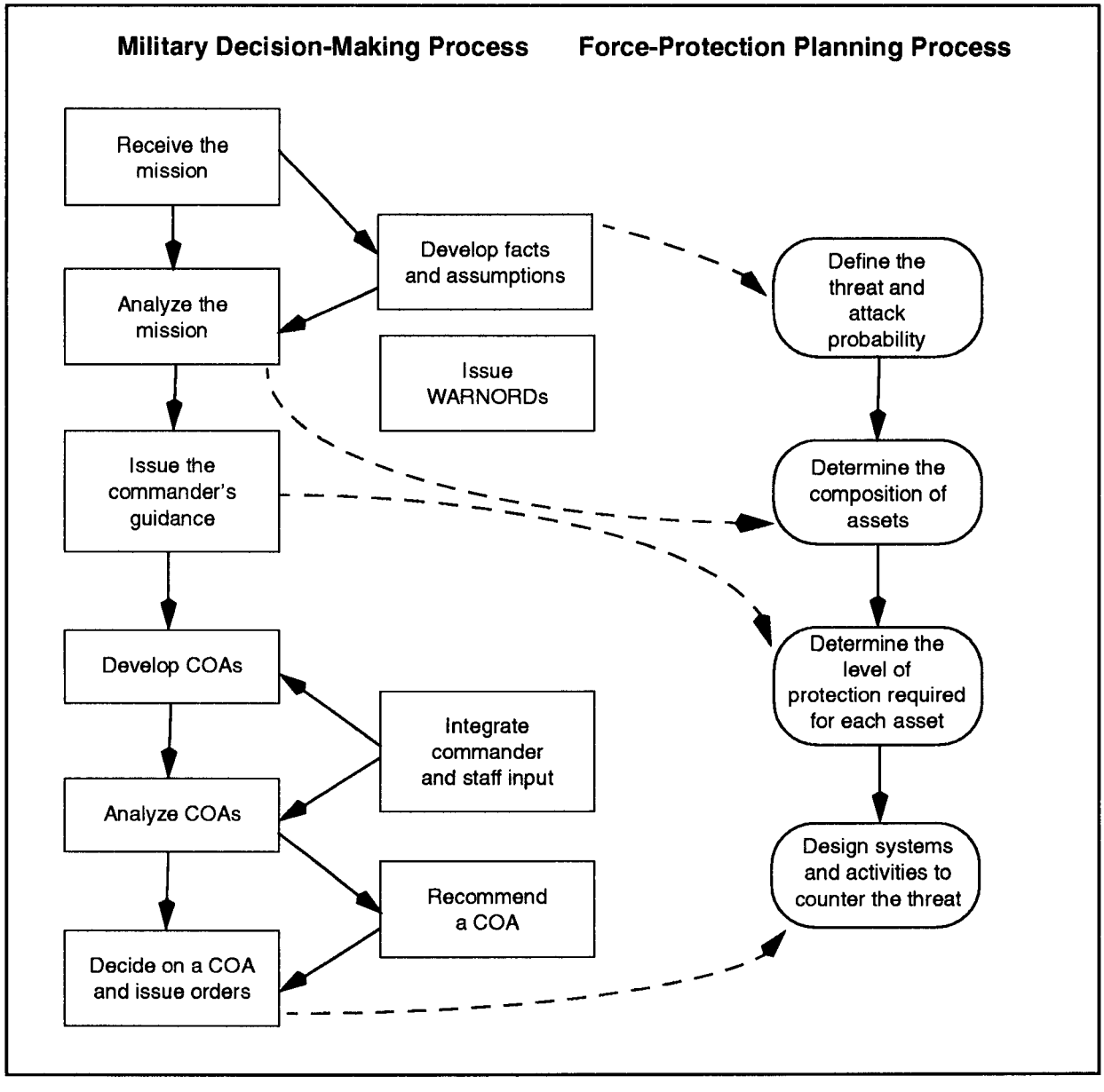


Figure 5-4. Relationship of the force-protection planning process to the military decision-making process

Step One

The results of this step are used to direct force-protection planning and design in step four. This step relies heavily on the IPB process already conducted during the decision-making process. It also provides the basis for step two, determining and evaluating enemy and friendly capabilities and vulnerabilities and potential COAs focused on the enemy's assault and potential attack of brigade assets. The bulk of the information is routinely derived from the DST and MCOO. Step one is a distinct process; however, it is ultimately performed simultaneously and continuously with the IPB process. This step has five parts as follows:

- Template the aggressor type and potential assault and attack methods. This information is an extension of the template and is normally compiled during the IPB process; it is focused on threat. Additional requests for information (RFIs) or PIR 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 aggressor and his ability to employ his preferred weapon, tool, or explosive. This evaluation helps determine the validity of the employment of any templated assault or attack method.
- Template potential assault and attack targets. This is derived from the aggressor template.
- Prioritize templated assault and attack methods based on the developed situational template (used in determining the protection level in step three).
- Prioritize templated assault and attack targets based on the developed situational template (used in step two). Which targets, or assets, within the brigade are going to pay the biggest benefit to the aggressor if they are damaged or destroyed?

Step Two

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, identifying 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 three 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 Three

This step focuses on taking information collected and developed in steps one and two and applying it to determine protective levels. Once the levels are determined, staff planners design, position, and resource protective efforts. Step three is divided into two parts as follows:

- Determine the force-protection level required for each position. The criticality (to the brigade) of the asset and the likelihood of an attack and assault (the criticality of the asset to the threat) 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. There is normally a balance between 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 balanced against the directed level of survivability for units, personnel, and systems within the position.
- Determine for the brigade the force-protection level required 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 one assets (priorities established in step two) within the brigade are to be provided level two threat protection (first two templated threat attack methods, determined in steps one and two) within 72 hours. All priority two assets (within the BSA only) are to be provided level one protection within 72 hours and level two protection within 96 hours."

Step Four

This step focuses on the final design and resourcing of the force-protection plan. Once the level of protective effort is determined (step three), protective activities are determined, positioned (as required), and subsequently resourced. *FM 5-114, Appendix A,* addresses specific techniques to counter potential threats. The key to this step is ensuring that the planned protective efforts accomplish the following:

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

Force-protection planning and its execution are not one-time processes. They must be continually and systematically updated, depending on METT-T, force-protection status changes, and the commander's guidance. *Figure 5-5* shows the force-protection planning process (its steps and actions to be taken). *Figure 5-6, page 5-10,* is an example of a matrix used to track force-protection planning and execution.

To ensure brigade-wide dissemination, the results of the force-protection planning process become elements of the brigade OPORD/operation plan (O PLAN). A statement/paragraph outlining the commander's intent for force protection can be addressed in paragraph 3 of the execution, in addition to a dedicated force-protection annex, as required.

MILITARY OPERATIONS ON URBANIZED TERRAIN

Operations in a MOUT environment are planned, coordinated, and executed in the same fashion as an operation in any other type of environment. Urbanized terrain does not change the nature of the operation, but it does cause the brigade engineer and the company commander to plan, coordinate, and execute using some additional considerations. Therefore, *Chapters 3 and 4* of this manual contain the bulk of information and doctrine that the brigade engineer and company commander need.

BRIGADE ENGINEER

The brigade engineer performs the following when planning force protection:

- Secures blueprints of buildings; sewer, electrical, and water systems; and others.
- Determines the location of utilities (power, water, telephone system, mass transit hubs, and mass fuel locations).
- Determines the availability of HN equipment, construction materials, fortification resources, civilian work-force assets, and civilian subject matter experts (SMEs) (guides, electricians, and so forth).
- Determines the unexploded ordnance (UXO) characteristics in the AO (type, number, density, and location).

Planning Steps	Actions to be Taken
Define the threat and attack probability	Sources of Information: • Enemy situation from the situation paragraph and the intelligence annex. • Known enemy information, to include recent and current enemy activities and capabilities. • S2's list of possible enemy COAs. • Terrain analysis around and into sites/positions. Determines: • Potential assault and attack methods by templating. • Potential assault and attack targets by templating. • Priority of potential assault and attack methods and targets. • Enemy and friendly capabilities.
Determine the composition of assets (personnel, equipment, and facilities)	Sources of Information: • Mission analysis. • Task organization. • Staff input on critical asset availability. Determines: • Units and systems requiring protective efforts. The list is compiled by all staffs and commanders. • Priority of units/systems to receive protection efforts. • Force-protection measures. • Assets available to conduct force-protection activities. • Time available/time allocated through time analysis. • Initial force-protection mission statement.
Determine the level of protection required for each asset	Sources of Information: • Higher HQ's force-protection plan or policy. • Commander's guidance. • Defined/templated threat and attack probability. • Staff input. Determines: • Level of protection for asset/unit. • Commander's force-protection policy and intent. • Priority and allocation of assets/units/time required to accomplish force protection. • Areas where risk will be accepted.
Design systems and activities to counter the threat	Sources of Information: • Information from steps one, two, and three. • Commander's selected COA. • FM 5-114. • Security Engineering Manual. • Multinational force information. • Available force-protection materials/logistics. Determines: • Commander's force-protection plan which addresses the following: – Subunit force-protection activities (specified and implied force-protection tasks, included in paragraph 3 of the OPORD). – Force-protection coordination (paragraph 3, 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/equipment resourcing. • Planning execution guidelines to— – Counter templated threat. – Support commander's force-protection plan.

Figure 5-5. Force-protection planning process

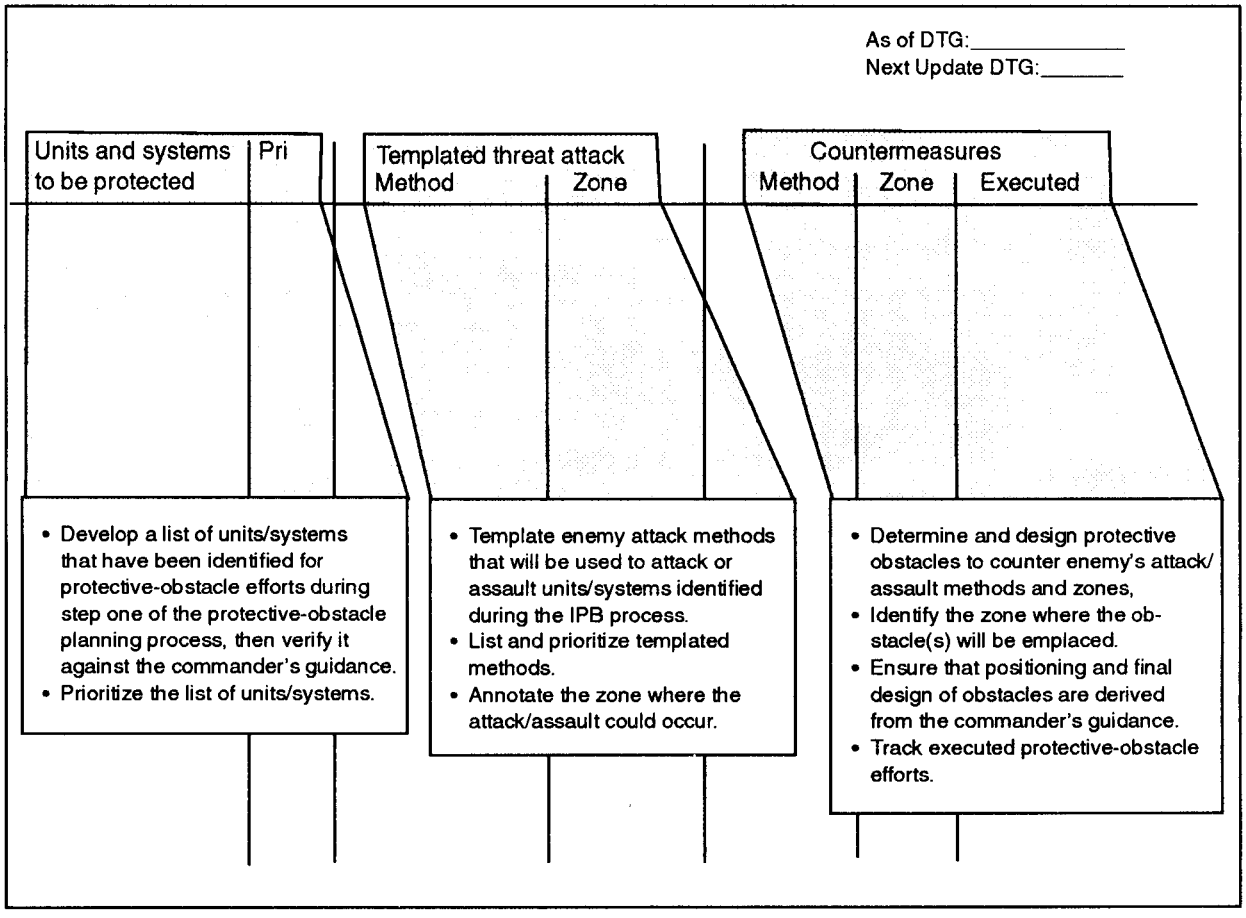


Figure 5-6. Protective-obstacle planning guide

- Considers centralized planning and decentralized execution.
- Determines how the rules of engagement (ROE) affect engineer capabilities and missions.
- War-games engineer support during the following phases:
  - Phase 1- Isolate the area.
  - Phase 2- Control dominant terrain (no traffic/no resupply in or out).
  - Phase 3- Seize a foothold.
  - Phase 4- Clear the urban area.
- Establishes the following common obstacle-control measures:
  - Obstacle marking.
  - Obstacle lane marking.
- Establishes demolition blast signals (visual and audible).
- Establishes common route markings.
- Plans for security requirements to protect Class IV/Class V supplies and engineer equipment.
- Ensures that engineers breach/reduce tactical obstacles and the infantry breaches/reduces protective obstacles.
- War-games SOSR in MOUT and ensures rehearsals.

- Plans for mobility teams (task-organized based on METT-T). SMEs educate infantry on obstacle breaching techniques.
- Plans in three dimensions (above ground, ground level, and below ground).
- Plans an engineer contingency mission for EOD.
- Plans for a hasty defense.
- Plans for follow-on engineer requirements.
- Plans and resources route-clearance operations.
- Addresses special obstacle-reduction requirements.
- Addresses and requests EAD engineers to support brigade general engineering tasks.
- War-games and plans for the contingency of MOUT-peculiar follow-on mission requirements.
- Addresses and resources the increase of demolition and Class V requirements in MOUT.
- Plans for additional "bunker-busting" capabilities (AT-4, shoulder-launched, multipurpose assault weapon (SMAW), and so forth).
- Requests the following special MEE:
  - 120-foot rope.
  - Grapnels.
- Plans for the procurement of the following additional materials (locally fabricated, if required).
  - Satchel charges (field expedient, if not available).
  - Rope ladders/ladders.
  - Marking materials (paint, chalk, engineer tape, and chemical lights).
  - Bangalore torpedoes.
  - Fragmentation/concussion grenades.
- Disseminates booby-trap neutralization equipment and techniques (special RFI) to higher or sister brigade.

COMPANY COMMANDER

The company commander performs the following when planning force protection:

- Identifies special equipment needs for the platoons.
- Plans for continuous resupply of engineer-specific logistics, especially demolition.
- Ensures that combined arms rehearsals are conducted for all operations.
- Teaches infantry demolition and breaching techniques.
- Plans for decentralized operations (team leader level).
- Ensures that eyery soldier understands ROE and how they affect engineer support of the operation.
- Works closely with the brigade engineer during the planning process.

RETROGRADE OPERATIONS

A retrograde operation is an organized and orderly movement of forces to the rear or away from the enemy. The rearward movement may be forced or voluntary; however, in either case, the division commander has authorized it.

TYPES

The basic types of retrograde operations are—

- Delay.
- Withdrawal.
- Retirement.

All three types are usually combined in simultaneous or sequential action. For example, a battalion TF may conduct a delay to facilitate the rest of the brigade's withdrawal or retirement.

Delay

The intent of a delay is to slow the enemy, cause it casualties, and stop it (where possible) without becoming decisively engaged. The brigade accomplishes this by defending, disengaging, moving, and defending again. The concept of the operation for a delay frequently requires offensive operations (counterattacks/spoiling attacks) on the part of the delaying force.

Withdrawal

The intent of a withdrawal is to allow the brigade to disengage from the enemy and reposition itself for some other mission. That mission may be to—

- Delay the enemy.
- Defend another position.
- Attack at another place and time.

The two types of withdrawals are–

- 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.

Retirements

A retirement is a retrograde operation in which the brigade, while not in contact with the enemy, moves to the rear in an organized manner. Tactical movement techniques are employed as well as foot marches and vehicular road marches. Retirements may follow withdrawals, or they may begin before contact is made with the enemy.

ENGINEER SUPPORT

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's freedom of maneuver. Second, the force must be protected during its retrograde. Light infantry forces are particularly vulnerable to enemy actions during retrograde operations. For this reason, they are normally conducted under limited visibility conditions. Engineers provide survivability for units left in contact and extend the time available to the brigade commander by reducing the enemy's mobility through obstacles, fires, and terrain.

The focus of engineer support to retrograde operations is normally countermobility and mobility 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 any of the retrograde operations. They require the application of METT-T to determine the prioritization of engineer mission support.

Staff Planning

Engineer involvement in the staff planning process for a retrograde is critical. Because of the up-tempo of the operation,

all contingencies are to be addressed, wargamed, prioritized, and resourced before execution. The tactical situation normally does not facilitate any significant changes to a plan once the operation is under way. Of special importance is the engineer's involvement in the IPB process. The level of detail developed by the staff and notably the engineer planner affects resourcing, task organizations, and ultimately execution.

During brigade retrograde operations, the brigade engineer coordinates with the S2 on engineer-specific PIR. These PIR are aimed at facilitating and maximizing the efforts of engineer units conducting the counterreconnaissance fight and retrograde. Considerations include the templating of enemy reconnaissance and main-body attack routes into the brigade sector. These considerations aid in the planning and execution of obstacle belts supporting the retrograde by the brigade.

Vital to all retrograde operations is the identification of routes to be used by the brigade. While conducting the terrain analysis during the IPB process, the brigade engineer works closely with the S2 to determine feasible routes. Once complete, these routes are coordinated with the brigade S3 and the commander to determine the actual routes that meet operational requirements. Once routes are identified, engineers 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.

The brigade engineer's involvement in the IPB process is vital to the retrograde. As laid out in *Chapter 4*, the end result of the brigade engineer's input into the MCOO is the determination of the effects the terrain will impart on the attacking enemy. Once determined, this product of the terrain analysis impacts the—

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

Countermobility

Countermobility planning for retrogrades 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 the BOSs.

Situational obstacles provide a key combat multiplier to the commander. For the light force, FASCAM obstacles are the predominant type, providing the commander maximum flexibility. Situational obstacles are planned predominantly against the most likely or the most dangerous AAs (where executed obstacles are not feasible). Situational obstacles, like other engineer operations in retrogrades, are normally centrally controlled.

Lane Closure

C2 of lane closure is vital to the brigade's retrograde. 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 the brigade's reserve obstacles. Lane closure depends on the—

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

Lane-closure parties (engineers if METT-T allows) close lanes upon notification from the commander to whom execution authority was delegated (the maneuver force overmatching 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 commander's intent. All lane-closure operations must be rehearsed.

Mobility

The brigade usually has a mobility advantage within its sector on interior LOC. This advantage must be capitalized on and maintained, by proper and timely use of engineer assets during the operation. One of the steps required during retrograde planning is the identification of routes. The size, location, and type of routes selected has significant impact on engineer support. Route selection impacts countermobility planning and execution as well as mobility operations.

Once the routes are finalized, the company commander is responsible for ensuring that they are upgraded and maintained as directed. LOC maintenance frequently requires nondivision engineer assets and support. Lanes through friendly obstacles must be established and marked. Every soldier in the brigade must clearly understand the brigade's lane-marking system. Guides are frequently left at obstacle-lane locations to ensure safe passage. Because of the critical nature of the mission, consider allowing engineers to assume the responsibility of providing guides, if METT-T allows.

Aviation

Army aviation units use retrograde operations to reposition units and to attack enemy forces, providing additional time for the maneuver force to disengage. Engineers support the aviation units through FACE operations and obstacle emplacement. Detailed planning between aviation units supporting the brigade and the BMEC is critical to the synchronization of this effort.

Battlefield Deception

Deception operations target the enemy force to cause indecision and to prevent it from concentrating combat power at a friendly force's weakness. The brigade engineer coordinates with the S2 and the S3 during initial planning to determine what battlefield deception assets are available. For example, a 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, utilizing engineer equipment forward gives the appearance of preparing for a hasty defense while covering the withdrawal of a force.

Combat Service Support

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 cannot keep up with the brigade's trains and must be hauled using transportation assets. To meet this requirement,

transportation assets may have to come from the division.

- Engineer Class V supplies need to be brought forward and rearward. Mines need to be positioned at obstacle lanes so they can be closed.
- Fuel requirements for forward heavy engineer equipment increase if the equipment is working in support of the retrograde operation. This fuel must be identified, like all other classes of supply, before it is moved to the rear.

PASSAGE-OF-LINES OPERATIONS

A passage of lines is an operation in which one force moves (forward or rearward) through another. Engineer considerations for each are similar and depend on whether the brigade is the passing force or remains in place. Primary considerations that impact planning for a passage of lines are the—

- Passage of engineer control.
- Exchange of information.
- Mobility of the passing force.

The passage of control between passing and in-place brigades is one of the key considerations in any passage of lines. The commanders of the in-place and passing brigades must establish a mutually agreed-upon event that triggers the passage of control. During a forward passage of lines, control of the battle is given to the passing brigade once it is committed to the passage routes or corridors. Once control is passed, the passing brigade exercises tactical control (TACON) over the in-place brigade until all of its forces are beyond the direct-fire range of the in-place brigade. During a rearward passage of lines, however, control is passed from the rearward-passing unit to the in-place brigade unit. Forces in the rearward-passing brigade turn over TACON to the in-place brigade once they are committed to the passage routes or corridors.

The brigade engineers must have a thorough understanding of when functional and unit control is passed and the disposition of engineer forces and missions at the time of passage. When control is passed between the brigades, the corresponding brigade engineer assumes TACON (through the TACON commander) of all engineer forces of the passing and in-place brigades. The controlling brigade engineer can then recommend mission assignments to the TACON commander for engineers of the adjacent brigade based on immediate requirements during the passage. This is critical during the forward passage of lines since it provides the passing brigade engineer a means of accomplishing unforeseen engineer tasks with minimal impact on engineer support to the subsequent attack.

Close coordination between brigade engineers is critical to the success of the passage of lines. The brigade engineers of both the passing and in-place brigades collocate during the planning and execution of the operation. They initially focus on the exchange of information on—

- Zones established by the division.
- Locations of established belts, groups, and individual obstacles.
- Details of reserve obstacles.
- Situational-obstacle planning and resourcing.
- Routes through the brigade sector.

The passing brigade engineer then ensures dissemination of the information to subordinates through coordination with the brigade

S3 and instructions in the brigade OPORD, engineer annex, and engineer overlays.

Whether conducting a forward or rearward passage, the in-place brigade is responsible for providing mobility for the passing unit along cleared routes or corridors through its sector. The in-place brigade engineer conducts a complete analysis of the passage-of-lines concept of operations. The in-place brigade normally tasks subordinate maneuver units to prepare the routes or corridors. The brigade engineer recommends task organization for engineer forces within the brigade, based on the assets needed to clear assigned routes and corridors. Clearing operations must be completed before the initiation of the passage. Additionally, the passed brigade engineer must plan the method for the closure of lanes through obstacles, if required, once the passage is complete.

The passing unit organizes for in-stride breaching operations before initiating the passage of lines. This is to ensure rapid support for mobility operations and continuation of the passage in the event a route is shut down during the mission. Creating lanes through the in-place unit's obstacles requires permission from the brigade exercising TACON. Authority to reduce friendly obstacles in response to an immediate tactical situation may be given to subordinate units. The authority is included in the coordinating instructions of the brigade's OPORD. Under all circumstances, this action must be reported to the passed unit so that the obstacle can be repaired. The brigade engineers must closely monitor the passage during execution to advise the respective brigade commanders on the impact of such occurrences.

C2 of both the passed and passing unit engineers during the passage of lines is also transferred to the brigade that is exercising TACON. That brigade engineer must facilitate control of the engineer units during planning and execution of the passage of lines by having an accurate status of all engineer assets, activities, and obstacle-control measures in the sector. This includes the status of all reserve targets and situational obstacles, including the execution criteria for each.

The following coordination considerations are for the brigade engineers of the passing and in-place brigades:

- Types of information exchanged between the brigade engineers are as follows:
  - Obstacle overlays (planned, prepared, and executed).
  - Class V stockpile, locations, types, and quantities.
  - Routes and lanes (alternates, limitations, and restrictions).
  - Obstacle and lane marking and guide positioning.
  - Enemy engineer assets, capabilities, and recent activity as templated.
  - Friendly unit assets, capabilities, and limitations.
  - Communication (frequency, variable, challenge/password, and so forth).
  - Date, time, and location for engineer key leader rehearsals.
- Brigade engineer execution checklist for in-place units is as follows:
  - Coordinate with the S2 for the counterreconnaissance fight.
  - Rehearse with all key engineer leaders.
  - Place guides.

- Specify obstacle lane-marking procedures and logistics.
- Complete mobility requirements (brigade rear to brigade front) before passage initiation (reconnaissance and route maintenance).

  Plan for lane closure once the mission is complete.
- Coordinate for prestocked Class IV/Class V supplies at lane locations.

  Report engineer assets, capabilities, and limitations to the brigade engineer of the passing unit.
- Disseminate the communications plan.

- Brigade engineer execution checklist for passing units is as follows:
  - Rehearse with all key engineer leaders.
  - Task-organize mobility teams to support the main effort (METT-T).
  - Be prepared to assume TACON of engineer responsibilities.
  - Maintain the current status of both brigades' assets, abilities, and limitations.
  - Disseminate the communications plan.

RELIEF AND LINKUP OPERATIONS

A relief operation is a combat operation in which all or part of a unit is replaced with another unit. The two types are—

- Relief in place
  - Units are similar in size.
  - Defensive operations continue.
- Area relief.
  - Units are dissimilar in size and/or table of organization and equipment (TOE).
  - Defensive needs are improving or unit expects a change of mission to offensive operations.

Engineer requirements remain essentially the same for either type of relief operation; however, turnover of obstacles, particularly reserve targets, are more difficult and time consuming during an area relief operation. This is especially true if a smaller-size unit is replacing a larger element.

Linkup operations are conducted to make physical contact between two forces to conduct future operations. 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-specific issues and tasks are similar for both relief and linkup operations.

PRINCIPLES

The following key considerations are used in planning and executing a relief operation:

- Security.
- Speed.
- Control.

Security

Because of the inherent vulnerabilities created by a relief operation, it must be

concealed from the enemy for as long as possible. Deception and operational security (OPSEC) are both important from the outset.

Speed

Once a relief operation begins, it is extremely vulnerable to being spoiled by the enemy. Unnecessary delays during execution must be avoided to prevent giving the enemy time to acquire a target and mass fires.

Control

Control is the most important relief operation principle. Intermingling forces place increased demands on brigade C2, particularly if enemy contact is made during the operation.

ENGINEER SUPPORT

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

Engineers facilitate the brigade's requirement for speed in two ways. They—

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

The brigade engineers for both units must develop engineer task organizations that meet the needs of the TF's mobility requirements. Brigade engineers also facilitate speed through a rapid but 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, location of HN engineer assets, and engineer-specific coordination with flank units.

Brigade engineers assist their respective brigade's control of the relief operation by—

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

When planning mobility operations, the brigade engineers review the relieved unit's defensive plan overlaid with the relief operation concept. Routes for the entering and exiting units must be clearly identified and marked; guides may be needed. The 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-T, both brigades may need to plan to use mobility teams during the operation.

When developing the obstacle-turnover plan, the relieved brigade engineer must have a detailed and current status of each obstacle in his 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 obstacles and situational-obstacle plans.

If supported by METT-T, the presence of engineer LOS (engineer squad level) at the infantry company level can greatly enhance the speed and control of obstacle turnover. Upon linkup, engineer LOS with the relieving units 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 obstacle turnover to improving the unit's defensive posture or preparing for a future attack.

Most relief operations occur when a unit is in either a hasty or deliberate defense. Light forces have the inherent requirement to conduct relief operations while the relieved unit is not in a defense. This usually takes place when a light force is relieving another light force while securing a lodgment (either a forced entry or an unforced entry) on an airfield, a port facility, or a combination of the two. An example of this is a brigade of the 82d Airborne Division relieving the 75th Ranger Regiment during an airfield seizure mission, followed by elements of the 10th Mountain Division relieving the 82d Airborne Division. When a light unit relieves another light unit, it is essential that the level of threat expected by the relieving unit is accurately templated and that preparations are made accordingly. An initial brigade R&S 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/securing a key facility have some special engineer considerations that differ from the hasty or deliberate defense.

AIRFIELD RELIEF OPERATIONS

Airfields are critical for sustainment of light forces. Once the lodgment is established, the engineers' most important mission is to make the runway operational and maintain it so that the air-land flow is uninterrupted. To effect this, the brigade engineer collocates with the brigade-level CP that controls the airfield (normally an assault CP from the brigade assault force). Coordination is also conducted with the Air Force combat control team (CCT) representative on the airfield. The brigade engineer obtains the following information from these individuals:

- Status of the airfield, to include the minimum number of operating strips; the maximum number of on-ground aircraft that the airfield can currently and 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.
- Status of the airfield facilities, to include the control tower, hangars, electrical power, runway lights, and bulk-fuel locations.
- Availability and location of HN support, to include hauling and off-loading assets and engineer equipment.

PORT-FACILITY RELIEF OPERATIONS

A port-facility relief operation is similar to an airfield relief operation. However,

instead of receiving aircraft, the unit receives ships, and instead of being relieved by light forces, the unit is probably relieved by a heavy force (Marine amphibious force (MAF) or Army mechanized unit). The brigade engineer should consider the following:

- Status of the port and facilities, to include an estimate of the water depth (divers may be needed), available docking sites, and off-loading equipment (cranes).
- Availability of HN equipment and personnel support to facilitate the off-loading of equipment.
- Status of port damage, current port repair, and maintenance operations.

RIVER-CROSSING OPERATIONS

Normally, light infantry brigades do not conduct river-crossing operations without extensive EAD augmentation, including additional EAD engineers (such as tactical bridging units). However, light infantry brigades may be tasked to support a crossing as part of a larger division or corps operation where a light division is moving into an area to allow heavy units to continue the attack across a river and beyond. It may also support an infiltration operation focused at supporting a larger force's crossing operation.

River-crossing operations fall into three categories:

- Hasty.
- Deliberate.
- Retrograde.

Deliberate river-crossing operations are covered in this chapter as a worst-case scenario for light engineer support. *FM 90-13* contains additional information on deliberate river-crossing as well as a discussion of the hasty and retrograde river-crossing methods.

A deliberate river crossing is an attack that is planned and carefully coordinated with all concerned elements. It is based on—

- Thorough reconnaissance.
- Evaluation of all intelligence and relative force ratios.
- Analysis of various COAs.
- Other factors affecting the situation.

A deliberate river crossing requires extensive planning, detailed preparation, and centralized control. It is usually conducted against a well-organized defense when a hasty river crossing is not possible or has failed. This type of river crossing requires the sudden, violent concentration of combat power on a narrow front, in an area where there is a high probability of surprise.

A deliberate river crossing supports the tactical plan in four phases:

- Advance to the river.
- Assault across the river.
- Advance from the exit bank.
- Secure the bridgehead line.

Light units may serve as the river-crossing assault force in conjunction with air-assault operations behind the enemy's defenses on the river. Once the far side of the river is cleared, rafting or bridging operations can begin. The actual crossing operation is often planned and executed by the brigade XO and staff. In this capacity, the brigade XO is the crossing-area commander.

The first two phases of the deliberate river crossing use control measures through assembly areas and holding areas (see *Table 5-1*). These control measures pertain only to a small-boat assault by light forces.

Table 5-1. Deliberate river-crossing phases

Phase	Location	Event
Advance to the river	Staging area	Linkup with the engineer LO Rehearsal of boat crews and bump plan Operation rehearsal
	Assault boat-staging area	Boats and crossing equipment dropped off Engineer supervision of inflation of rafts for initial crossing force Boats carried forward by the initial crossing force to the forward assembly area (FAA) once complete. It has the last covered and concealed position before entering the river.
	FAA	Equipment rigged on boats Infantry assault forces move forward to the position of the river
Assault across the river	Assault-crossing site	Initial assault force (with assault boats) guided forward by engineers to the crossing site
	Exit bank	Crossing force exits assault boats and deposits vest and paddles Engineers secure equipment and return to entry bank to transport the next unit

The only light engineer river-crossing capability for vehicles and equipment would be through the identification and construction of fords. The final two phases beyond the river crossing require engineer support for offensive operations. The engineers supporting this requirement should be independent from the crossing engineers. Chapter 3 covers the planning and execution for offensive operations. *Table 5-2, page 5-22,* gives some planning considerations for the brigade engineer and the company commander.

REAR-AREA OPERATIONS

The brigade rear is that area from the TF's rear boundary to the brigade's rear boundary. Brigade rear operations are designed to ensure freedom of maneuver and continuity of operations, including sustainment and C2. Brigade rear operations normally have little immediate impact on current close ground operations but are critical to subsequent operations.

Reserve forces and CS and CSS units are located in the rear area. The BSA, FOBS, FARPs, artillery fire bases, and TF combat and field trains may be positioned in the brigade rear area. Engineer support of rear- area operations may require additional engineer assets. These assets need to be requested from the corps through the division. Adequate engineer support of rear-area operations requires detailed planning and coordination by both the brigade engineer and the company XO. The company XO also acts as the BSA engineer.

Rear-area engineer operations, if neglected, may cause the maneuver plan to fail. Therefore, rear-area engineer operations must be planned and executed to sustain the combat power of the light infantry brigade and to allow the brigade to provide needed support to its TFs.

Table 5-2. Planning considerations

Planning and Execution Considerations	Responsibility	
	Brigade Engineer	Engineer Commander
IPB	*	*
Reconnaissance	*	
Crossing-site capabilities (possible fords)	*	
Fire support	*	
Air defense	*	
Communications (use of land lines to avoid creating a large signature)	*	*
Deception	*	
Smoke	*	
Traffic	*	*
Aviation	*	
Night operations	*	
Equipment load classification	*	
* Indicates who is involved in the planning process.		

MOBILITY

The brigade engineer addresses rear-area operations during the IPB process. As the terrain expert, he determines possible rear-area-unit locations from a mobility and countermobility support standpoint. Direct coordination between the brigade engineer, the BREC, the brigade S3, and the brigade rear CP results in rear-area-unit locations that are both operationally sound and trafficable, The brigade engineer must also coordinate with the brigade S3 and S4 to ensure that trafficable and easily maintainable MSRs are identified in the brigade's OPORD.

The brigade engineer also plans route-reconnaissance and route-clearance operations and MSR maintenance, Reconnaissance of initial MSRs must be done by engineers so they can be validated for use by the brigade's support vehicles. The initial reconnaissance gives the brigade engineer and the company commander an initial work estimate for repair and maintenance of the MSRs.

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 the enemy's assets and capabilities and the current level of threat. During engineer-intensive operations (for example, defense), the brigade may need additional engineer support (corps engineers) to adequately conduct these missions.

SURVIVABILITY

During rear-area operations, engineers focus on force-protection support to units in the rear area. *FM 5-114* covers the levels of support, as do *Chapters 3 and 4* of this manual. 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 fire bases, and TF field trains.

Unit operations officers have staff responsibility for their units' force-protection planning from two perspectives. They—

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

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, with the overall force-protection policy and plan being the responsibility of the brigade commander. The level of threat established during the IPB is the key factor in determining the amount of force protection the brigade rear area requires. 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.

COUNTERMOBILITY

All rear-area units are required to emplace protective obstacles around their perimeters to prevent enemy infiltration 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, the engineers are not responsible for the obstacle construction.

GENERAL ENGINEERING

The maneuver brigade relies on the 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.

AREA DAMAGE CONTROL

The brigade engineer develops plans for—

- Assessing or estimating damage.
- Clearing a damaged area.
- Reconstructing and/or rehabilitating an area if damaged by either friendly or enemy activity.

Divisional light engineers normally require external support from EAD engineer units to execute ADC missions.

MOUNTAIN OPERATIONS

Operations in mountainous terrain require special equipment and training and acclimatization, along with a high degree of self-discipline, if they are to succeed. These operations are planned, coordinated, and executed in the same fashion as an operation in any other type of environment. Planning considerations outlined in Chapters 3 and 4 apply. Because of their adaptability and tactical mobility in restrictive terrain, light forces are frequently in this environment. The brigade engineer and the company commander should take into account the following special considerations when planning operations in mountainous terrain:

- LOC are typically inadequate in quantity and capacity; therefore, significant engineer equipment augmentation to construct and upgrade the LOC is essential. Consider task-organizing engineer heavy equipment forward to ensure that mobility is not hindered and that LOC are well maintained. Rockslides and mud slides can present a considerable obstacle in the mountains.
- Construction time for field fortifications and obstacles (particularly above the timberline and in rocky areas) or during periods of extreme weather may be significant. Resupply assets are constrained because of the terrain. Considerable time and equipment may be required to emplace these field fortifications because of the rocky ground. In extreme cases, extensive use of demolitions may be necessary.
- Stream crossings are frequent and difficult (particularly during the rainy season or spring thaw) and are usually accomplished by expedient means.
- In extremely rough terrain, cableways and tramways offer an effective means of supplying an attack and evacuating the wounded.
- Standard military bridging should be on hand to reinforce existing bridges that typically have low military load classifications.
- Helicopters play a key role in most mountain operations (both maneuver and logistics support). This makes it necessary for engineers to clear and level LZs, PZs, and FARPS. Nevertheless, the low-density altitude and extreme weather can significantly reduce the effectiveness of helicopters, resulting in an increased reliance on ground LOCs.
- METT-T may dictate increased decentralization of light engineer assets since mountainous terrain requires small-unit decentralized operations.
- Additional items (such as compressors, power drills, chain saws, and bulldozers) may be necessary to operate efficiently. Large amounts of explosives and obstacle materials may also be required.
- Enemy minefield are typically sited at choke points where the bypass is difficult or impractical; therefore, the scouts should be augmented with engineers to enhance the brigade's ability to collect engineer IR (for example, provide detailed minefield reconnaissance).
- SCATMINES are extremely effective for isolating most objectives because of the limited LOC available to the enemy.

- Engineer reconnaissance should precede all operations since maps are inadequate; however, it should not delay operations. Aerial reconnaissance and the division terrain-analysis team should be used to the maximum extent.

JUNGLE OPERATIONS

The brigade engineer and the company commander should consider the following when conducting operations in support of the brigade in jungle terrain:

- Road construction in the jungle is usually affected by poor drainage, heavy rainfall, and poor subgrade foundation. These problems can be dealt with by—
  - Avoiding low ground for road construction.
  - Laying long sections of pontoon bridging or corduroy or chess palling road through low swampy ground.
  - Making roads wider, which thins the overhead foliage, so that the sunlight dries out the road.
  - Using subgrade materials to support heavy traffic.
  - Using runway matting or paving on roads to control erosion during the rainy season and dust during the dry season. Lime stabilization is also a field expedient method of stabilizing wet soils.
- It is essential that the infantry provide security to engineers performing missions.
- Operations in the jungle include—
  - Clearing vegetation with engineer equipment to provide unobstructed fields of fire around fixed facilities.
  - Requesting augmentation engineers to clear vegetation back 100 meters from MSRs; this greatly discourages insurgent mining and ambush operations. Paving the roads also significantly hampers insurgent mining operations.
  - Tasking engineer teams to habitually clear the same route. This enables them to become intimately familiar with the route and to locate recently emplaced mines and booby traps.

CHAPTER 6

Combat Service Support

CSS for the light engineer company is characterized by constrained organic assets and a heavy reliance 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. Light force operations frequently require units to operate in restrictive terrain with little or no access to ground LOC. This fact, coupled with the light brigade's mission of rapid deployment anywhere in the world, creates a very challenging CSS environment. CSS for the light engineers must ultimately accomplish the following:

- Sustain engineer company operations, to include attachments from its parent HQ and, as necessary, those from corps.
- Cater to engineer company mission requirements in support of current and future brigade operations.

Mission CSS will prove to be the most challenging as the light engineer will frequently find himself operating anywhere on the brigade battlefield under changing task organizations.

SUSTAINMENT PRINCIPLES

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

ANTICIPATION

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

- High fuel-consumption rates (higher than the majority of equipment found in the light brigade).
- Engineer-specific Class IX repair parts.
- Large amounts of Class IV/Class V barrier materials.
- Demolitions for both 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.

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 overloaded and 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 (for example, clearing a LZ for aerial resupply). These missions must be anticipated and planned for during the mission analysis. Another mission that must be planned for is the passage of CSS units through obstacles for follow-on missions.

INTEGRATION

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. He should make an accurate but timely recommendation on required logistics support.

CONTINUITY

Engineer units are always committed to either the current battle or 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 the lull in battle. This increases the need for engineers to plan for continuous routine and emergency logistical support.

RESPONSIVENESS

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 for until the task organization is modified or changed. When possible, the plan should include aerial resupply.

IMPROVISATION

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, whenever possible.

CSS ORGANIZATIONS AND FUNCTIONS

When engineer CSS operations are under company control, the company sustains the supporting companies and their platoons. The company also assists, troubleshoots, and facilitates mission-oriented CSS operations for its units when they are task-organized to subordinate units in the brigade.

TACTICAL LOGISTICAL FUNCTIONS

The tactical logistical functions of CSS are—

- Manning.
- Arming.
- Fueling.
- Fixing.
- Moving.
- Sustaining the soldier.

Manning

The systems of personnel readiness management, replacement management, and

casualty management must meet the needs of the units. The services provided include—

- Personnel accountability.
- Strength reporting and management.
- Replacement operations.
- Awards and decorations.

When under parent-unit control, the DIVEN headquarters and headquarters company (HHC) Personnel and Administrative Center (PAC) provides most of the company's administrative support. Information is passed from the company to the PAC through the S1 or the PAC supervisor. When the company is task-organized to a maneuver brigade, it normally receives administrative support from the brigade. The engineer company is only responsible for reporting casualties and requesting personnel actions.

The brigade S1 manages the support provided to the engineer company by the personnel-services company (PSC). He collects reports from the maneuver battalions that give the statistics on their attached engineers. The BREC is responsible for reporting the personnel statistics of the engineer company and those units not task-organized to the maneuver battalions. The brigade rear CP operates the brigade S 1 section that–

- Performs strength accounting and casualty reporting.
- Verifies replacement operations.
- Performs administrative services and limited legal, personnel, and financial services.

The engineer company XO and 1SG are the persons who coordinate with the brigade S1 section.

Arming

Arming the force is normally associated with ammunition requirements to destroy the enemy. For the engineers, arming the force is divided into the following categories of requirements:

- Mission sustainment.
- Unit sustainment.

The brigade engineer can influence both unit and mission sustainment requirements through early integration into the sustainment planning process at the brigade main and the brigade rear CPs. The following will assist engineer units in accomplishing their mission:

- Sound sustainment estimates.
- Accurate tracking of the engineer unit sustainment posture.
- Continuous coordination with the FSB to ensure that requirements for engineer units are properly forecasted, prioritized, and delivered.

Mission Sustainment. Installing obstacles in the offense and defense requires supplies, such as Class IV/Class V, that are requisitioned by the FSB for both division and nondivision engineer units *(see Figure 6-1, page 6-4)*. These supplies are normally moved from corps supply and ammunition companies by corps trucks as close to the obstacle locations (groups) as possible. This—

- Minimizes multiple material-handling requirements.
- Reduces transportation requirements on brigade transportation assets.
- Facilitates a more rapid emplacement of the obstacles.

If mission-required supplies cannot be delivered directly to the obstacle locations by corps transportation assets, a plan is

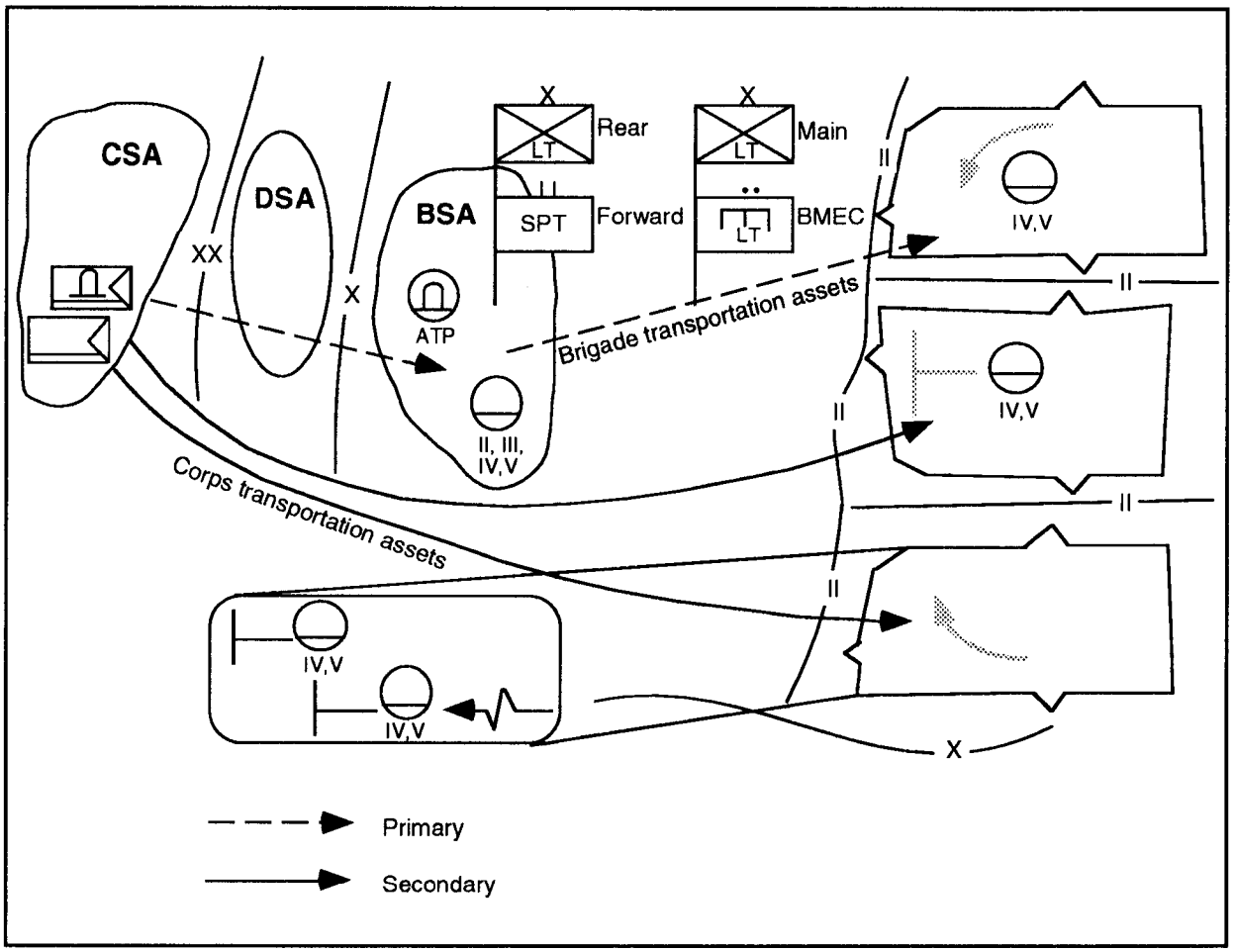


Figure 6-1. M/S mission sustainment

required that uses division and brigade transportation assets. Engineer units are not responsible for planning, controlling, and executing the delivery of mission-required supplies.

Unit Sustainment. The FSB CSS structure services engineer units, usually through echeloned support paths. For DIVEN units, these paths flow to and from the division through the brigade's FSB. Supply and services for nondivision engineer units are normally requisitioned through the corps support battalions and the corps personnel units that support them *(see Figure 6-2).*

Resupply System. The two resupply systems available to the company commander are the—

Push system. Prepackaged bundles of supplies are sent to units on a regular basis without being requested. These bundles are easy to configure and speed up the throughput of supplies.

Pull system. Units request specific quantities and types of items needed for resupply. Requests are usually submitted on the unit logistical status (LOGSTAT) report, which allows the command to use limited haul assets to transport the most critical supplies.

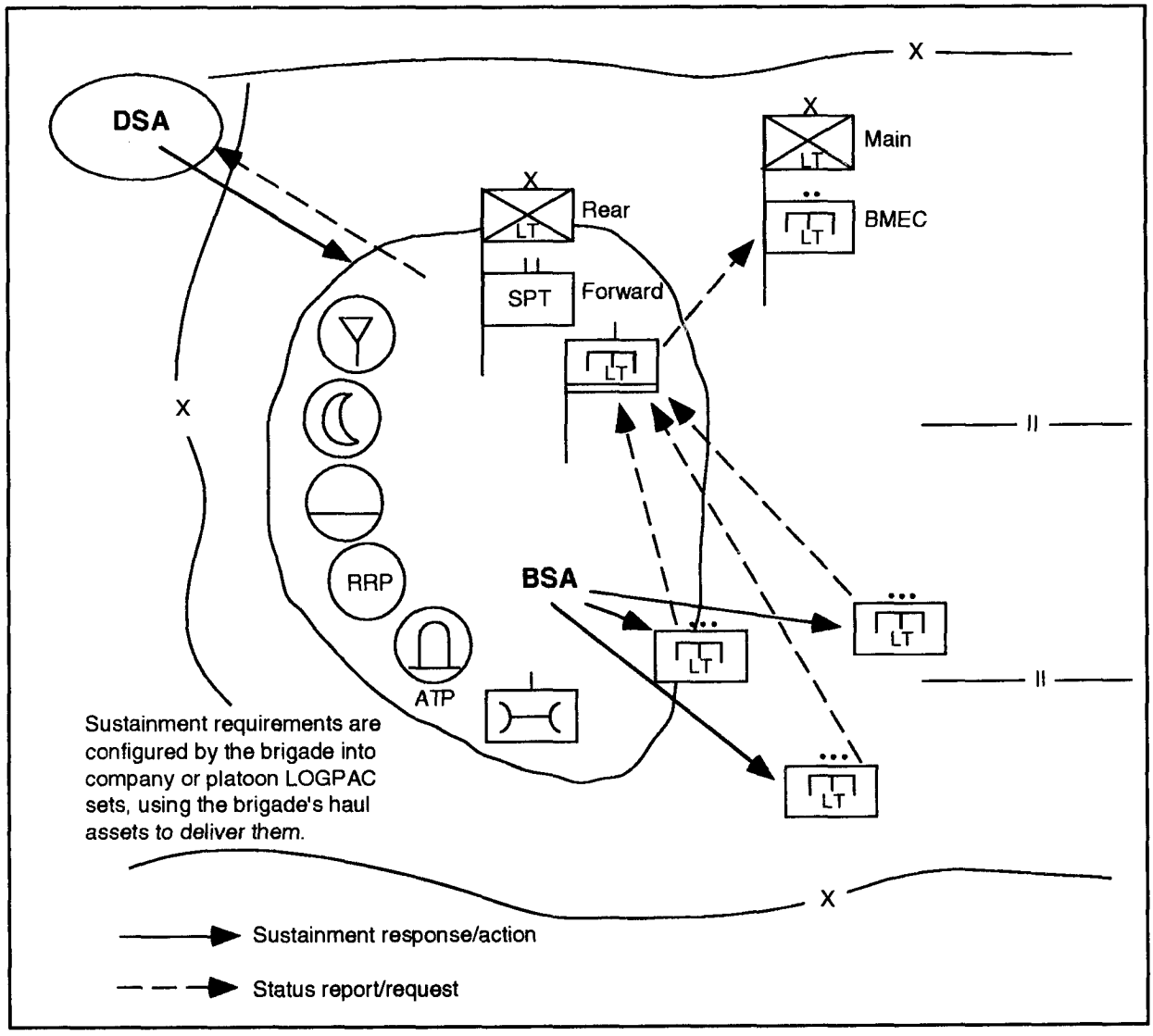


Figure 6-2. Unit sustainment

Both systems have benefits and shortcomings. If only the push system is used, a unit may develop a stockpile of unneeded supplies that slows its ability to move. Additionally, some supplies may be neglected because they were not part of the push package. On the other hand, the pull system is a slow, laborious process that requires detailed records and planning to ensure that needed supplies are requested.

During high-intensity conflicts, the FSB relies mainly on the push package and only handles pull requests for critical items. If time permits, a combination of the two is most ideal. The FSB can determine from the LOGSTAT report whether the unit desires a standard push package or a specifically designed pull package. These LOGSTAT reports are normally required at least 24 hours in advance to allow the FSB time to react.

Standardized Load System. One application of both resupply methods is the establishment of a limited number of

"brigade-common" preconfigured kits (preferably constructed, supported, and established by the division). These kits are configured as an end item for the using unit, with all the materials necessary to achieve the desired end state of the resupply. The kit's size and shape is determined by the smallest load-carrying haul asset available within the brigade (for example, Black Hawk sling load and HMMWV trailer). If a larger haul capacity mode of transport is available, multiple kits could be hauled. An example is a conventional minefield kit. The kit (or configured load) would contain enough M21 mines to construct a minefield of a fixed length and depth. Based on the planning and execution requirements, "X" number of kits would be pushed forward to the obstacle location FSP to achieve the desired intent. In this case, perhaps four kits, within the confines of the MC, would achieve a fix effect. Therefore, if 30 kits are established, it defeats the purpose of simplicity, both for the unit responsible for kit construction and the unit using it.

Since the unit can request and receive logistics in a packaged manner, ordering and handling requirements are minimized at the user level, which facilitates and expedites the execution.

Fueling

Because of minimal requirements for fuel in the light brigade, most refueling assets are maintained in the CS and CSS elements. The FSB in the brigade is the primary manager for fuel for the entire brigade. Through coordination and synchronization with the FSB, the light engineer company can refuel engineer assets forward in a timely manner. This is a critical, time-sensitive mission for engineers when additional heavy equipment has been task-organized to the brigade.

Fixing

The supporting maintenance structure for light engineer companies is austere in organization and capabilities. Organic maintenance support is limited to operator maintenance on all equipment except communications and organic weapons which receive organizational maintenance. External maintenance support is critical for the engineer company, and coordination and synchronization for this support is vital. The supported maneuver unit must provide organizational and DS maintenance for task-organized engineers. The maneuver brigade has mechanics to support the engineer's wheeled vehicles and weapons. The parent engineer battalion HHC normally provides an organizational contact team, with a prescribed load list (PLL), to the engineer company when engineer equipment (small emplacement executor (SEES), dozers, armored combat earthmover, M9 (ACES), and bucket loaders) is task-organized from the battalion to them. Additionally, division support command (DISCOM) provides a DS engineer equipment contact team, with a basic load of repair parts, to the FSB for forward repair of engineer equipment based on mission requirements. The brigade evacuates inoperable wheeled equipment (HMMWVs and 5-ton cargo trucks) through maintenance collection points. Contact teams must fix engineer equipment as far forward as possible because of the lack of recovery assets available to evacuate the equipment. If engineer equipment cannot be fixed on-site, the brigade notifies the MSB so proper recovery assets can transport equipment to the rear.

Nondivision engineer units must bring their own maintenance personnel and a DS contact team for DS maintenance. These units still need support from the FSB or corps support group to order parts; major assemblies; and petroleum, oils, and lubricants

(POL). A corps engineer company has as many vehicles as the light infantry battalion. This can have a serious impact on logistics operations in the FSB if it is not planned for. A corps logistics-support section needs to accompany the corps engineer assets and assist the FSB with their support.

Moving

Soldiers, equipment, and supplies must be moved rapidly and in sufficient quantities to support combat operations. Because of the lack of organic haul assets, special consideration and planning is necessary at all levels in the light infantry divisions.

Light forces are designed to be flexible and responsive. Therefore, they consist mainly of foot-mobile fighters. The light force's success is limited by the physical ability of the light engineer to deliver to the appropriate place on the battlefield, in a timely manner, the engineer support and materials required to defeat the enemy and survive. The ability of a light engineer to fight is directly related to the load that he is required to carry. The bulk and weight of explosives and mines, the primary tools of the light engineer, are a double-edged sword. To ensure that they have adequate supplies to accomplish the mission, the loads are commonly excessive. The engineer leader is faced with the challenge of assembling a combat load that ensures mission success. Engineer leaders should consider load planning, calculation, and management.

Load Planning. Light forces normally plan to be able to conduct operations for 72 hours without resupply. Soldiers must carry enough rations, water, ammunition, and obstacle material (Class IV / Class V supplies) to exist until support units can establish resupply operations. The use of aerial resupply (such as, parachutes, LAPES, or sling loads) can be a critical asset in reducing the load carried by each soldier. Load cards are needed for all vehicles. Haul space is critical and needs to be managed.

Load Calculation. Historically, US soldiers have gone into combat with too much equipment, which slowed them down. Usually, much of the excess was discarded en route. Units must establish packing lists that maintain individual rucksacks at manageable weights. When soldiers pack their rucksack, they must adhere strictly to unit SOPs in what to pack and what not to pack. The average soldiers' rucksack should not exceed 75 pounds (about 40 percent of an individual's weight). Proper load calculations help ensure that all soldiers make it to the battle. Light engineers cannot carry an arsenal of Class IV / Class V supplies. Leaders must assess possible missions and adjust loads accordingly. The light engineer should try to avoid carrying unnecessary items. A shape charge may seem nice to have; however, usually more than one is needed, and it is not very useful without the cratering charge. There is a lot of excess weight carried around on soldiers' backs. Leaders should arrange to have standard obstacle packages on call and delivered by aerial / ground resupply.

Load Management. Ensure that enough space is left in rucksacks for essential supplies (such as rations, water, and ammunition). Distribute the heavier loads so everyone shares a little of the burden. This ensures that most of the supplies are available when they are needed. Key leaders need to record the distribution of supplies and equipment so they know exactly what items each person is carrying. Maneuver units need to assist in carrying the necessary Class IV / Class V supplies.

Sustaining the Soldier

The elements to sustaining soldiers and their systems are—

- Personnel-services support.
- Health-services support.
- Field-services support.
- Quality-of-life support.
- General-supply support.

Personnel-Services Support. This support encompasses the following areas:

- Religion. This includes religious services, personal and religious counseling, and pastoral care.
- Legal. This includes advice and aid to soldiers and commanders concerning laws and regulations.
- Finance. This includes all matters involving a soldier's pay.
- Public affairs. This includes all matters relating to command information, public information, and community relations.

Health-Services Support. This support encompasses the following areas:

- Medical treatment. Casualties are a certainty in war, and it is a leader's responsibility to ensure that health services are planned for and available to his engineers. Medics from the DIVEN HHC are trained to treat casualties. The engineer company SOP should require that at least two engineers per squad be trained as combat lifesavers. They are a vital component to medical support in the engineer company. Because the medics or combat lifesavers cannot be everywhere on the battlefield, every soldier must be trained to provide basic first aid.
- Casualty evacuation. Responsive casualty evacuation increases the morale of a unit. On the decentralized battlefield of a light force, detailed planning and coordination are required to be successful. During the fight, casualties are routinely left where they received initial treatment (such as self-aid and buddy-aid). As soon as the tactical situation allows, casualties are moved to the nearest casualty collection point (CCP). These CCPs are normally established by the engineer platoon when they are operating independently (for example, route clearance) or by the maneuver unit they are supporting. The casualties are then evacuated directly to the medical company in the FSB or to the nearest maneuver battalion aid station. Company SOPs must contain detailed procedures for evacuation, casualty marking, and limited-visibility casualty-evacuation operations.
- Preventive medicine. *FMs 21-10 and 21-11* contains detailed information on preventive medicine, focusing on nonbattle injury prevention and treatment.

While the engineer company does not have any organic aidmen, they are available and are normally task-organized from the DIVEN HHC.

Field-Services Support. This support encompasses food preparation, water purification, bakery facilities, clothing and light textile repair, laundry and shower facilities, parachute packing, air item maintenance, rigging supplies and equipment for airdrops, and mortuary affairs.

Quality-of-Life Support. A direct relationship exists between adequate, well-thought-out soldier and family quality-of-life programs, soldiers' morale, and combat effectiveness. These operations include–

- Postal services. This includes the movement, delivery, and collection of mail in the company.
- Public affairs. This is the provision of an expedited flow of complete, accurate, and timely information, which communicates the Army perspective, keeps soldiers and the American people informed, and helps to establish the conditions that lead to confidence in the US Army.
- Family-support-group programs. These programs enhance the soldiers' effectiveness by making sure that families are appropriately cared for in their absence.

General-Supply Support. It encompasses the provision of clothing, water, and major end items in support of the force. These classes of supply include all the systems that support soldiers. The quality and acceptability of rations, clothing, and sundry packages are critical in sustaining the morale of soldiers, enhancing their ability to perform effectively.

BRIGADE CSS SYSTEM

The brigade receives CSS from elements of the DISCOM and corps support command (COSCOM). The support received includes—

- All classes of supply.
- DS-level maintenance.
- Health services.
- Field services.
- Material collection and classification.

Brigade CSS comes from a habitually associated FSB from the DISCOM. This habitually supporting FSB provides the dedicated division-level CSS for its specific maneuver brigade. It also provides area support to divisional elements operating in the brigade sector, as well as units task-organized to the brigade, such as the engineers. It is organized with a headquarters and headquarters detachment, a supply company, a maintenance company, and a medical company.

ENGINEER CSS LAYDOWN

The engineer company receives CSS from various elements, both inside and outside the supported brigade. The DIVEN battalion, like the maneuver brigades, is limited in its organic capability to sustain its subordinate companies. DIVEN line companies rely on either the DISCOM (through the DIVEN HHC when under parent unit control) or a supported brigade's FSB assets for logistics sustainment. The DISCOM is organized to allow it to tailor sustainment support packages for the FSBs to support the CSS requirements of the supporting engineers.

DIVEN Company

The FSB provides brigade-level logistics and health-services support to the task-organized engineer company when it is supporting the brigade. Personnel-services support, minus promotions and transfers, are obtained through direct coordination between the engineer company and the brigade S1.

The engineer battalion's HHC provides CSS to the engineer company when it is under parent-unit control. This support normally comes from the DISCOM's main support battalion (MSB) through the DIVEN field trains. The field trains can also provide limited support packages to the engineer

company on a case-by-case basis when the company is task-organized to the brigade.

Nondivision Engineer Units

The FSB provides logistics and health-services support to nondivision engineer units supporting the brigade. Personnel-services support remains with corps personnel units which normally locate in the division support area (DSA). To provide this support, special support packages from the corps support group can be tailored and sent to the FSB to support nondivision engineer units. They may also receive their logistics support from corps logistics units operating in the brigade rear area or in the division rear area. Health-services support requirements for nondivision units is absorbed into the existing brigade's medical support structure, which is normally augmented by division and, as required, corps medical units. The early transfer of logistics information and requirements, to include any tactical standing operating procedures (TSOPs), is important to the combined effort of both the division and nondivision engineers.

Engineer Cells

The BMEC, task-organized to the brigade CP, is supported in conjunction with the brigade CP (normally the main CP) they collocate with. The brigade CPs receive their logistics and health-services support from the FSB through the brigade HHC. Personnel-services support for the BMEC is acquired through the brigade S1 and the DIVEN S1. When the BREC is established, it receives its support through the engineer company CP.

CSS DUTIES AND RESPONSIBILITIES

The responsibilities of the engineer organization's key CSS leaders and planning cells, and their functions within the brigade CSS system, are crucial to the accomplishment of the CSS mission.

ENGINEER PLANNERS

Engineer planners and executors at all levels within the brigade must be familiar with these responsibilities to ensure appropriate unit and mission sustainment of the engineer force.

Brigade Engineer

The brigade engineer is ultimately responsible for all engineer logistics estimates and plans and the monitoring of engineer-related CSS execution within the brigade. When an engineer company is task-organized to the brigade, the brigade engineer relies heavily on the BREC to assist him in logistics activities. The brigade engineer—

- Writes the engineer annex to the brigade OPLAN/OPORD to support the brigade commander's intent. He recommends any command-regulated classes of supply and allocates and sets priorities for engineer units involved in M/CM/S operations.
- Identifies FSP locations to be run by the FSB. He identifies unit responsibilities for haul, push-package composition, push-package timetables (with the brigade S4), and possible FSB support operations.
- Works closely with the brigade S4 to identify available haul assets (including HN assets) within the brigade and recommends priorities to the brigade CSS planners. He advises the brigade commander on the impact of low-priority transportation support.
- Coordinates unit MEDEVAC procedures for engineer units. He coordinates

with the CSS planners to ensure that the FSB and MSB can handle additional work loads.

- Identifies critical engineer equipment and engineer mission logistics shortages.
- Provides the brigade S4 with an initial estimate of required Class IV/Class V supplies for the TF obstacle groups, using the obstacle belts and group planning factors to allow the brigade logistical planners to accelerate requisitions to the MSB. He adjusts the estimate based on the ground reconnaissance done by maneuver or engineer units. He plans the use of FASCAM with fire support and logistical units.
- Tracks the flow of mission-critical Class IV/Class V supplies into the BSA and forward to the TF sectors.
- Coordinates MSR-clearance operations (primarily through the BREC) and tracks the status of these operations at the brigade main CP.

Company Commander

The company commander's primary responsibility is ensuring that CSS operations sustain his company's fighting potential and ability to enhance the combat power of his supported brigade. He provides critical insight during the brigade tactical planning process and provides mission guidance to his CSS operators. The company commander also—

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

Company XO

The company XO is the coordinator and the supervisor of the company's logistical effort. During planning, he receives status reports from the platoon leaders, sergeants, and 1SG. He reviews the tactical plan with the commander to determine company CSS requirements and coordinates these requirements with the FSB. During mission execution, the XO is at the second most important place on the battlefield. Frequently, he focuses his time on ensuring that the engineer CSS requirements are met. The company XO—

- Serves as the link between the brigade rear CP and the FSB, 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 his engineer company and the CSS units of the brigade, the staff elements of the FSB, and the brigade rear CP.
- Serves as the brigade rear logistics engineer planner.
- Anticipates problems and works to avoid delays in planning and battle transition. He conducts company CSS "battle tracking."

- Identifies the need for push packages, ensures their construction, and tracks their usage.
- Monitors equipment locations and maintenance status.

First Sergeant

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 him in preparing reports/requests for the brigade and the parent battalion. The lSG helps the XO/commanding officer (CO) prepare paragraph 4 of the company OPORD. He—

- Executes and coordinates the company's CSS and unit sustainment.
- Receives, consolidates, and forwards all logistics, personnel, and casualty reports to the brigade rear CP.
- Supervises the evacuation of casualties, enemy prisoners of war (EPWs), and damaged equipment. He establishes and supervises company resupply activities.
- Monitors the company's maintenance activities. He orients new personnel replacements and assigns them to squads and platoons, according to the commander's guidance.
- Maintains the company's battle roster.
- Tracks platoon logistics requirements and relays/coordinates the requirements with TF S4 for logistical packages (LOGPACs).
- Monitors casualty evacuation.
- Assists the XO in troubleshooting logistics problems with the FSB and the parent unit engineer HHC.

Supply Sergeant

The engineer company supply sergeant's primary focus is on assisting the 1SG with logistics support. His principal duty is the execution of CSS operations for the company and its subordinate units. He—

- Is responsible for the platoon LOGPAC tie-in to the TF movement schedule when subordinate units are task-organized to the maneuver battalions.
- Coordinates unit CSS requirements with the TF S4 and the support platoon leader, as required.
- Maintains the basic load of all unit sustainment classes of supply.
- Assists in contingency supply planning through maintaining up-to-date information on the tactical situation and adjusts the CSS plan as appropriate.
- Is responsible for forecasting the company's consumption of food, water, ammunition, and batteries based on the current tactical situation.

Brigade S1

The brigade S1 is the central point of contact for coordination of engineer company matters concerning personnel-services support. When working with a task-organized engineer company, the brigade S1 is responsible for—

- Coordinating engineer personnel-services support with the brigade engineer and the engineer company XO.
- Providing and receiving personnel and strength accounting, casualty reporting, replacement operations, awards, and personnel management.
- Coordinating chaplain support for engineer units.

Brigade S4

The brigade S4 is the central point of contact for logistics planning and coordination between the brigade engineer, the engineer company, the FSB, and the brigade. He also—

- Identifies shortfalls and coordinates with COSCOM units to fill requirements.
- Anticipates unforecasted logistical requirements and coordinates for support (transition from offense to defense, and so forth).

ENGINEER CSS C2 RESPONSIBILITIES

Engineer CSS C2 centers on the BMEC and the BREC. These planning cells and the engineer company CP have specific responsibilities in identifying requirements, estimating resources, integrating into the brigade's planning and decision cycle, and monitoring the execution of engineer sustainment missions.

Brigade Rear Engineer Cell

The BREC is the brigade engineer's primary integrator in the execution of CSS operations for the brigade's engineer units. The BREC, led by the engineer company XO, works closely with the brigade rear CP. The BREC coordinates sustainment for current operations and plans and prepares for implementation of future operations based on guidance from the BMEC and the company commander. The BREC's sustainment missions consist of the following:

- Maintaining the updated CSS status of engineer units.
- Providing the BMEC with detailed CSS estimates to assist in formulating brigade orders.
- Ensuring that engineer sustainment plans for-both division and nondivision engineer units are synchronized with the FSB.

Brigade Main Engineer Cell

The BMEC collocates with the brigade main CP. It is responsible for—

- Providing input to the brigade commander on engineer sustainment issues.
- Developing the engineer sustainment plan and writing the engineer CSS portions of the basic brigade OPLAN/OPORD and paragraph 4 of the engineer annex.
- Ensuring that immediate sustainment requests received from the maneuver battalions or the brigade tactical CP, if active, are forwarded to the BREC.

Tactical Engineer

The tactical engineer is part of the brigade tactical CP when it is active and when his presence is required by the brigade commander. The tactical CP is normally located in the MBA, close to the forward battalions, where it can synchronize the combat, CS, and CSS of engineers supporting close operations. The tactical engineer has limited capability to impact CSS operations from this location. His primary duties relating to CSS are receiving and forwarding reports and influencing the redirection of engineer-related sustainment priorities for the forward maneuver units.

Engineer Company CP

The company commander's administrative logistics section establishes a CP in close proximity to the brigade rear CP. The company CP is led by the XO and is responsible for the sustainment of the headquarters section. This includes coordinating sustainment support for the engineer company CP

and any organic or attached engineer element not task-organized to the maneuver battalions. The company CP maintains close coordination with the brigade's S1 and S4 sections to monitor the status of replacements, maintenance, and requisitions for supplies and services that support the DIVEN units. Normally, the 1SG and the supply sergeant are the primary executors of the engineer sustainment estimates used in planning operations. Their training in the development of engineer sustainment estimates is essential to the effectiveness of the BREC. The company CP reports all required CSS to the parent engineer battalion's S1 and S4 in the DIVEN rear.

CSS PLANNING

The engineer company's efforts to plan and coordinate engineer CSS are essential to the full integration of engineers into the brigade's sustainment structure. The BMEC (assisted by the brigade main CP), the BREC (assisted by the brigade rear CP), the FSB, and the S4 work closely to synchronize the planning and coordination process and facilitate sound and timely plans or orders and sustainment for engineer units.

PROCESS

When the BREC receives the WARNORD for a mission from the BMEC, it immediately initiates a logistics estimate process. This is conducted with the brigade rear CP's logistics planners, as outlined in *FMs 101-10-1/2 and 63-2-1*. These estimates are specifically focused on the sustainment of all subordinate engineer units task-organized to the brigade. Classes I, III, IV, and V supplies and personnel losses are the essential elements in the estimate process. Close integration with the FSB can simplify and speed up this process through the use of their automated data processing (ADP) systems. 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.

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

The requirements for unit and mission sustainment supplies and their availability are forwarded to the BMEC, along with a projected combat power status that is based on current engineer sustainment operations. At the BMEC, the requirements are analyzed and translated 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's basic order and paragraph 4 of the engineer annex are developed and incorporated into the order. Current sustainment operations may require redirection based on the new plan and will be sent to the BREC for execution.

The BMEC also tracks essential CSS tasks involving nondivision engineer units supporting the brigade. The brigade engineer monitors the sustainment status of nondivision engineer units. Nondivision engineer unit commanders and their staffs must support this requirement. 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 nondivision engineer units to execute missions for the brigade are integrated into the brigade's CSS plans. For the brigade engineer to properly execute these missions, accurate and timely reporting and close coordination between the brigade engineer and supporting nondivision engineers are essential. This reporting is normally facilitated by the existing BREC. Supporting nondivision engineer units, if not attached to the existing division engineer company, must effect linkup with the existing engineer CSS to ensure their synchronization of effort.

FOCUS

The focus of CSS planning is ensuring 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 BMEC and BREC with planning. Brigade and engineer company orders can then focus on the deviations from the routine planning priorities established in the SOPs.

Offensive Operations

The focus of CSS operations in support of the offense is to 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 off of their basic load/stockage objective. Shortages of sufficient haul assets and the normal dismounted nature of light infantry operations do not allow units to stockpile and move supplies. Because of the speed of the battle, the push-package concept is the desired resupply method.

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 HATK, great shifts in the engineers' 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 the brigade S4's logistics plans are organized to help the CSS executor to be proactive to the change of the mission without interruption of CSS. In planning offensive operations—

- Position vital engineer-related CSS supplies (explosives, Class III supplies, and so forth) well forward in the combat trains of the battalions.
- Use air resupply, when possible.
- Use previously planned and configured engineer LOGPACs of supplies, when possible.
- Plan for increased engineer equipment maintenance problems.
- Use HN or captured enemy engineer supplies, especially haul for bulky Class IV/Class 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, when possible. Operations include engineer reconnaissance, route clearance, FACE, and others.
- Plan and prepare for replacement operations based on known and projected engineer losses.

Defensive Operations

In contrast to offensive operations, the focus of defensive operations is to break the momentum of the enemy attack. The engineer company does not have the requisite

haul assets to transport Class IV/Class V supplies to the obstacle site. Mission-critical materials must be planned for and throughput to the obstacle site considered. Light engineers cannot allow barrier material to be stockpiled at any one location except the BSA. Stockpiled unit-sustainment supplies (such as rations, water, and fuel) for company 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—

- Maintain a brigade-level or, if possible, a division-level focus in Class IV/Class V obstacle material handling in the brigade sector. The maneuver battalions have no capability to move or transport these materials. Their focus is on the battalion unit and infantry-peculiar mission sustainment.
- Maintain a low signature of any logistics FSPs. 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 stockage of Class IV/Class 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. In the restrictive terrain that light forces frequently operate in, these assets are a HVT for the enemy.
- Plan for additional maintenance of engineer equipment and its rapid evacuation, as required. Consumption of fuel and engineer-peculiar Class IX supplies is also high for engineer equipment. The impact of not having these resources can quickly have a detrimental effect on light brigade defensive operations.

OTHER CONSIDERATIONS

CSS planning should also include contingency operations, A&O platoon assets, and nondivision engineer logistics support.

Contingency Operations

In most cases, the unit must operate from its basic load. Most contingency operations are offensive in nature. Regardless of the situation, the push system is the preferred resupply method.

A&O Platoon Assets

When A&O platoon assets are task-organized, they should carry enough PLL and POL for initial sustainment. Additional logistics (for example, more POL and PLL) must be supplied by the supported unit. Heavy equipment requires great amounts of fuel, packaged POL, and a Class IX PLL and authorized stockage list (ASL) beyond what the FSB normally supports. The MSB is capable of establishing a DS maintenance team to be task-organized to the FSB. METT-T and engineer equipment densities task-organized to the brigade ultimately determine the contact teams' task organization to the brigade.

Nondivision Engineer Logistics Support

The key to effective logistics support for task-organized nondivision engineer units is division and corps support packages. Nondivision engineer units have both equipment and equipment densities not found anywhere in the light brigade. Without proper planning, the logistics burden that nondivision engineer units can place on brigade CSS infrastructure can be detrimental.

For task organization and support considerations, nondivision or mechanized engineer units should be considered like an armored unit and OPCON to the brigade. Corps engineer companies will arrive with enough personnel and equipment to satisfy initial sustainment requirements (maintenance, mess, and POL). Extended operation resupply and medical support are corps engineer shortfalls that must be addressed by the brigade engineer. Corps engineers must—

- Deploy with adequate support packages.
- Channel additional support requirements through the BMEC/BREC to ensure that the brigade S4 can support it.
- Inform the brigade engineer of all corps engineer unit activities in support of the brigade.

Corps engineers need accounts for resupply of all classes of supply. A corps area support battalion normally exists in the division area to resupply nondivision units. If a support battalion does not exist, then the corps unit will have to establish accounts with the FSB and/or the MSB.

Most corps engineer companies will have two combat medics with aid bags. The maneuver units will have to assist with casualty evacuation and mortuary affairs.

Resupply Operations

The engineer company and platoon must maximize the number of assets that maneuver units have available for most resupply operations. Neither the company nor the platoon has the assets to support itself for any extended period of time. Engineer resupply must be coordinated and synchronized with the maneuver LOGPAC executors, when possible. This allows engineer supplies to be moved as a part of the LOGPAC to the forward units.

Class IV/Class V Supplies. Deliveries of Class IV or Class V supplies (wire and mines) need to be pushed to the actual obstacle site locations or, as a minimum, to a FSP established in close proximity to the related obstacle group. Engineers do not have sufficient transportation assets or manpower to operate FSPs for Class IV/Class V (obstacle) supplies and haul their own barrier material to the site.

Transportation. The transportation available to the light engineers varies according to the modified table of organization and equipment (MTOE); however, it is always very austere and inadequate for anything but minimal troop movement on the battlefield. DIVENs rely on the maneuver unit to provide transportation for barrier material, fuel, and other resupply items. Air assets are the most valuable and flexible types of transportation available to the light units. The use of free-fall, high-velocity, low-velocity air drops and sling loads offer great flexibility to resupply with limited transportation assets. The general uses for these air-delivery systems are—

- Free-fall and high-velocity air drops. This includes clothing; meals, ready- to-eat (MREs); and items not damaged from falling without parachutes.
- Low-velocity air drop (heavy drops, CDS, and LAPES). This includes

equipment, bulk Class IV/Class V supplies, general supplies, fuel or water platforms, and so forth.

- Sling load. This is anything meeting dimensions and weight limitations of the cargo nets and the aircraft. Sensitive items that cannot withstand hard impacts (water and fuel bladders not on platforms and blasting caps) should have priority for sling-load operations.

CHAPTER 7

Force Projection

Force projection is the demonstrated ability of military forces to rapidly alert, mobilize, deploy, and operate anywhere in the world. Force-projection operations frequently are in response to politically sensitive situations that require the rapid projection and employment of military forces in support of national policy. These operations are normally undertaken in crisis-avoidance or crisis-management situations that require versatile, easily tailorable forces to accomplish a wide range of military operations under all environmental conditions with little or no advance warning. Because of their unique characteristics, the airborne, air assault, and light infantry divisions are ideally qualified to conduct force-projection operations.

Crisis situations are not restricted to peacetime engagement or hostilities short of war. Force-projection operations may be conducted across the continuum of military operations. This chapter focuses on engineer support to warfighting operations. *FM 5-114* gives details on engineer planning and considerations for other types of operations. *FM 100-5* contains the fundamental doctrine for Army force-projection operations.

A force-projection operation may be conducted under conditions ranging from mature AOs with an established infrastructure to immature areas with an austere infrastructure and no forward-deployed forces or supplies. While the organization of an Army corps provides the necessary resources to plan and execute force-projection operations, a brigade HQ serves as the base for each assault force and is complemented with appropriate combat, CS, and CSS units. In most force-projection operations, a corps conducts deliberate, crisis action, and integrated planning as part of a joint or combined force. The corps's ability to quickly prepare initial forces and concurrently deploy and employ overwhelming combat power into an austere environment under a variety of conditions is essential to the execution of force-projection operations. Additional engineer forces that the corps provides to the division and its brigades are critical in providing the requisite level of engineer support for the operation.

Because of their ability to deploy rapidly and their versatility, the airborne, air assault, or light infantry division frequently forms the nucleus of the Army force deployed for force-projection operations. These divisions can be deployed as an organized force or as a tailored force mix from each of the three, with forces from the Army's heavy divisions introduced later into the contingency area.

CHARACTERISTICS AND TYPES

Since force-projection operations are rapid-response actions that are designed to bring an early resolution to a crisis, they normally have one or more of the following characteristics as they develop:

- US interests at stake.
- Quick response/early resolution.
- Timely, detailed intelligence of the objective area.
- Rapid projection of CONUS-based combat power.
- Constrained sea lift and airlift.
- Joint and combined operations.
- Precise C2 during initial stages.
- Diverse operational options.

Some types of force-projection operations in which light engineers are involved are violent while others are benign. Peacetime operations are conducted according to the basic combat doctrine described in this manual and *FM 100-23*. Peacetime operations are modified to conform to the special METT-T requirements of force-projection operations. Engineer involvement in a force-projection operation may include the following OOTW missions:

- Disaster relief and humanitarian assistance.
- Nation assistance.
- Arms control.
- Noncombatant evacuation operations.
- Show of force and demonstration.
- Rescue-and-recovery operations.
- Strikes and raids.
- Operations to restore order.
- Peacekeeping operations.
- Counterdrug operations.
- Security assistance surges.
- Combating terrorism.
- Support to domestic civil authorities.
- Support to an insurgency or counter-insurgency.

PLANNING AND EMPLOYMENT CONSIDERATIONS

During mission planning for force-projection operations, the principal goals of the brigade engineer and the company commander are to—

- Maximize the combat capability of their supported brigade.
- Reduce support requirements to mission essentials.

While METT-T is the overriding factor in determining the exact mix of engineer forces in the brigade, the influence of these two goals on planning is extremely important and must not be overlooked. Force-projection operations are characterized by uncertain and rapidly changing situations, coupled with the unknown duration of the operation. The engineer plan must support the maneuver commander in overcoming these situations while also allowing him to adapt and remain proactive during the entire operation.

OPERATION STAGES

There are usually eight stages to Army force-projection operations. They are—

- Mobilization operations.
- Predeployment operations.

- Deployment operations.
- Entry operations.
- Combat operations.
- War termination and postconflict operations.
- Redeployment and reconstitution operations.
- Demobilization operations.

These stages provide a general structure for force-projection operations and can be modified to account for changes. Engineer planners must be aware of these changes, usually initiated at division level, and understand their impact on engineer support to the brigade. Execution of these stages may not be distinct. Decisive combat operations might begin well before the entire force closes in the force-projection operational area. Some force-projection operations may not include all the stages. A force-projection operation may also escalate into a mid-intensity conflict or a high-intensity conflict environment, much in the way that Operation Desert Shield evolved into Operation Desert Storm; or it may transition into a peacetime engagement operation, such as Operation Golden Pheasant. The following text focuses on force-projection operations that involve combat operations. Mobilization and demobilization operations are not discussed.

PREDEPLOYMENT OPERATIONS

This is the most critical stage of a force-projection operation (see *Figure 7-1, page 7-4).* The principal goal of brigade planners is to—

- Anticipate the military conditions necessary for success.
- Achieve those conditions through a sequence of activities.
- Establish the timely sequencing and introduction of resources into the AO.

Achievement of this goal is essential to successfully execute subsequent stages of force-projection operations. All available employment options will be addressed, resolved, and then selected. The selection of the preferred option or combination of options during the military decision-making process is based on mission guidance, METT-T, and the following planning considerations:

- Level of expected violence.
- Duration of the operation.
- Force tailoring to fit available sealift/airlift.
- Maneuver.
- Fire support.
- Task organization.
- Intelligence.
- Logistics.
- Communications.
- C2.
- Special operations forces (SOF).
- Public affairs.
- OPSEC and deception.
- ROE.
- Risk assessment.

Maneuver Considerations

At division level and lower, units and personnel are alerted. According to established readiness procedures, soldiers are recalled, assembled, and moved to the marshaling areas where unit preparation begins. This includes mission analysis, tactical plan development, and task organization

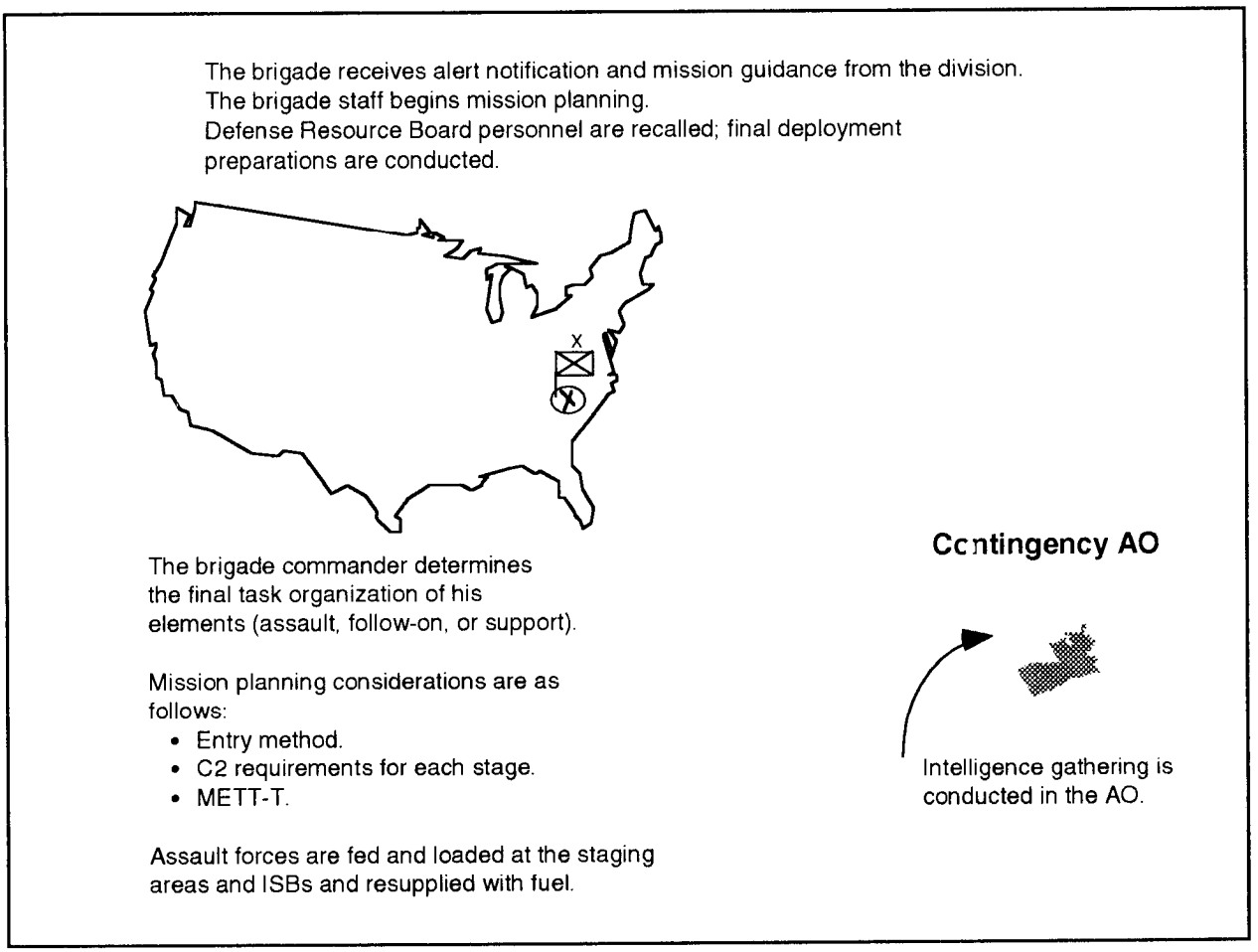


Figure 7-1. Maneuver-force predeployment operations

required to accomplish the mission at all levels.

Force-projection operations require that the force is tailored to the specific mission and then echeloned to permit simultaneous deployment and employment. Usually, a combined arms force is organized into the following three echelons:

- Assault.
- Follow-on.
- Support.

The initial assault element must be organized with sufficient combat power to seize the lodgment area and begin military operations. The follow-on element must be equipped to expand the lodgment area and conduct decisive military operations. The support element must provide sustainment for extended operations. C2 must be phased into the operation early. In every element, combat forces must integrate with all BOSs. The force must rapidly establish a lodgment, take the fight to the enemy, and win the battle.

Brigade Engineer Functions

As a member of the deploying maneuver brigade staff, the brigade engineer is

incorporated into the brigade's mission analysis as outlined in *Chapter 2*. The brigade engineer must identify and analyze all engineer missions and force requirements throughout each stage of the force-projection operation in order to support the maneuver commander's intent (see *Figure 7-2)*. He must consider and review the five engineer battlefield functions:

- Mobility.
- Countermobility.
- Survivability.
- General engineering.
- Topographic engineering.

The brigade engineer and staff develop and recommend an engineer task organization for deployment, entry operations, and initial operations in the AO during predeployment activities. The task organization of engineer units is initially established for the brigade by the division (with input by the division

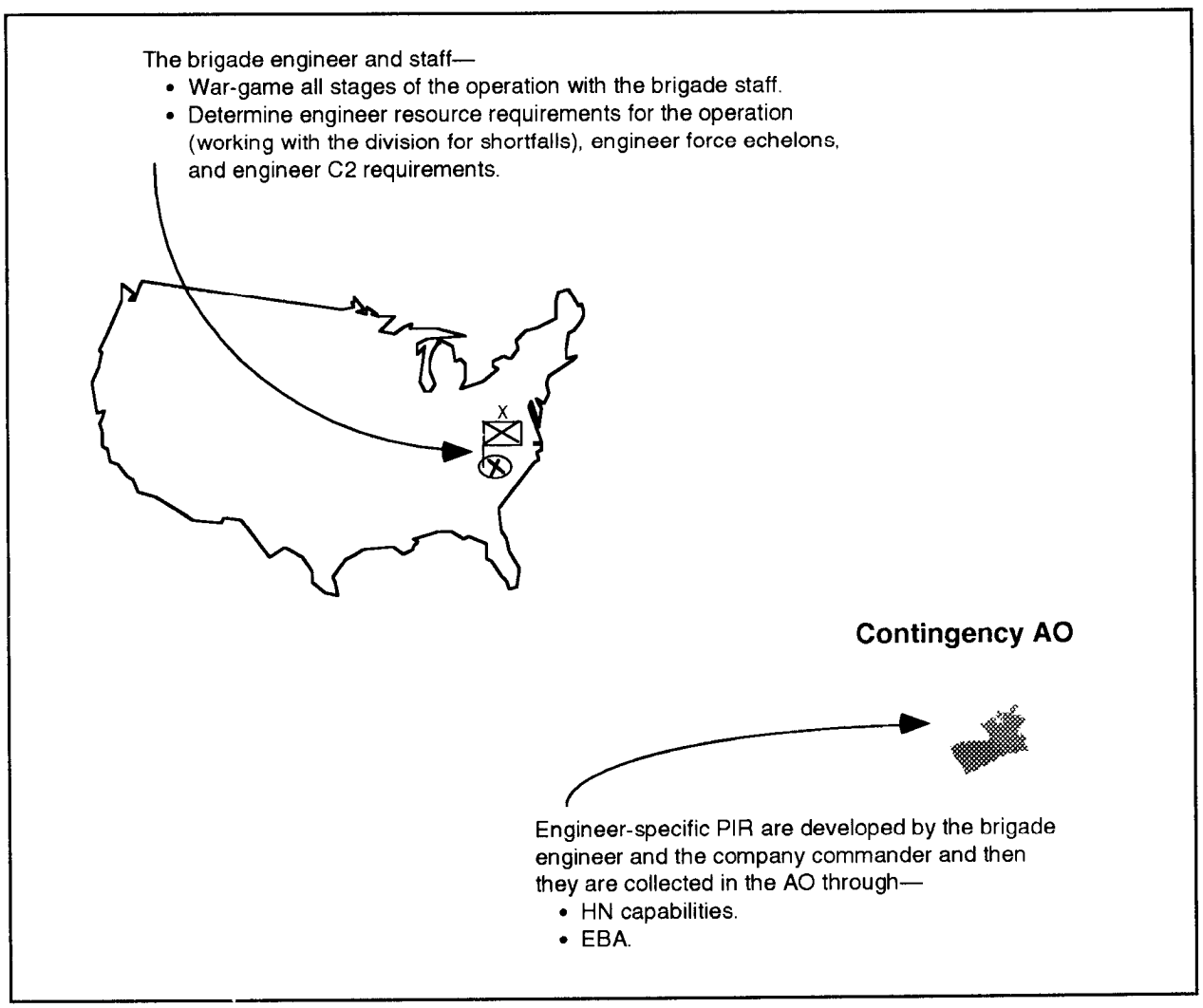


Figure 7-2. Engineer-force predeployment operations

engineer commander and his staff); however, changes can be made as required, pending the METT-T analysis by the brigade. The task organization established during initial planning must potentially address all stages of the force-projection operation. At brigade level, the brigade engineer, the staff, and the supporting company commander must consider all contingencies to ensure that the brigade achieves a mix of engineer forces that mutually support the mix of maneuver forces. This may require additional engineer forces. If the engineer task organization exceeds two engineer companies, the brigade engineer may request that the division establish an engineer C2 HQ from internal assets of the parent division light engineer battalion.

During detailed mission analysis at the brigade, the review and analysis of initial engineer-specific LOGPACs, allocated to the brigade by the division engineer commander, is key. Requirements must be balanced against allocations and the brigade engineer must quickly resolve any shortfalls or omissions. The brigade engineer must also consider the following engineer factors during the preparation of the engineer estimate and ultimately the engineer annex:

- Terrain analysis and topographic support.
- HN engineer equipment.
- HN engineer materials and supplies.
- Conditions and capabilities of ports, airfields, MSRs, and bridges.
- Enemy engineer capabilities.
- Extent of enemy obstacles in the lodgment.
- Survivability of critical facilities/assets.
- Construction water sources.
- Employment of SCATMINEs and situational obstacles.
- Battle damage repair.
- Force sustainment and protection.
- ROE.
- UXO.

The brigade engineer also integrates into the brigade S2's IPB. The brigade engineer's involvement in the IPB process ensures that engineer-specific PIR, IR, and NAIs are incorporated into the collection plan. The brigade engineer develops these IR to support all eight stages of the force-projection operation. Corps collection assets include long-range surveillance teams and SOF already in position in the force-projection operational area. The IPB/EBA helps identify engineer force requirements to accomplish the mission.

A light engineer company normally forms the base of the engineer force for a light infantry brigade during deployment. Additional engineer forces (division and nondivision) and assets are task-organized to the brigade based on the METT-T analysis of the force-projection operation (if these engineer forces are less than company strength, then the brigade engineer should consider task organizing them to the deploying engineer company). The company commander initiates the alert notification. He is also responsible for the recall, assembly, and movement of his unit to the marshaling area. While the brigade engineer conducts mission analysis with the brigade battle staff, the company commander simultaneously receives initial mission and deployment guidance from the DIVEN commander and the supported brigade commander. As soon as predeployment activities allow, the company commander links up with the brigade engineer and assists in the planning process. The focus of this assistance is the

identification of engineer missions, specified and implied tasks, and any special task organizations affecting the company.

Once the brigade plan is finalized, the company commander should be concerned with the—

- Echelonment and deployment sequence of engineer forces.
- Structure of engineer C2.
- Conduction of detailed rehearsals for engineer missions.
- Attachment of additional division or nondivision engineer assets.

The company commander is responsible for the deployment of all engineer assets task-organized under his control. Additionally, the company commander must publish the OPORD for his unit and any subordinate elements.

DEPLOYMENT OPERATIONS

This stage initiates the execution of the force-projection operation and encompasses the movement and the establishment of an initial lodgment in the objective area (see *Figure 7-3, page 7-8).* Depending on the location of the objective area, deployment to an intermediate staging base (ISB) may be required. This allows for final planning, coordination, and preparation before the assault force is transported tactically into the lodgment. Tailored assault packages, echeloned C2, and the synchronization of joint air power with assault operations are essential for mission success. The strength and composition of the first elements to arrive in the AO depend on METT-T, including the—

- Number of friendly HN forces available to provide security.
- Strength and capabilities of the enemy.
- Availability of other US forces to provide support.

ENTRY OPERATIONS

The requirements of entry operations following the deployment vary. The brigade's entry may be in DS of the HN or forward presence forces. Some conditions may dictate that operations be conducted in the absence of either. Entry operations may be either opposed or unopposed. The brigade assault force may conduct its own unopposed entry operation or follow the opposed entry operation conducted by another force and conduct a relief in place. During entry operations, SOF initiate operations in denied areas to conduct surveillance, provide intelligence, and seize or destroy critical targets. The assault force secures its initial objectives to—

- Establish and maintain a secure lodgment.
- Protect it from direct fires and observed indirect fires so it can safely land follow-on forces during the next stage of the operation.

Brigade Engineer Functions

The division and corps normally echelon engineer C2 early in the deployment sequence based on the level and density of engineers in the theater (see *Figure 7-4, page 7-9).* Sometimes this is not the case, and the brigade engineer is the senior engineer initially on the ground for a brigade assault force occupying a lodgment. Then he becomes the Army force or JTF engineer responsible for orchestrating the engineer support for the close, deep, and rear battle. The brigade engineer should be concerned with the current status of M/S planning for the first phase of the operation, specifically the following:

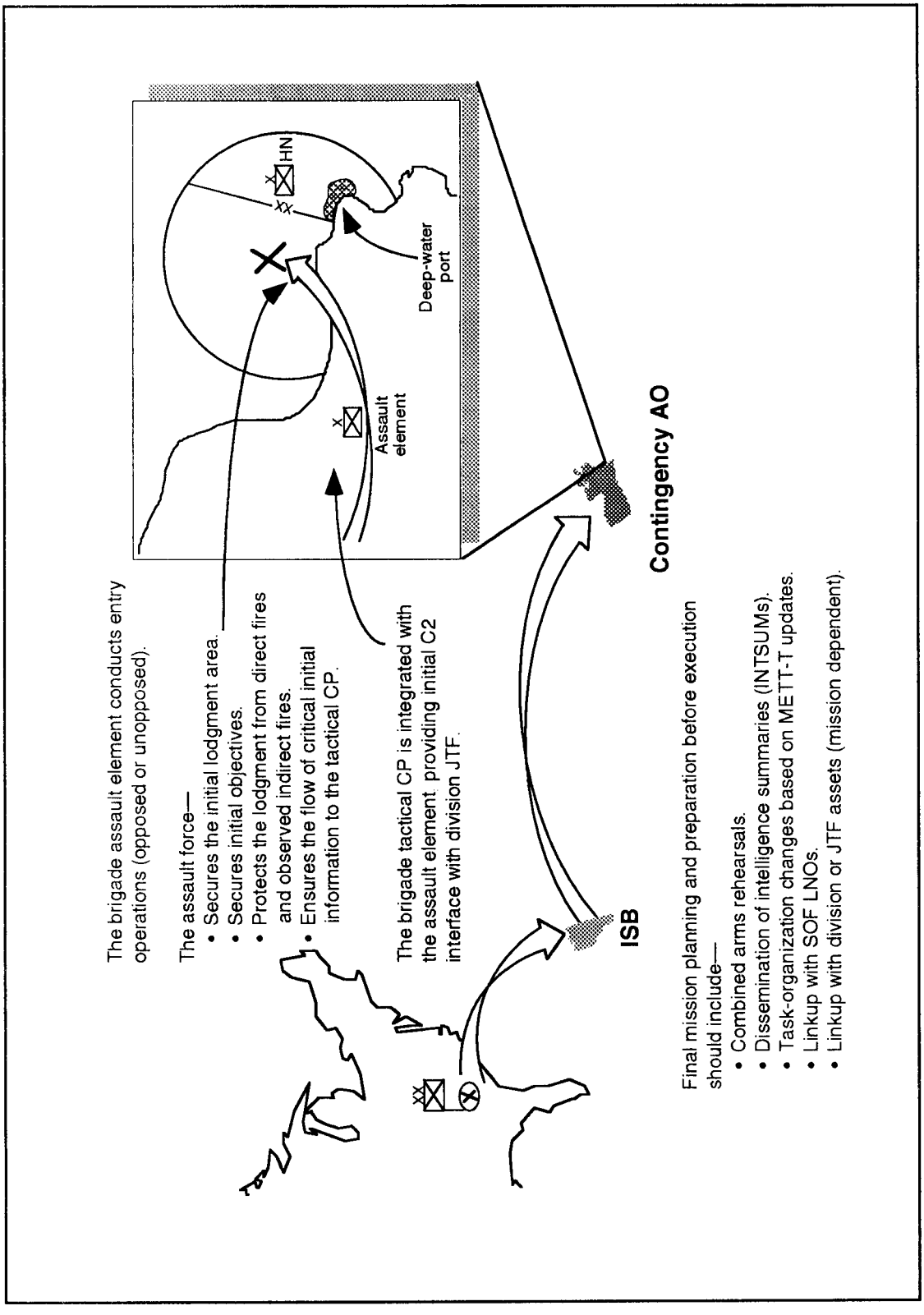


Figure 7-3. Deployment and entry operations

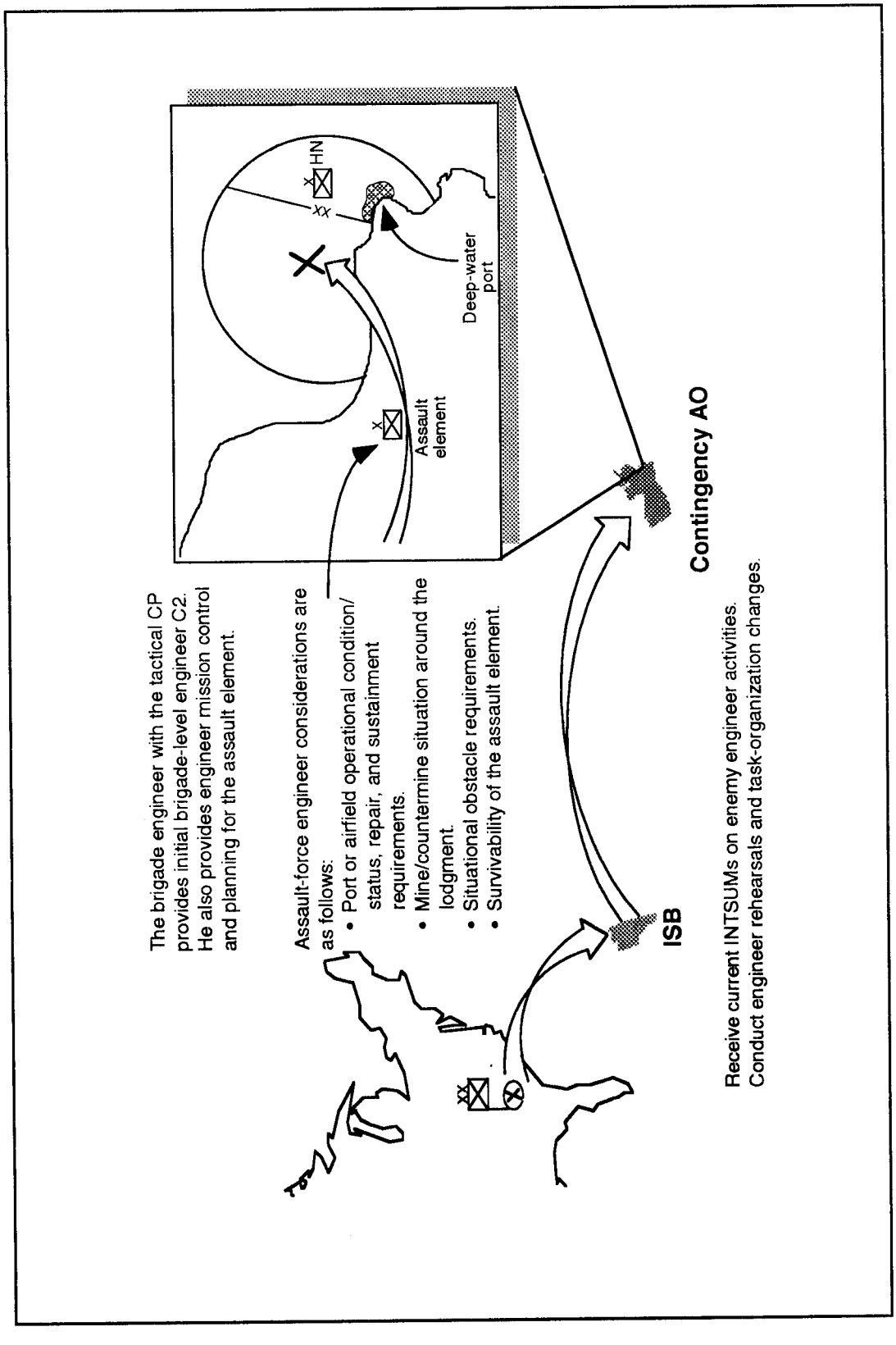


Figure 7-4. Engineer force deployment and entry operations

- Extent of obstacles (friendly/enemy) within the lodgment.
- Current operational condition of the port or airfield.
- Location and condition of HN engineer equipment.
- Location and quantity of Class IV/Class V supplies.
- Critical assets and facilities that require survivability.
- Use of situational obstacles to repel counterattacks.
- Capability of the road network to support MSRs and the requirements for improvements to them.
- Location of construction water sources.
- Battle damage repair.
- CSS for engineers.
- Assured mobility.

If the brigade assault force conducts a relief in place of another unit (a ranger battalion, a ranger regiment, or a marine force) that has already conducted a forced-entry operation, the brigade engineer must coordinate with the relieved unit's LO to obtain this information. *Chapter 5* of this manual addresses relief-in-place operations in more detail.

Vital to the success of the relief in place is the transfer of engineer-specific information between the two forces. This is accomplished by the brigade engineer and either the ranger regiment engineer cell or the ranger battalion. These two cells must acquire and develop the necessary information to pass on to the relieving force. This is accomplished either at the staging base, at the ISB, en route to the objective area, or at the lodgment area. The following are examples of information to be passed:

- Current operational conditions (such as usable length, width, surface condition, and composition) of the port or airfield.
- Initial estimates of port or airfield repair or upgrade.
- Obstacle plan/overlay of obstacles in the lodgment area (planned, templated, and executed), to include plans for obstacle turnover from the relieved force to the relieving force.
- Capabilities of enemy engineers, including the description, location, and employment techniques of mines and explosives encountered (UXO information is also included).
- Location and condition of engineer equipment secured or located by the assault force and the subsequent turnover of engineer-specific items left or seized by the relieved force.
- Class IV/Class V stockpiles (mines and explosives) in the lodgment area.
- Engineer characteristics of the AO.
- Engineer contact point for the final exchange of information during the relief.

If the brigade conducts its own entry operation, either opposed or unopposed, the information listed above is developed by the brigade engineer who is part of the assault force. The brigade engineer receives this data from the brigade S2 as the collection plan is executed by the long-range surveillance detachment, SOF, and organic assets, to include scouts and combat engineers. The brigade engineer must estimate repair or upgrade requirements that are needed to sustain force buildup and, if necessary, he must coordinate for additional assets. The priority of engineer effort during entry operations is METT-T dependent. Sustainment

of the airfield and mobility to assault forces are usually the initial priorities of engineer effort. The next priority is either countermobility or survivability depending on the potential counterattack threat or the need to protect vital facilities in the lodgment area. The brigade engineer's COA must focus on shaping the battlefield to enhance the effectiveness of the maneuver force.

Company Commander Functions

Depending on the task organization of the brigade assault force, the company commander may or may not have direct control over his subordinate units. In either case, he must ensure that they are prepared to conduct the following close combat operations:

- Assault breaching of extensive complex obstacles.
- Bridge demolitions to isolate the lodgment against counterattacks.
- Emplacement of situational obstacles (such as Volcano, MOPMS, conventional minefield, and wire) based on templated threat capabilities.
- Route-clearance operations.
- Rapid runway repair (RRR).
- Engineer reconnaissance.
- Runway-clearance operations (including the use of vehicle "hot-wire" teams).

It is important that the company commander deploys where he can best C2 his subordinate units. The brigade engineer usually deploys with the brigade tactical or assault CP, while the company commander deploys with the brigade main CP. When the company commander arrives at the lodgment, he immediately coordinates with the brigade engineer. The brigade engineer informs the company commander of the engineer situation in the lodgment. This transfer of information is critical to the company commander's execution of close combat missions. Depending on the mission, the company commander focuses his efforts on—

- Tracking TF sector M/S mission status.
- Identifying problems.
- Finding and executing solutions.

COMBAT OPERATIONS

The combat operations stage is an extension of the deployment and entry operations stages. The focus of this stage is to complete the buildup of combat power (if not already accomplished during the previous stage) and quickly expand military operations. *Figure 7-5, page 7-12,* and *Figure 7-6, page 7-13,* depict examples of this stage. The key to execution is to place a force on the ground that can take the fight to the enemy while follow-on forces arrive in the lodgment area for subsequent operations. Engineer forces supporting combat operations are normally task-organized to maneuver TFs for mobility operations. These forces must be—

- Compatible with the type of maneuver force they are supporting.
- Capable of self-sustainment for the duration of force buildup.
- Capable of supporting decentralized operations.

Principal tasks conducted during the combat operations stage include but are not limited to—

- Forward operating base establishment.
- Force closure.
- Security of the lodgment by expanding the security area out to the range of indirect-fire weapon systems.
- Joint force linkup and coordination.

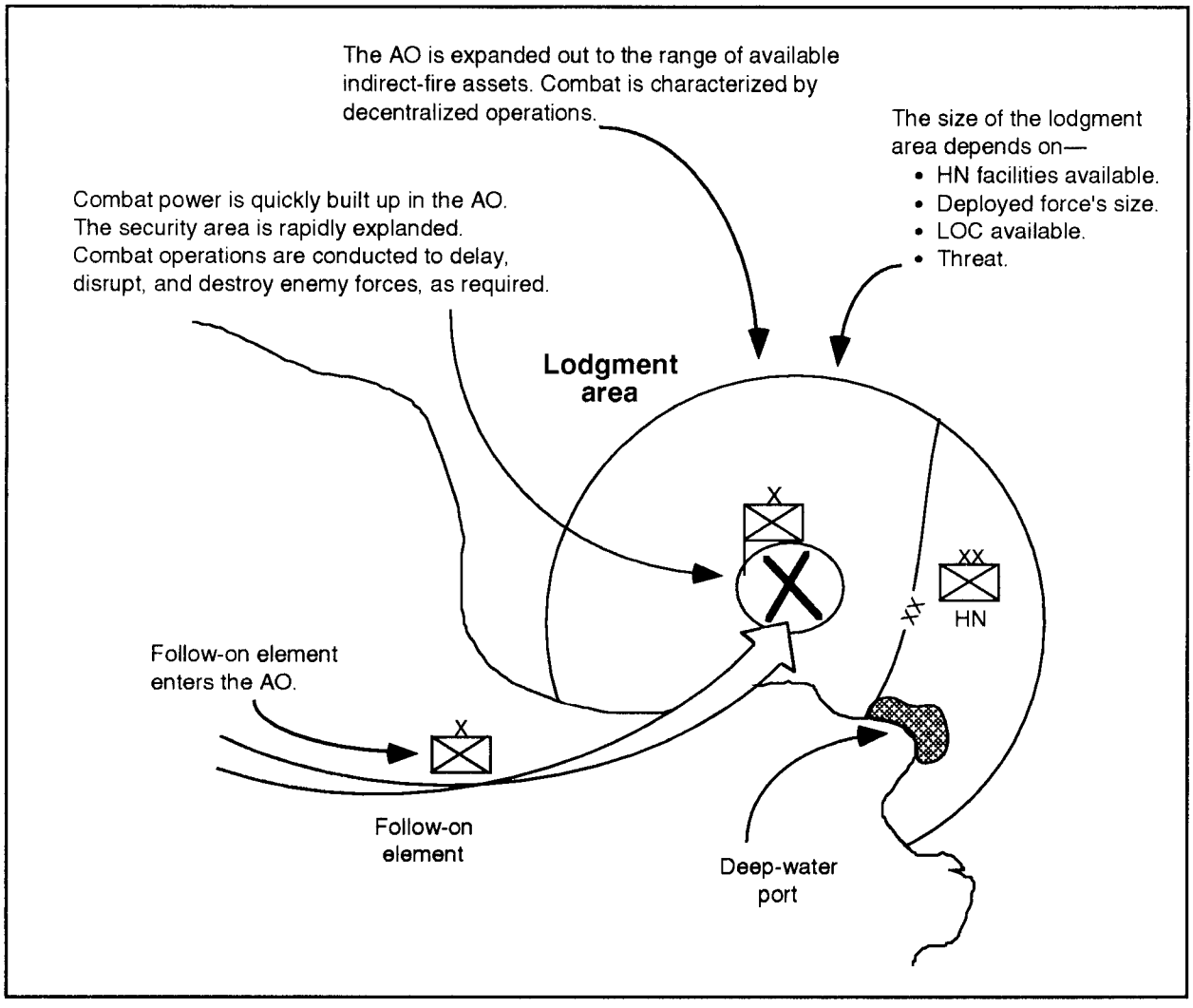


Figure 7-5. Combat operations analysis

- Offensive operations to destroy enemy forces threatening the lodgment.
- Relief in place of the assault element.

A combined arms effort and continued synchronization of the joint combat power are essential during this stage. Speed is critical since the success of decisive combat operations hinges on rapidly building combat power while maintaining the initiative. The size of the lodgment area depends on—

- HN facilities available.
- Deployed force's size.
- LOC available.
- Threat.

Combat forces and a logistical base are concurrently established and expanded to support combat operations. As the situation in the lodgment area is stabilized, the brigade performs (as directed) expanded combat operations from the lodgment area to eliminate the enemy force. These operations can be offensive and defensive in nature and

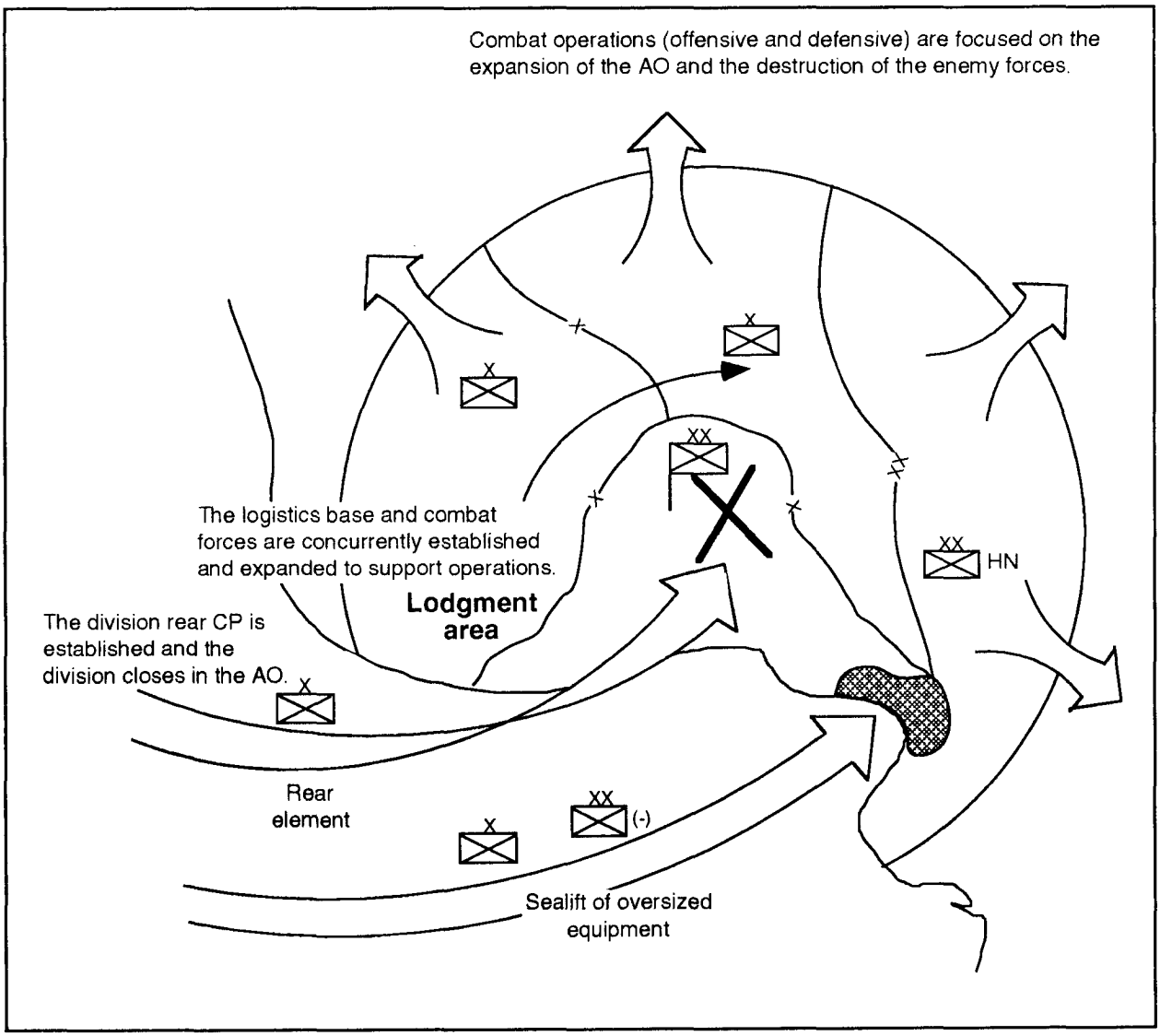


Figure 7-6. Decisive combat operations analysis

will require additional combat, CS, and CSS forces.

Maneuver Considerations

With the closure of follow-on and support forces, the lodgment and security area is expanded. Military operations are directed toward attaining the tactical objectives that achieve the strategic purpose of the operation. The operation's focus is on destroying or neutralizing the enemy's center of gravity by simultaneously applying joint fire and maneuver. Military operations include offensive, defensive, and other tactical operations.

Military operations may include mixed maneuver forces. With the introduction of armored forces to the lodgment area, either by strategic airlift or sealift, the maneuver force commander may tailor the force to achieve a light/armored or an armored/light mix.

Brigade Engineer Functions

Because execution of the combat operations stage is the most critical point for the force, the brigade engineer must ensure that the brigade is fully resourced with engineer forces and assets for the mission. The planning, resourcing, and identifying of additional assets required for this stage must occur during the initial planning to ensure the availability and task organization of engineer forces. The brigade engineer focuses on providing the maneuver force commander with accurate and timely engineer-pertinent information that influences the way current and future operations are conducted (see *Figure 7- 7)*. The brigade engineer must continue to coordinate engineer support to maintain the speed of the force buildup and to ensure the flexibility of the committed maneuver forces. Some areas addressed during this stage are—

- Coordination of HN engineer resources.
- General engineering of the lodgment.
- Maintenance of LOC.
- Mobility operations of maneuver forces.
- Survivability in and around the lodgment.
- Continuation of engineer reconnaissance.
- Airfield sustainment and upgrade.
- Integration of EAD engineer support.
- ROE.
- Force protection.
- UXO.

Although the priority of engineer effort is METT-T dependent, engineer forces must focus on supporting the maneuver force's expansion of the initial lodgment area. The maneuver force's success can hinge on engineer support which allows them to maintain the initiative. Engineer forces must be properly task-organized to support maneuver units conducting close combat operations. The brigade engineer must continually assess engineer requirements and coordinate with the DIVEN for additional EAD engineer assets to support current and future operations. Normally, DIVEN companies focus their efforts on supporting the maneuver TFs, with corps units focusing on general engineering. As the situation dictates, corps engineers are then task-organized to the forward TFs to augment the main effort, increasing the capabilities of the DIVEN units.

MSR maintenance becomes a critical engineer mission as force buildup is complete and the force begins conducting decisive combat operations. This is particularly true when armored forces are employed with the light brigade in the AO. Available blade assets are commonly consolidated at the brigade (CSE company and other corps engineer assets) and formed into MSR maintenance teams. Detailed planning is conducted by the brigade engineer and the company commander to ensure that mobility and survivability efforts are balanced in the brigade sector.

Once the brigade has closed, the priority of engineer effort shifts to supporting the maneuver force's involvement in offensive and, if required, defensive operations. If higher engineer C2 arrive late, the brigade engineer must shift his focus from the close, deep, and rear battle of the lodgment area to the close battle of his brigade sector (see Figure 7-8, page 7-16). With the introduction of heavy forces into the lodgment area, the maneuver brigade can be task-organized with a mix of armored and light forces; likewise, engineer forces can be task-organized

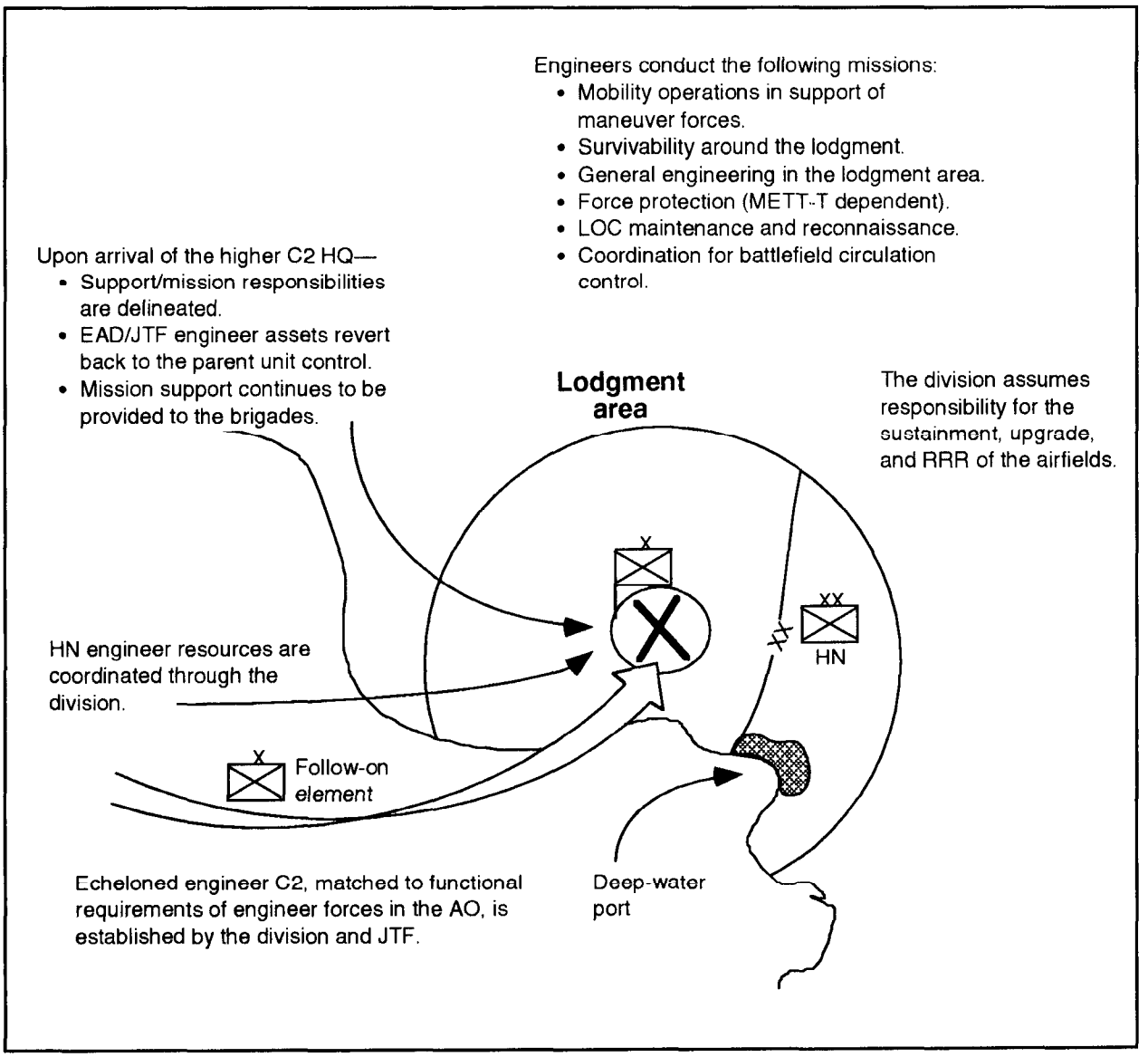


Figure 7-7. Engineer functions in combat operations

with a mix of mechanized and light forces. When a mechanized engineer force is task-organized to a light TF, a CSS package must accompany the mechanized engineer force because it is beyond the capability of the light force's CSS structure to support them. Similarly, when a light engineer force is task-organized to a mechanized TF, transportation assets have to be provided so that the light force has battlefield mobility.

Since the priority of engineer support is normally devoted to TF combat operations, the brigade engineer must continue to monitor general engineering. These missions include FACE, force-protection operations, and LOC maintenance. This level of effort normally requires company-level C2 and the equipment assets found in corps engineer companies. The corps assets attached to the brigade before the arrival of the

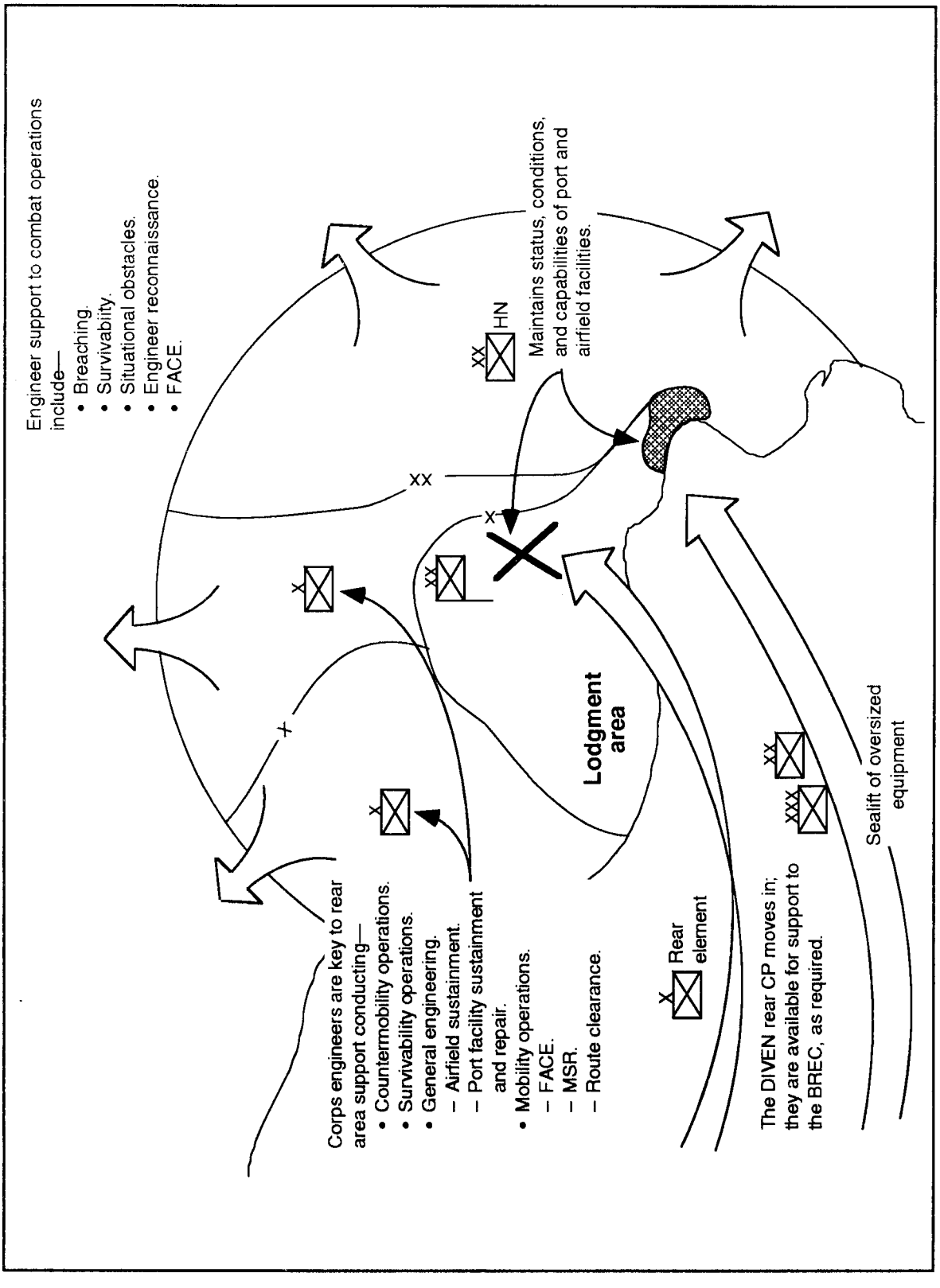


Figure 7-8. Engineer functions in decisive combat operations

DIVEN commander and/or JTF C2 into the lodgment may revert to the DIVEN commander or JTF control depending on METT-T and the success of the overall operation.

Detailed functions and responsibilities of the brigade engineer and the company commander in support of decisive combat operations are discussed in *Chapters 3, 4, and 5* of this manual.

Company Commander Functions

The company commander continues to provide support to maneuver forces conducting close combat operations, much the same as in deployment and entry operations. It is critical that the company commander continuously update the brigade engineer and the brigade commander on the operational and logistical status of his subordinate units. This allows the brigade engineer to recommend proper reallocation of engineer resources to the maneuver commander, if necessary. It also facilitates the brigade engineer's coordination for engineer-specific logistics requirements. The company commander is readily available to the brigade commander to operate forward in the brigade tactical area or to assume the duties of the brigade engineer, when either is required. Engineer support to military operations is decentralized by nature. The company commander ensures that his subordinates' freedom of action and initiative is maintained by issuing clear mission guidance and intent.

WAR TERMINATION AND POSTCONFLICT OPERATIONS

The objectives of this stage are to consolidate friendly control of the operational area, redeploy the force as rapidly as possible, and shift the operation from combat to peacetime engagement operations (see *Figure 7-9, page 7-18).*

REDEPLOYMENT AND RECONSTITUTION OPERATIONS

Redeployment may be to CONUS, an ISB, or another theater of operations. Once the force is redeployed, it is reconstituted and made ready for other force-projection operations. As in the deployment stage, echeloning C2, CS, and CSS elements while maintaining flexibility and security is essential for successful redeployment.

Brigade Engineer Functions

The brigade engineer's focus is general engineering missions aimed at facilitating the brigade's redeployment (see *Figure 7-10*, page 7-19). Examples of engineer missions and responsibilities are—

- Sustainment.
- MSRs.
- LOC.
- Ports/airfields.
- ADC.
- Coordination for obstacle turnover with stay-behind forces or HN forces.
- Coordination for obstacle removal and/or clearance.
- Possible involvement in peacetime engagement operations.
- Coordination for the return of HN engineer equipment.
- Coordination for EAD engineer support.
- Force protection.

The relative level of responsibility devoted to these engineer missions by the brigade engineer depends on the—

- Level of violence.
- Duration of the operation.

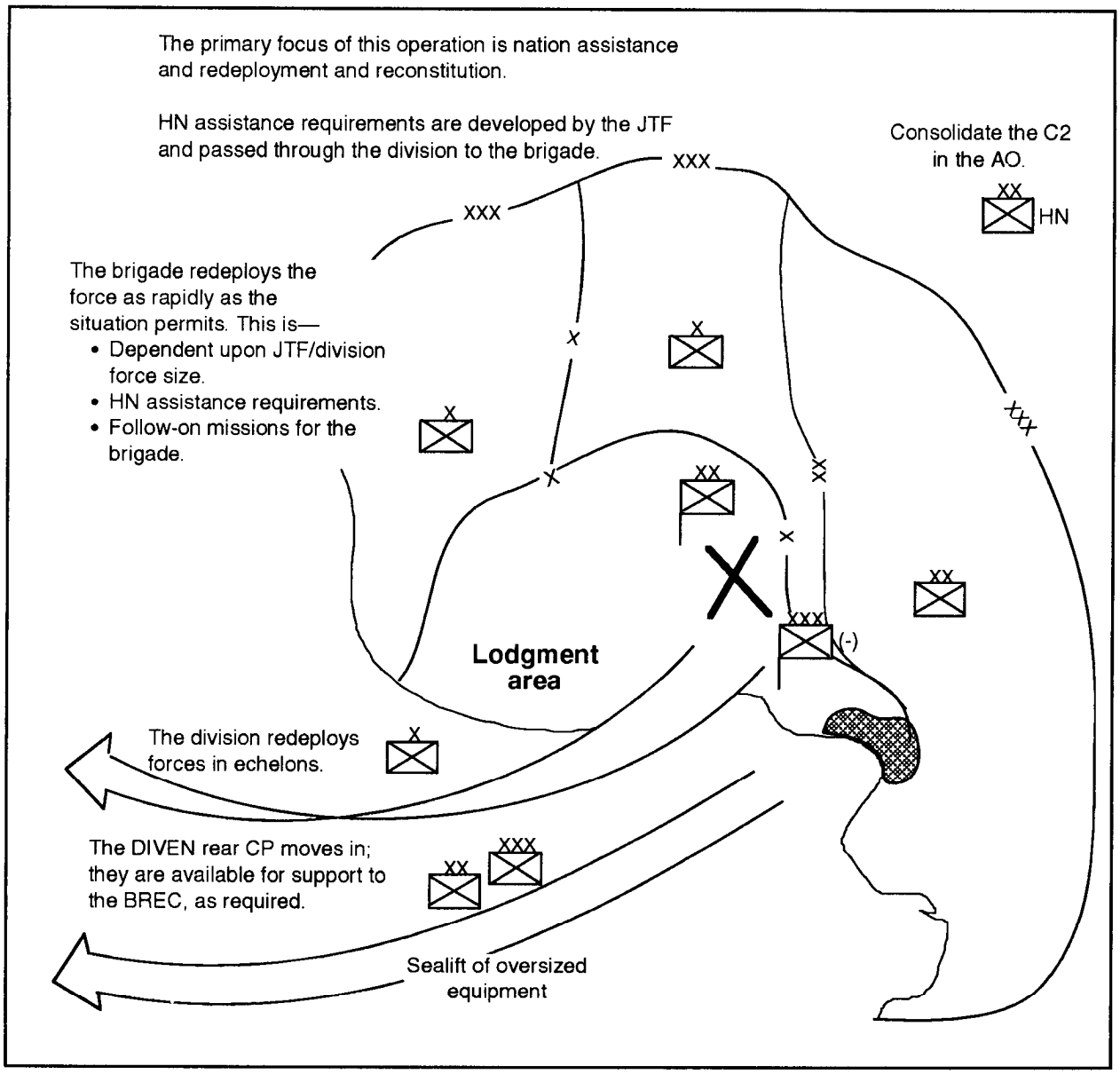


Figure 7-9. War termination and redeployment and reconstitution operations

- Force composition of the brigade, division, and JTF.
- Maturity of the force-projection operational area.

Nondivision engineers normally execute these engineer missions because 'of limited engineer capability within the brigade, with the light DIVEN forces redeploying with an associated brigade.

Companv Commander Functions

The company commander is responsible for the redeployment of all engineer assets task-organized under his control. Specific missions that the company commander must execute are—

- ADC.
- Obstacle removal and/or clearance.

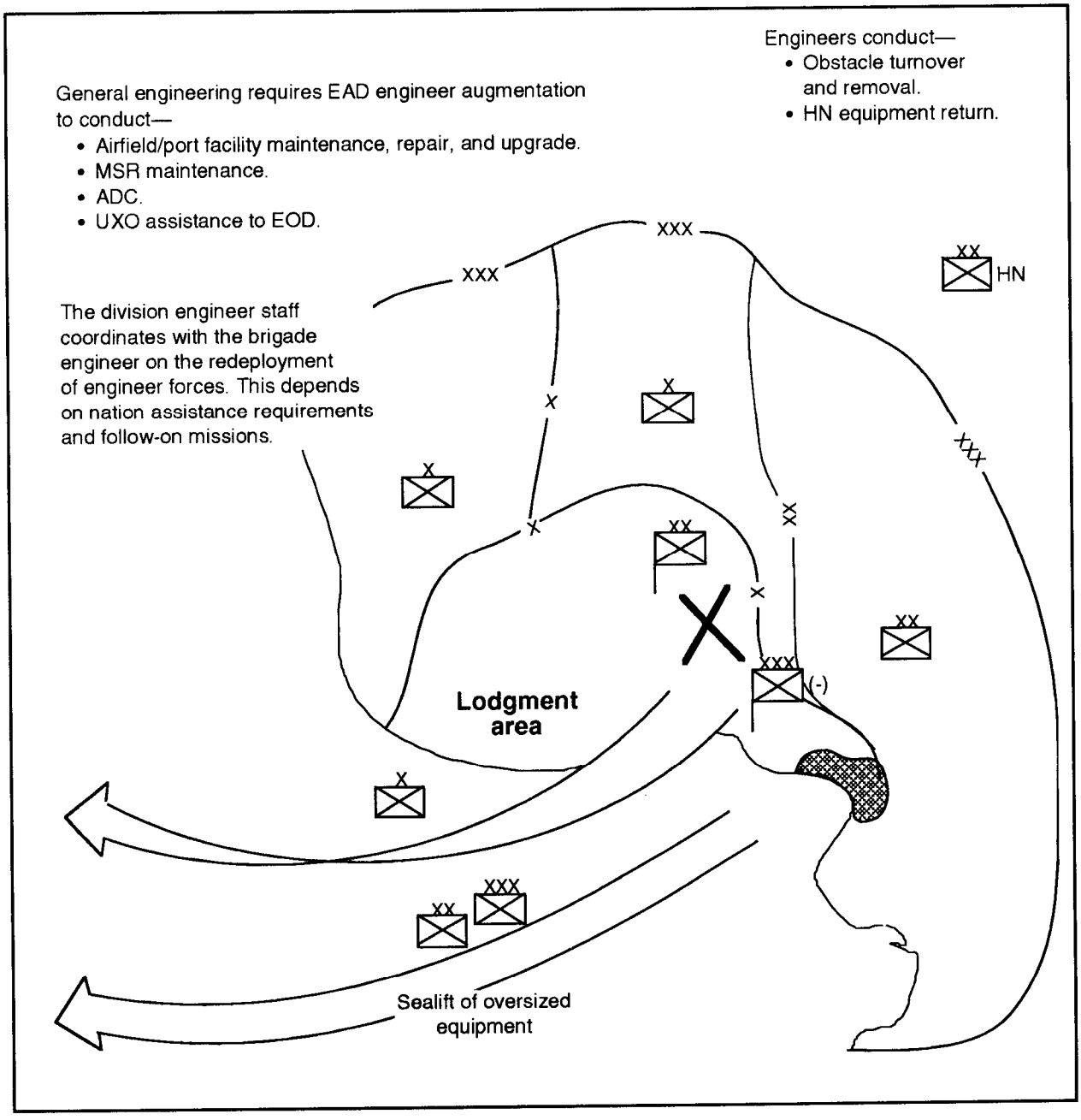


Figure 7-10. Engineer functions in war termination and redeployment operations

- Physical handover of HN engineer equipment and supplies under his control.
- Obstacle turnover.

These missions are received from the maneuver commander through the brigade engineer.

APPENDIX A

Engineer Estimate

The engineer estimate is an extension of the military decision-making process. It is a logical thought process that is conducted by the engineer staff officer concurrently with the supported maneuver force's tactical planning process. The engineer estimate—

- Generates early integration of the engineer plan into the combined arms planning process.
- Drives the coordination between the staff engineer, the supported commander, and other staff officers.
- Drives the development of detailed engineer plans, orders, and annexes.

Each step of the engineer-estimate process corresponds to a step of the military decision-making process. Like the military decision-making process, the engineer estimate is continuously refined. *Table A-1, page A-2,* shows the relationship between these two processes. Each step of the engineer-estimate process is discussed in detail in the following paragraphs. The military decision-making process provides the framework for the discussion of the corresponding engineer-estimate actions. For more information on the engineer estimate, see *ST 100-9.*

RECEIVE THE MISSION

The staff engineer quickly focuses on several essential components of the basic order and engineer annex when he receives the mission. These components are the—

- Enemy situation.
- Mission paragraph.
- Task organization.
- Logistics paragraph.
- Engineer annex.

From these components, he determines the—

- Type of operation (offensive or defensive).
- Current intelligence picture.
- Assets available.
- Time available (estimate).

CONDUCT IPB/EBA

Developing facts and assumptions is a detailed and sometimes lengthy process. The staff engineer must maintain his focus on the information required by the maneuver commander and his battle staff to make decisions. Facts and assumptions pertain to both the enemy and the friendly situation. The staff engineer uses the EBA

Table A-1. Relationship between the military decision-making process and the engineer estimate

Military Decision-Making Process	Engineer Estimate
Receive the mission	Receive the mission
Develop facts and assumptions	Conduct IPB/EBA
Analyze the mission	Analyze the engineer mission
Issue the commander's guidance	Develop the scheme of engineer operations
Develop COAs	War-game and refine the engineer plan
Analyze COAs	Recommend a COA
Decide on a COA and issue orders	Finalize the engineer plan and issue orders

as the framework for developing facts and assumptions. The EBA consists of three parts (see *Table A-2*). They are—

- Terrain analysis.
- Enemy mission and M/S capabilities.
- Friendly mission and M/S capabilities.

The EBA is a continuous process that is continually refined as the situation becomes clearer. Each time new information is collected or the conditions change, the staff engineer must evaluate its impact on the mission and refine the facts and assumptions, as necessary.

TERRAIN ANALYSIS

Terrain analysis is a major component of the IPB. The objective of the terrain analysis is to determine the impact that the terrain (including weather) will have on mission accomplishment. The staff engineer supports the intelligence officer in this process. Normally, using the OCOKA framework, they determine what advantages or disadvantages the terrain and anticipated weather offer to both enemy and friendly forces. This process has a direct impact on the planning of engineer operations. *Table A-3, page A-4,* shows examples of how the components of OCOKA may impact engineer support.

ENEMY MISSION AND M/S CAPABILITIES

Threat analysis and threat integration are also major components of the IPB. Enemy mission and M/S capabilities are a subcomponent of the threat analysis and integration process. The staff engineer supports the intelligence officer during the threat evaluation by focusing on the enemy's mission as it relates to enemy engineer capability. When executing this component of the EBA, the staff engineer must first understand the enemy's anticipated mission (attack or defend) and consider how enemy engineers will be doctrinally employed. The staff engineer then develops an estimate of the enemy's engineer capabilities. To do this, he uses the S2's order of battle and

Table A-2. Engineer battlefield assessment

Component	Description
Terrain analysis	• Analyze the terrain's impact on the battle using the OCOKA framework: – Observation and fields of fire. – Cover and concealment. – Obstacles. – Key terrain. – AAs. • Analyze the advantages/disadvantages the terrain offers to both enemy and friendly forces. • Decide what impact the terrain has on mission accomplishment.
Enemy mission and M/S capabilities	• Anticipate enemy engineer operations and their impact on the battle. • Consider the enemy's mission and the doctrinal employment of engineers in battle. • Estimate enemy engineer capability based on— – S2's order of battle. – Threat engineer organizations. – Manpower/equipment capabilities. – Recent activities. • Plot enemy engineer effort based on— – S2's situational template. – Doctrinal enemy engineer employment.
Friendly mission and M/S capabilities	• Evaluate friendly engineer capability and its impact on accomplishing the mission. • Consider the friendly mission. • Estimate the engineer assets available based on task organization of— – Maneuver forces. – Engineer forces. – Higher engineer HQ. – Adjacent engineer units. • Consider the availability of critical resources. • Estimate the total engineer capability based on engineer planning factors.

knowledge of enemy engineer organizations and other assets (such as combat vehicle self-entrenching capabilities) that may impact engineer operations. The staff engineer must also consider hard intelligence pertaining to recent enemy engineer activities.

The staff engineer then uses the S2's situation template and the enemy's capability estimate to plot the enemy's engineer effort and its location. Coordinating with the S2, the staff engineer recommends PIR and the engineer force necessary to augment the reconnaissance effort that will confirm or deny the situation template. Enemy engineer activities must be organic to the total combined arms R&S plan. See *Table A-2* for a quick summary on enemy mission and M/S capabilities.

In the defense, the staff engineer plots the enemy's—

- Mobility assets, capabilities, and location in its formation.

Table A-3. OCOKA and sample M/S effects on planning

OCOKA	Examples of Effects on Engineer Support	
Observation and fields of fire	Offense	Requires planning for the obscuration/location of the support force for breaching operations.
	Defense	Reduces obstacle distance from direct-fire systems. This might also affect obstacle composition with reduced standoff.
Cover and concealment	Offense	Requires planning for obscuration/assault positions for breaching operations. Impacts the feasibility for conducting a covert breach.
	Defense	Impacts the required effort for survivability and deception operations.
Obstacles	Offense	Requires the task organization of special engineer mobility assets (AVLBs, ACEs). Plots enemy countermobility effort and obstacles.
	Defense	Ties in reinforcing obstacles to existing obstacles. This might require an increase countermobility effort.
Key terrain	Offense	Targets indirect-fire suppression and obscuration for breaching operations.
	Defense	Ties obstacle intent to the retention value of the key terrain.
Avenues of approach	Offense	Requires planning to conduct in-stride, deliberate, and covert breaching operations. Requires the task organization of countermobility assets for the transition to a hasty defense and flank protection.
	Defense	Requires the tying of specific obstacle effects to a specific location in an AA. The size of the AA impacts the required countermobility effort.

- Use of SCATMINES.
- Engineers that support the reconnaissance effort.
- HVT (such as bridging assets, breaching assets. and SCATMINE delivery systems).
- Countermobility and survivability capabilities in a transition to a defense.

In the offense, the staff engineer plots the enemy's—

- Tactical- and protective-obstacle effort.
- Use of SCATMINES.
- Survivability and fortification effort.

FRIENDLY MISSION AND M/S CAPABILITIES

The third component of the EBA is to estimate the friendly engineer capability and its impact on mission accomplishment. To perform this function, the staff engineer uses the information he developed in the first step (receive the mission).

Knowing the type of operation, the staff engineer quickly prioritizes the development of capability estimates. He considers engineer forces task-organized to his supported unit as well as the 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 HQ and adjacent engineer units should be noted for

future reference in the event a lack of assets is identified during COA development.

Having determined the assets available and having already estimated and refined the time available with the S3, the staff engineer uses standard planning factors or known unit work rates to determine the total engineer capability. For example, in the offense, the staff engineer would focus first on the total numbers of breaching equipment (armored vehicle-launched bridges (AVLBs), MICLICs, ACEs, engineer platoons, and combat engineer vehicles (CEVs)) and translate that into breach lanes. In the defense, the staff engineer would determine the number of minefield, hull- or turret-defilade positions, and tank ditches he could construct with available resources. The staff engineer uses the results of his capability estimates during the COA development. Table A-2, page A-3, contains an outline of this analysis.

The staff engineer combines his analysis of the terrain and enemy and friendly capabilities to form facts and assumptions about the following:

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

ANALYZE THE ENGINEER MISSION

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 staff engineer identifies engineer tasks from the higher unit's entire OPORD, not just the engineer annex. The staff engineer must look in numerous places to fully understand the total scheme of maneuver, the commander's intents, and instructions from the higher unit's staff engineer. The staff engineer should concentrate on the following portions of the OPORD as he receives and identifies the engineer mission:

- Mission *(paragraph 2).*
- Commander's intent (two levels up) *(paragraphs lb and 3).*
- Scheme of maneuver *(paragraph 3).*
- Scheme of engineer operations *(paragraph 3).*
- Subunit instructions *(paragraph 3).*
- Coordinating instructions *(paragraph 3).*
- Service support *(paragraph 4).*
- Command and signal *(paragraph 5).*
- Engineer annex.

Mission analysis has several components, with the staff engineer focusing on engineer capabilities in each component. They are—

- Specified tasks.
- Implied tasks.
- Assets available.
- Limitations (constraints and restrictions).
- Risk.
- Time analysis.
- Essential tasks.
- Restated mission.

SPECIFIED TASKS

Tasks derived directly from the WARNORD, the OPORD, or the commander's intent. Examples are 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-handover coordination during a relief-in-place mission, if not specified, is an implied task. A classic example of an implied task is identifying and planning a river-crossing operation (not specified in the higher OPORD) to seize an objective if a river crossing is necessary to accomplish the mission but is not specified in the higher OPORD.

ASSETS AVAILABLE

The staff engineer should have already identified the available engineer assets in the EBA. He should also examine the total force structure of the combined arms team. This helps the staff engineer as he participates in the COA development. For instance, the amount of firepower available may help to determine whether the force should conduct an in-stride breach versus a deliberate breach.

LIMITATIONS (CONSTRAINTS AND RESTRICTIONS)

Constraints are those specified tasks that limit freedom of action. Designated reserve targets, obstacle belts (with intents), and breach-lane requirements are examples of constraints the staff engineer must consider in his mission analysis. Restrictions are limitations placed on the commander that prohibit the command from doing something. Therefore, they greatly impact the COA development. Obstacle zones and belts are excellent examples of restrictions because they limit the area in which tactical obstacles can be placed.

RISK

A commander may specify a risk he is willing to accept 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 staff engineer must understand how a risk involving an engineer capability specifically impacts combined arms-operations and must advise the commander accordingly.

TIME ANALYSIS

The staff 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 a factor an assumption of the time available while preparing the friendly capabilities portion of the EBA. Now he refines his time analysis. A good tool to use in this process is a basic time-line sketch that includes such items as the—

- Supported unit's 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 staff engineer in accurately refining the estimate of the amount 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 staff engineer focuses the development of his plans, staff coordination, and allocation of resources on the essential tasks. The staff engineer does not ignore the 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.

DEVELOP THE SCHEME OF ENGINEER OPERATIONS

The staff engineer needs to receive planning guidance to tailor the schemes of engineer operations that he will develop during COA development. The amount of guidance required is based on the experience of the staff engineer and maneuver commander, the time available, whether habitual relationships between the engineer and maneuver units have been established, and the SOPs. Some areas in which the staff engineer might require guidance are—

- Situational-obstacle planning.
- Use of digging assets (survivability versus countermobility).
- Use of maneuver forces in the obstacle effort.
- Risk acceptance of M/S tasks.
- Interpretations of higher commander's intent pertaining to M/S.

The next step of the military decision-making process is developing the maneuver COAs. COA development centers on the employment of maneuver forces. The staff engineer assists in this process by considering the impact engineer operations has on maneuver. The staff engineer must participate in order to tailor the scheme of engineer operations for each COA. He develops a scheme of engineer operations for each maneuver COA. The staff engineer does not develop complete plans, just a concept. It is developed using the same steps as the maneuver COA but without the detailed force allocation. If time permits, the staff engineer may begin working on the details for each plan. The process is as follows:

- Analyze relative combat power.
- Identify engineer missions and allocate forces.
- Develop tentative schemes of engineer operations.
- Balance assets against support requirements.
- Integrate into the maneuver COA.

ANALYZE RELATIVE COMBAT POWER

The staff 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. Then he determines if the friendly engineer capability is sufficient to overcome the enemy capability. Likewise, in the defense, the staff engineer looks at enemy capability and when and where he expects that capability to be employed. Then he determines what will

defeat it and what assets are available to ensure success.

IDENTIFY ENGINEER MISSIONS AND ALLOCATE FORCES

Based on the maneuver COA, situation analysis, mission analysis, and commander's intent, the staff engineer assesses the engineer requirements. This is the most important step in developing a scheme of engineer operations.

DEVELOP TENTATIVE SCHEMES OF ENGINEER OPERATIONS

The scheme of engineer operations focuses on how the engineer efforts integrate into and support the maneuver COA. Like the maneuver COA, the scheme of engineer operations 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 staff engineer reviews his scheme of engineer operations in light of the assets he has available (using his EBA product). Hasty-estimate tools, such as belt-planning factors, blade-hour estimates, and breach-lane requirements, are used to quickly assess whether adequate assets are available to support the plan. All shortfalls are noted and the scheme of engineer operations is refined, if necessary. The plan is refined by—

- Shifting assets to the main effort.
- Shifting priorities with the phases of the operation.
- Recommending to the commander to accept risk.
- Requesting additional assets.

INTEGRATE INTO THE MANEUVER COA

The staff engineer prepares a statement describing the scheme of engineer operations. This statement addresses how engineer efforts support the maneuver COA. He integrates the necessary graphics to illustrate this tentative engineer plan (for example, breach-control measures and obstacle graphics and intent).

WAR-GAME AND REFINE THE ENGINEER PLAN

Staff analysis identifies the best COA to recommend to the commander. War-gaming techniques are used to analyze the COAs. War gaming is a systematic visualization of enemy actions and reactions to each friendly COA. The staff engineer participates in war gaming to—

- Ensure that the scheme of engineer operations supports the maneuver plan and is integrated with the other staff elements.
- Further identify weaknesses in his plan and make adjustments, if necessary.
- Ensure that the S2 integrates enemy engineer assets and actions as he portrays the enemy force.

The three techniques for war gaming are as follows (see *Table A-4):*

- Avenue in depth.
- Belt.
- Box.

The next step, after each COA is independently war-gamed, is to compare the results. The goal of comparing COAs is to analyze their advantages and disadvantages

Table A-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	The belt 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.

relative to the other plans. Each COA is compared to the others using specific evaluation criteria. These evaluation criteria may be developed by the staff or may be directed to the staff by the commander during his planning guidance.

The staff engineer compares COAs in terms of which scheme of engineer operations best supports accomplishing the mission. His comparison is only part of the total comparison by the staff.

RECOMMEND A COA

The objective of the comparison is to make a unified recommendation to the commander on which COA is best. The staff engineer may have to give greater consideration to a COA that he can least support if it looks like it is the best selection from the other staff perspectives. The staff engineer must be prepared to inform the maneuver commander of—

- Which risks to accept.
- What additional assets he needs to avoid risks.
- Where he can obtain the assets.
- How influential he has to be to obtain the assets.

This is where knowledge of the higher and adjacent unit engineer assets becomes important.

Based on the staff's recommendations, the commander makes a decision on which COA to adopt for final planning. He may select a specific COA, modify a COA, or combine parts of several COAs. In any event, the commander decides and issues to the staff additional guidance for developing the plan. This guidance concentrates on synchronizing the fight, focusing on bringing the combat multipliers together.

FINALIZE THE ENGINEER PLAN AND ISSUE ORDERS

The staff engineer focuses his planning efforts on the scheme of engineer operations for the selected maneuver COA. The staff engineer determines the C2 necessary to accomplish the engineer missions (see *Chapter 2* for additional information). The

scheme of engineer operations is fine-tuned based on the war-gaming process, the commander's guidance, and situation updates. As the staff engineer fills in the details of his plan, he refers back to his initial mission analysis to ensure that all missions have been taken into account. The staff engineer ensures that all engineer tasks are assigned to maneuver and engineer units as part of the subunit instructions. Final coordination is made with other staff members to ensure total integration and mutual support.

The staff engineer conveys his written plan through his input in the basic OPORD (scheme of engineer operations, subunit instructions, and coordinating instructions paragraphs) and the engineer annex (see *Appendix B).* As part of the combined arms staff, the staff engineer also participates in the OPORD brief to the assembled command group. As with the other primary staff officers, the staff engineer gets only one chance to brief the command group on the scheme of engineer operations. This is the first step in a properly executed and well-coordinated engineer plan. The focus of the staff engineer is briefing the subordinate commanders; the maneuver 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 staff engineer should be thoroughly familiar with the total plan so that he is comfortable answering questions.

APPENDIX B

Orders and Annexes

Orders and annexes are critical components of the brigade's engineer C2. The brigade engineer, through the brigade commander, exercises functional control over the engineer operations within the brigade sector by including critical instructions in the brigade order and the engineer annex. The supporting company commander also issues unit orders to exercise unit control over engineer forces under his command. The products from the brigade engineer and the company commander must work together to synchronize and coordinate engineer support to the brigade.

BRIGADE OPORD

Figure B-1, pages B-2 through B-4, is a sample format of the brigade OPORD. Paragraphs in which engineer input is required are bolded.

ENGINEER ANNEX

The engineer annex contains information not included in the base brigade order that is critical to the brigade engineer plan or required for subordinate engineer planning. It does not include instructions or orders directly to engineer units. All instructions or tasks are addressed to maneuver brigades, not supporting engineer units. More importantly, the engineer annex covers critical aspects of the entire engineer plan, not just parts that pertain to engineer units. 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 engineer units remaining under brigade control; those orders and instructions are contained in the engineer company order. The engineer annex should meet the following general criteria:

- Includes critical information derived from the EBA process.
- Contains all critical information and tasks not covered elsewhere in the order.
- Does not contain items covered in SOPs unless the mission requires a change to the SOP.
- Contains information and tasks directed to major subordinate elements of the division, not supporting engineer units.
- Avoids qualified directives and is clear, complete, brief, and timely.
- Includes only information and instructions that have been fully coordinated with other parts of the OPORD, brigade commander, and staff.

(Classification)

Copy_____ of _____ copies
Issuing HQ
(Place (coordinates) country)
(Date-time group, month, year)
(Message reference number)

OPERATION ORDER (number) (code name, if used).
Reference(s): Map(s) and other references required.
Time zone used throughout the order:

Task Organization:

- **Must 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.**

   b. Friendly Forces.

   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.

3. EXECUTION.

   Intent:

   a. Concept of the Operation.

      (1) Maneuver.

Figure B-1. Brigade OPORD

(2) Fires.

(3) Counterair operations.

(4) Intelligence.

- **Include the focus of intelligence-collection efforts that impact the maneuver plan.**
- **Provide subordinate units with information requirements (developed by the S2 and the brigade commander) that are command PIR.**

(5) Electronic warfare.

(6) Engineer.

- **Describe the concept of engineer operations to support the maneuver plan.**
- **Establish the main effort by mission and unit for each phase of the operation.**
- **Focus primarily on support to close and rear operations.**
- **Discuss the brigade-level missions that impact the battalions.**

(7) (Other paragraph, as needed.)

b. Tasks to Maneuver Units.

- **List mission-essential tasks to be accomplished by a specific maneuver element.**
- **List mission-essential tasks to be accomplished by engineers task organized to maneuver elements.**

c. Tasks to Combat Support Units. May include brigade-level tasks assigned to supporting engineer units. This paragraph is used to inform brigade commanders of tasks under division control being done by division-level forces.

d. Coordinating Instructions.

- **Include critical instructions common to two or more maneuver units.**
- **Do not include SOP information unless it is needed for emphasis.**
- **May include times or events in which obstacle zones become effective, if they differ from the effective time of the order.**

Figure B-1. Brigade OPORD (continued)

4. SERVICE SUPPORT.

a. **General Concept of Logistics Support. This paragraph should include the—**

- **Concept for push of Class IV/Class V (obstacle) supplies.**
- Concept for organic and supporting corps engineers task-organized to maneuver battalions, if not listed in service-support annex.

b. Material and Services.

(1) **Supply. This paragraph should include—**

- **Brigade allocations of Class IV or engineer Class V supplies if not contained in the engineer annex.**
- Tentative locations for transfer of Class IV/Class V (obstacle and overhead cover) supplies to maneuver brigades.

(2) Transportation.

(3) Services.

c. Medical Evacuation and Hospitalization.

d. Personnel.

e. Civil-Military Cooperation.

f. Miscellaneous.

5. COMMAND AND SIGNAL.

a. Command.

b. Signal.

Acknowledge:

Commander's signature (optional)
Commander's last name
Rank

Official:
(Authentication)
Annexes:
Distribution:

Figure B-1. Brigade OPORD (continued)

The engineer annex includes any combination of written instructions, matrices, or overlays to convey the necessary details of the engineer plan. The engineer annex outlined in the following paragraphs provides a standard format for both 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 engineer plan. A standardized annex format makes it easier for the engineer staff officer to remember what should be included and for subordinate staff officers to find required information. The format tailors the standard five-paragraph order to convey critical information.

Matrices may be used as part of the body of the engineer annex or as separate appendices. Matrices are used to quickly convey or summarize information not needing explanation, such as logistics allocations, obstacle zone priorities and restrictions, or task summary (execution matrix). Finally, overlays are used to give information or instructions and expedite integration into the overall combined arms plan. At 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 NAI/TAI and decision points).
- Known and plotted enemy obstacles (must also be on situation template).
- Logistics locations and routes, as they apply to engineer operations.
- NBC-contaminated areas.

Figure B-2, pages B-6 through B-9, is a sample format of a written engineer annex. *Figure B-3, page B-10,* provides a sample matrix and overlay.

ENGINEER UNIT ORDERS

The company commander uses a unit order to exercise unit control over engineer units remaining under his command. At the outset of an operation, the company commander uses his order to—

- Effect the necessary task organization of engineers in the brigade.
- Assign initial missions.
- Establish sustainment integration with the FSB.

Once the task organization is effective and during combat operations, the company commander directs subsequent unit orders only to those 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.

The brigade engineer issues WARNORDs to all engineers supporting the brigade to facilitate parallel planning within engineer units and any engineer TFs. WARNORDs to engineers supporting maneuver battalions are for planning only and are not executive.

BRIGADE ENGINEER WARNORD

The purpose of the WARNORD is to help engineer staff officers and engineer units initiate planning and preparations for an upcoming operation. The WARNORD is critical to foster parallel planning at the engineer unit and maneuver battalion levels.

There is no prescribed format for the WARNORD. It may be either written or verbal but should include the following information:

ANNEX_____ (ENGINEER) TO OPORD_____.

Task Organization:

- List engineer units only and task-organize them to maneuver battalions or the brigade.
- List all engineer units supporting the brigade and units task-organized to other than the parent unit.
- May include a summary of low-density equipment, as necessary, to clarify unit task organization.
- Address command support relationships, as appropriate.
- Clearly 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 operations.

      (2) Weather. Include critical aspects of the weather that affect operations.

      (3) Enemy engineer capability/activity include—

         - Known and plotted locations and activities of enemy engineer units.
         - Significant enemy maneuver and engineer capabilities that impact engineer operations.
         - Expected employment of engineers based on the most probable enemy COA.

   b. Friendly Forces.

      - List designation, location, and activities of higher HQ and adjacent engineers impacting the division or requiring coordination.
      - List nonengineer units capable of assisting in engineer operations.
      - List nonengineer units capable of emplacing SCATMINEs.

   c. Attachments and Detachments.

      - List units attached or detached, as necessary, to clarify task organization.
      - Highlight changes in engineer task organization occurring during operations, along with effective times or events.

Figure B-2. Engineer annex

2. MISSION. Same as the brigade mission statement.

3. EXECUTION.

a. Scheme of Engineer Operations.

- Describe the concept of operations supporting the maneuver plan. The scheme of engineer operations must tie critical tasks or the main effort to the brigade defeat mechanism.
- Establish the engineers' main effort by mission and unit for each phase of the operation.
- Focus primarily on engineer support to close operations.
- Discuss division-level missions that impact the brigade.

(1) Obstacles.

- Supplement the narrative above, focusing specifically on details of the countermobility effort.
- Identify obstacle belts used to support the brigade deep, close, and rear operations. Assign belt responsibilities, priorities, and restrictions to obstacle belts. Belt restrictions may preclude the use of certain types of mines or obstacles or the use of obstacles on specific routes through zones.
- Identify, prioritize, and assign responsibilities for division- and brigade-directed and reserve targets. Also provide execution criteria for reserve targets.

(2) Situational obstacles include—

- Concept for the employment of situational obstacles, focusing on how they will be used to support the brigade maneuver plan.
- Brigade-planned and executed obstacles. The brigade plan clearly identifies location, intent, and execution criteria of brigade-level targets that the brigade plans and executes.
- Brigade-planned and battalion-executed obstacles. The brigade assigns responsibilities for executing brigade situational obstacles targeted and resourced by the brigade. The brigade plan must include details on NAIs, TAIs, decision points, and execution criteria.
- Brigade-resourced and battalion-planned and executed obstacles. The brigade plan assigns intent and allocates resources to battalions. It may also state execution criteria.
- Criteria for each type of obstacle, clearly stating the HQ maintaining the authority to use SCATMINEs and any restrictions on duration (by belt).

Figure B-2. Engineer annex (continued)

b. Subunit Instructions.

- List engineer tasks to be accomplished by a specific subordinate unit and that are not included in the base OPORD.
- List engineer tasks to be accomplished by engineers supporting maneuver elements (only as necessary to ensure unity of effort).
- Ensure that brigade-level tasks assigned to the engineer organization are included. This paragraph is used to inform subordinate-unit commanders of tasks under brigade control being done by brigade-level forces.

c. Coordinating Instructions.

- Include critical engineer instructions common to two or more maneuver units not already covered in the base OPORD.
- Include SOP information if needed for emphasis.
- May include times or events in which obstacle belts become effective if they differ from the effective time of the order.
- Include brigade PIR that must be considered by subordinate engineer staff officers or that must be reported to the brigade engineer.
- Include mission reports required by the brigade engineer if not covered in the "Signal" paragraph or unit SOP.
- Include explanation of engineer work lines, if used.

4. SERVICE SUPPORT.

a. Command-Regulated Classes of Supply. Highlight subunit allocations of command-regulated classes of supply that impact the operation's control supply rate (CSR). May summarize in a matrix or table.

b. Class IV/Class V (Obstacle) Supply Distribution Plan.

- State the method of supply (supply point or unit distribution) to be used to provide each subunit with Class IV/Class V (obstacle) supplies.
- Give tentative locations for Class IV/Class V supply points or locations for linkup of corps push packages directly to units.
- Give allocation of Class IV/Class V (obstacle) supplies by brigade, zone, or a combination. This may be summarized in a matrix or table.

c. Transportation.

- Allocate and prioritize support of division and brigade haul or airlift assets dedicated to the brigade for Class IV/Class V (obstacle) supplies haul.
- List requirements for the brigade to supplement division transportation mission loads (for example, the brigade is responsible for haul forward of PL_____).

Figure B-2. Engineer annex (continued)

d. Health-Services Support. Address the support for corps engineer units that are performing brigade-level missions in the brigade area.

e. HN Coordination. This includes—

- Type and location of HN engineer facilities, assets, or support.
- Procedures for requesting and acquiring HN engineer support.
- Limitations or restrictions on HN support (for example, HN personnel not authorized forward of PL_____).

5. COMMAND AND SIGNAL.

a. Command.

- List location of key engineer leaders.
- Designate a logical chain of command.
- Designate the HQ that controls the effort within work lines on an area basis.

b. Signal.

- Identify communication networks monitored by the brigade engineer, BREC, and BMEC for reports if different than SOP.
- Identify critical engineer reporting requirements of subordinates if not covered in the coordinating instructions or SOP.

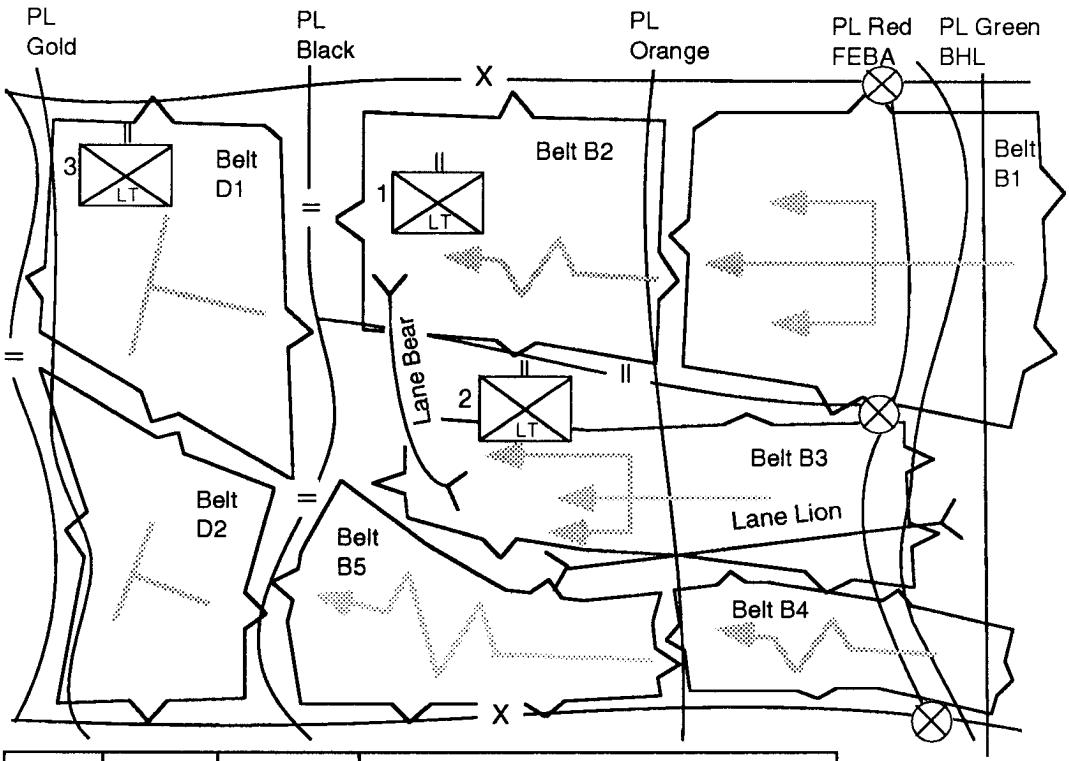
Acknowledge:

Commander's signature (optional)
Commander's last name
Rank

Official:
/s/
Name:
Position:

Appendixes:

Figure B-2. Engineer annex (continued)



Unit	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	2 4	

Figure B-3. Obstacle overlay

- Heading.
- Situation.
- Attachments and detachments.
- Earliest time of move.
- Nature and time of operation.
- Time and place of orders group.
- Administrative/logistical information.
- Acknowledge.

Heading

WARNORDs must always begin with the words "Warning Order." This is to ensure that recipients understand the information

is for use only as a basis for planning and will be followed by orders. The addressees should also be listed in the heading. The brigade engineer's WARNORD to the unit should address all engineer units supporting the brigade.

Situation

This section includes a brief description of friendly and enemy situations and critical events. It may also include probable missions for the brigade and specified or implied tasks, and it may assign tentative tasks for planning only to engineer units.

Attachments and Detachments

This section gives tentative and known changes to the task organization. However, it must be clear to engineers supporting the maneuver battalions that changes in task organization are for planning and are not effective until after an order is received from the brigade by the supported battalion.

Earliest Time of Move

This section states the earliest possible time that units must be ready to move. The company commander may give actual movement times, if known, to units under his command. The earliest time of move is critical to synchronizing sustainment operations to support future missions.

Nature and Time of Operation

This section provides recipients with as much information about the brigade plan as possible to foster parallel planning and preparations and to set priorities. Depending on the maturity of the planning process, this section may include a concept of engineer operations or tentative scheme of engineer operations. Orders for preliminary action may also be included, such as—

- Assigning engineer tasks, such as tactical/technical reconnaissance.
- Establishing Class IV/Class V supply points.
- Moving to linkup points.

These orders are normally qualified as "be-prepared" or "on-order" tasks, depending on how the plan is established. Orders to engineers supporting maneuver battalions are always on-order tasks, with execution instructions coming through maneuver headquarters-generated orders.

Time and Place of Orders Group

Engineer units under the brigade commander are told when and where to receive the entire order and who will attend. Units should identify the composition of the orders group in their SOP.

Administrative and Logistical Information

This includes instructions and warning information on changes in unit logistics operations and linkup with maneuver sustainment systems, as required by future operations. This information may also direct movement to assembly areas and provide instructions for sustainment after movement.

Acknowledge

An acknowledgment of receipt is always required to ensure that the WARNORD is received by all addressees.

ENGINEER COMPANY OPORD

The DIVEN commander issues OPORDs to all engineer units under his command. Once the task organization is effected, all instructions and missions to engineers supporting maneuver battalions are conveyed in brigade orders and are addressed to the

maneuver battalion commanders. The engineer company OPORD is outlined in the following paragraphs (see *Figure B-4, pages B-13 through B-18* for an example). *Figure B-5, page B-19,* shows an engineer execution matrix. When the order is an OPLAN instead of an OPORD, the assumptions on which the plan is based are included at the end of the "Situation" paragraph.

ENGINEER COMPANY FRAGO

The company commander frequently needs to modify his OPORD to make changes in engineer operations that allow the brigade to take advantage of tactical opportunities. He can do this by issuing a FRAGO. The company commander issues FRAGOs 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. A FRAGO does not have a specified format, but an abbreviated OPORD format is usually used. 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 is rarely afforded the opportunity to issue FRAGOs to his subordinate leaders face-to-face. He normally issues them over the radio. The company commander may use his XO or 1SG to issue the FRAGO in person to subordinates. This ensures 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 scheme of engineer operations 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 "Service Support" and "Command and Signal" paragraphs of the current OPORD made necessary by the change in the scheme of engineer operations.

(Classification)

Copy_____ of _____ copies
Issuing engineer HQ
(Place (coordinates) country)
(Date-time group, month, year)
(Message reference number)

OPERATION ORDER (number) (code name, if used).
Reference(s): Map(s) and other references required.
Time zone used throughout the order:

Task Organization:

- 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 not clear in unit task organization.
- Must streamline C2.
- Address command support relationships, as necessary.

1. SITUATION.

a. Enemy Forces.

(1) Terrain and weather include—

- 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. This paragraph should include—

- 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 COA.
- Enemy activities, capabilities, and COAs that affect brigade-level engineer operations.

Figure B-4. Engineer company OPORD

b. Friendly Forces.

(1) Higher. This paragraph should include—

- Division and brigade missions and commander's intent; paraphrase division's and commander's intent as it applies to engineer operations.
- Brief description of the division 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.

c. Attachments and Detachments.

- List attachments and detachments of organic and supporting engineers to the brigade, as necessary, to clarify the task organization.
- Highlight any attachments and detachments that occur during the operation, including the time or event that triggers the change.

2. MISSION. This paragraph should include—

- Who (the engineer company organization).
- What, when, where, and why (the brigade mission). ("What" also includes any essential brigade-level engineer missions).

3. EXECUTION.

Intent: 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 operations (why).
- Describe the "end state" of company-level operations and its link to the "end state" of the brigade operation.
- Do not describe the scheme of engineer operations or subunit tasks.
- Must link engineer intent to the brigade defeat mechanism.

a. Scheme of Engineer Operations.

- Must be a clear, concise narrative of the engineer plan from the beginning to the end. Use phases of the brigade plan, organization of the defense, or battlefield framework to organize the narrative.

Figure B-4. Engineer company OPORD (continued)

- Must focus on mission-essential engineer missions and the brigade's engineer main effort only. The scheme of engineer operations is not a summary of all engineer tasks. The company order usually concentrates on engineer operations in the brigade rear or division-level missions in the close operation.
- Must clearly identify the company's 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 operations. Assign belt responsibilities, priorities, and restrictions to brigade-level countermobility efforts and engineer units.
- Identify and assign responsibilities for brigade- and 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).

b. 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 unit; tasks are generally listed in the order they will be executed during the operation.
- Clearly distinguish "be-prepared" and "on-order" tasks from normal tasks.
- Ensure that tasks/instructions common to two or more units are not included.
- Ensure that all brigade-level missions are identified during the estimate process, if necessary.

c. Coordinating Instructions.

- Include tasks and instructions that are common to two or more units subordinate to the company organization.

Figure B-4. Engineer company OPORD (continued)

- Must include all pertinent coordinating instructions listed in the brigade order.
- Do not list SOP orders 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.
- Give the time that the task organization is effective.

4. SERVICE SUPPORT.

a. General Concept of Logistics Support.

- 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** (BSAs and FSBs), 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 (DSA, FSBs, CSA, combat service group (CSG), ammunition supply points (ASPs), ATPs,and so forth) and planned subsequent locations if they change during the operation.

b. Material and Services.

(1) Supply. For each class of supply—

- List allocation and CSRs for each unit, based on missions.
- List basic loads to be maintained by the unit.
- List method of obtaining supplies, if different from general concept. **NOTE: Mission logistics may be different than unit (scheduled) logistics.**
- Address any special arrangements or plans to sustain specific mission needs (Class IV/Class V or Class III push to sustain engineer preparation of defenses).

(2) Transportation.

- List primary, alternate, and contaminated MSRs during the operation.
- State allocations of division or corps haul assets.

Figure B-4. Engineer company OPORD (continued)

(3) Services. For each service, list the location and means of requesting and obtaining it.

c. Medical Evacuation 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.

- Identify method of handling EPWs and 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 HN.

f. Miscellaneous.

5. COMMAND AND SIGNAL.

a. Command.

- List the location of key leaders and the company CP during the operation and planned movements.
- Identify locations and planned movements of key brigade C2 nodes.
- Designate logical chain of command.

b. Signal.

- Identify any communication/signal peculiarities for the operation not covered in the SOP.
- May identify critical reporting requirements of subordinates if it is 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
Rank

Figure B-4. Engineer company OPORD (continued)

Official:
(Authentication)

Annexes: Possible annexes may include but are not limited to—
- Execution matrix
- Intelligence annex
- CSS annex
- Movement annex

Overlays:
- Situation template
- Engineer operations overlay: Includes brigade maneuver graphics and engineer graphics, as necessary.
- Brigade CSS overlay
- Brigade obstacle plan
- Other operations

Distribution:

Figure B-4. Engineer company OPORD (continued)

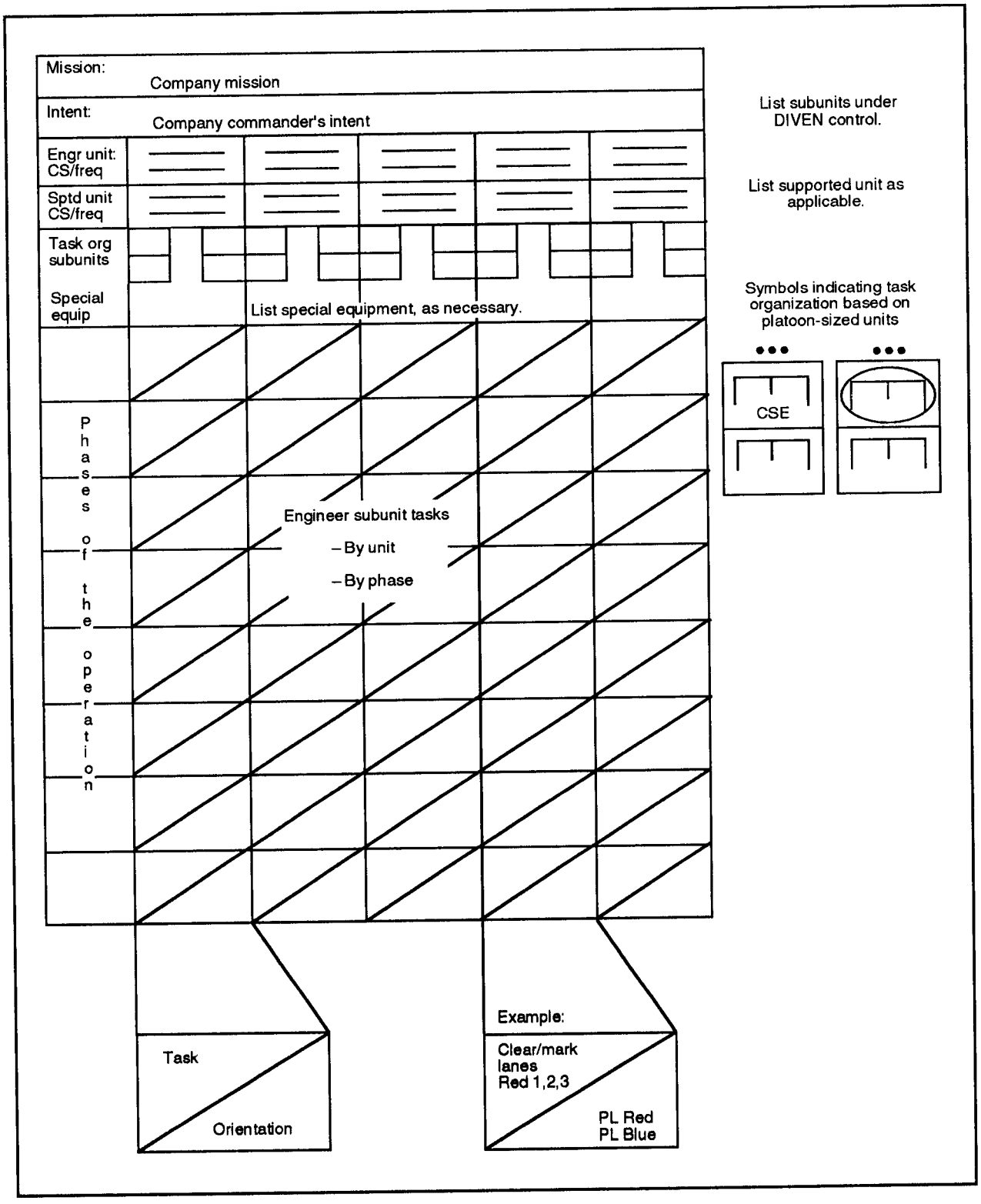


Figure B-5. Engineer execution matrix

APPENDIX C

Key Leaders' Responsibilities

This appendix outlines key duties and responsibilities of several of the principal leaders involved in brigade-level engineer C2. They are the—

- Brigade engineer.
- Engineer company commander.
- XO.
- 1SG.
- Communications sergeant.
- Supply sergeant.
- NBC sergeant.
- Armorer.
- Combat signaler.

The duties and responsibilities listed are a foundation of mission-essential tasks required of engineer key leaders supporting the light brigade. The DIVEN may modify the duties and responsibilities based on METT-T and the structure of the supported brigade and the supporting engineers.

BRIGADE ENGINEER

The brigade engineer is the primary engineer staff planner for the brigade commander. He is task-organized from the divisional light engineer battalion by the division engineer. The brigade engineer is responsible to the brigade commander for providing organizational focus and synchronizing cohesive engineer support for the entire brigade. As a special staff officer, he is the principal engineer advisor to the brigade commander and the rest of his staff. He is responsible for integrating specified and implied engineer tasks into the brigade plan. The brigade engineer has the ultimate responsibility for ensuring that supporting engineer units are completely integrated into the brigade's mission planning, preparation, and execution. This task will be one of the most challenging and will only be successful with the full support of the supporting company commanders.

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 engineer battlefield functions into future brigade plans and develop the necessary input to brigade orders, annexes, and engineer unit orders, as required.
- Make time-sensitive engineer decisions on requests from the TF engineers for recommendations for immediate tactical support.
- Train the brigade engineer cell located at the brigade main CP.

- Establish the BMEC and integrate the BREC into brigade C2 operations.
- Formulate ideas for engineer support to meet the brigade commander's intent.
- Visualize the future state of engineer operations in the brigade.
- Recommend to the brigade commander the engineer priorities of effort and support and acceptable risks.
- Determine and accurately evaluate the critical aspects of the engineer situation.
- Decide what engineer missions must be accomplished to support the brigade's current and future fights.
- Prioritize and recommend the allocation of engineer personnel, equipment, logistics, and units.
- Develop a scheme of engineer operations concurrently 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 facilitate subordinate planning, preparation, and integration.
- Monitor the execution of engineer orders and instructions by keeping track of the current fight.
- Alter the engineer plan, as required, with feedback from the maneuver battalions and engineer units.
- Interface with the DIVEN on DIVEN plans, status of brigade engineer missions, and identification of any brigade requirements for division or EAD engineer assets to support the brigade.
- Inform the brigade commander of the capabilities, limitations, and employment considerations of supporting engineers.

ENGINEER COMPANY COMMANDER

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 his company. He must fully understand the capabilities of his soldiers and the best method of how to employ them. The company commander must also understand what the light brigade and battalions are capable of and how they fight.

The company commander is the engineer executor on the brigade battlefield. He has "unit control" and command responsibility over his unit. One of his greatest challenges is maintaining an execution focus for the brigade commander while sustaining his staff-level input to the brigade engineer. He is ultimately responsible for—

- Writing the company OPORD that supports the brigade commander's intent and concept of the operation and the brigade's engineer annex.
- Providing mission-oriented C2 to his company.
- Supervising the execution of his unit's engineer support within the brigade area.
- Achieving integration with the supported brigade through his link with the brigade engineer and the brigade commander's C2 organization. (C2

assets from the company are key in facilitating this process.)

- Ensuring that an accurate and current engineer status is retained at the brigade by tracking the status of the company's missions and units and forwarding it to higher HQ, as required.
- Dividing duties among key leaders of his company. Each subordinate must know what his job is and how the company functions while executing its missions. The decentralized nature of light brigade operations dictates that the company and its subordinate units be able to function in any mission or situation with minimal guidance and control from higher HQ. Although every situation is different, the company SOP standardizes the way tasks are accomplished and facilitates execution of decentralized operations.
- Remaining focused on engineer missions rather than the method of his subordinates' execution. The company commander must not give his subordinates missions and guidance that conflict with those of the maneuver brigade and supported battalion commanders.
- Assuming the responsibilities of the brigade engineer. While he is always an advisor on his unit's capabilities, limitations, and current operational status, he normally passes this information through the brigade engineer. In the absence of the brigade engineer, the focus of the company commander is more on integrating into brigade planning and less on unit command.
- Providing mission and status reports to the brigade commander and the brigade engineer (and his immediate engineer commander) so that they may make decisions that can influence the battle.

EXECUTIVE OFFICER

The XO is second in command. His primary role is to help the commander direct the fight of the company and ensure its seamless integration into the brigade combat, CS, and CSS structure. His responsibilities include—

- Receiving and consolidating unit and mission reports from the platoons and submitting them to the BMEC, the brigade rear CP, and the parent engineer battalion commander, as required.
- Assuming command of the company, as required.
- Establishing and operating the company CP. T-his CP 'accomplishes two primary tasks. It facilitates the C2 process of the company and augments and synchronizes the engineer C2 organization in support of the brigade.
- Planning and supervising the engineer company CSS.
- Ensuring that PCIs are complete throughout the company.
- Planning and coordinating all logistical support with the FSB, the parent engineer battalion, and other agencies outside the company.
- Preparing or assisting in the preparation of the company OPORD, specifically focusing on *paragraph 4.*
- Coordinating with higher, adjacent, and supporting units. 'This function is vital when the company receives support from other units of the parent

battalion (such as equipment, maintenance, or medical assets) or from corps engineers.

The XO has a secondary role as the brigade rear engineer. In this role, he accomplishes those tasks required to integrate and synchronize the engineer support for rear-area operations, such as—

- 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 the FSB.
- 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.

FIRST SERGEANT

The 1SG is the senior NCO and 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. He operates where the commander directs or where his duties require him. His responsibilities include—

- Being involved early in the planning process to provide quality control in the execution of engineer missions and logistics operations.
- Checking on soldiers' welfare as a second set of eyes for the commander. He may be located with the company commander, on a secondary engineer effort, or in any of the CPs to ensure smooth engineer operations.
- Executing and supervising routine operations.
- Enforcing the tactical SOP.
- Planning and coordinating training.
- Coordinating and reporting personnel and administrative actions.
- Supervising supply, maintenance, communications, field hygiene, and MEDEVAC operations.
- Ensuring that CSS priorities are requisitioned and replenished.
- Monitoring logistical statuses and submitting reports to the company XO and the brigade rear CP, as required.
- Supervising, inspecting, and observing matters designated by the commander. He may observe and report on the status of obstacles or survivability within the brigade or range cards within the company.
- Assisting and coordinating with the XO, preparing to assume his duties, as required.

COMMUNICATIONS SERGEANT

The communications sergeant is the company expert and advisor on all aspects of tactical communications. He is responsible for—

- Ensuring that the company's radios and telephone assets are in working condition and providing communications down to the platoons.

- Supervising the operations, maintenance, and installation of organic wire and frequency modulated (FM) communications. This includes sending and receiving radio traffic and making required communications checks.
- Supervising the company CP, to include relaying information, monitoring the tactical situation, establishing the CP security plan and radio-watch schedule, and informing the commander and subordinate units of significant events. These actions are an essential component of the dual functions of the company CP in providing unit- and brigade-level engineer C2 support.
- Performing limited troubleshooting of organic communications equipment.
- Providing the link between the company and the FSB for maintenance of communications equipment.
- Supervising all aspects of communications security (COMSEC) equipment, to include requesting, receiving, training, maintaining, securing, and employing related equipment and materials.
- Receiving, accounting for, and distributing signal operation instructions (S0I).
- Advising the commander in planning and employing the communications systems.
- Preparing or assisting in the preparation of *paragraph 5* of the OPORD, based on the commander's guidance.

SUPPLY SERGEANT

The supply sergeant is under the direct supervision of the lSG but must ensure that the company CP is kept informed of the status of all critical supply items. His responsibilities include—

- Requesting, receiving, issuing, storing, maintaining, and turning in supplies and equipment for the company.
- Coordinating requirements with the 1SG and supporting units within the FSB.
- Monitoring the tactical situation together with the communications NCO.
- Anticipating logistical requirements and assisting in the operations of the company CP. *Chapter 6* has a more detailed discussion of the CSS requirements.

NBC SERGEANT

The NBC sergeant works with the 1SG and commander in planning and conducting NBC operations. He is located in the company CP. He assists the communications NCO and supply NCO in monitoring the tactical situation, CP operations, and security. He is responsible for—

- Organizing and training the company's NBC teams and supervising the execution of assigned tasks, as required.
- Supervising the maintenance and employment of the company's NBC equipment.
- Relaying NBC reports, advising the commander on areas of contamination, and maintaining the radiation status chart.

ARMORER

The armorer may operate at the company CP to support continuous CP operations. His duties include—

- Performing organizational maintenance on the company's small arms.
- Evacuating weapons to the DS maintenance unit in the FSB.
- Assisting the supply sergeant.

COMBAT SIGNALER

The combat signaler may also operate at the company CP to support continuous CP operations. He is responsible for—

- Operating and performing maintenance on communications equipment as directed by the communications sergeant.
- Assisting in the preparation of the OPORD by copying the overlays and building sand tables.
- Acting as the commander's radio/telephone operator (RTO), as required.

APPENDIX D

Tactics, Techniques, and Procedures

The purpose of this appendix is to assist field units in two problem areas: route-clearance operations and FLS seizure/clearance operations. The TTP that follow establish basic guidelines for conducting these combined arms combat operations. They are not all encompassing and may be modified to meet the needs of the user.

ROUTE-CLEARANCE OPERATIONS

MISSION

A battalion TF is to conduct clearance-in-zone operations to ensure battlefield circulation.

OVERVIEW

To clear a route, the battalion focuses one company team as the main effort on the route proposed as the MSR and the remainder of the battalion conducts clearance-in-zone operations on terrain that dominates the MSR. The brigade retains an air-assault or a mechanized company in reserve. During route-clearance operations, the TF could perform the following missions:

- Conduct a deliberate breach through a known minefield or obstacle.
- Conduct an in-stride breach through an unknown minefield.
- React to a near/far ambush.

FACTS AND ASSUMPTIONS

In a route-clearance operation, the following facts and assumptions apply:

- Noncombatants are in the area.
- Noncombatants use the MSRs.
- ROE are in effect.
- MSRs are limited and the terrain is restrictive.
- The terrain limits communication capabilities.
- Enemy teams, squads, and platoons conduct decentralized operations; they can mass to a company-level operation.
- The enemy makes extensive use of minefield, indirect fires, snipers, and shoulder fired surface-to-air missiles (SAMs).
- The enemy can infiltrate to ambush, emplace minefield, reseed cleared minefield, erect obstacles, emplace explosive devices, and conduct acts of terrorism.
- Buried point minefield can be emplaced in 1 to 1 ½ hours on an unimproved road and 2 hours on an improved road.
- Point minefield consist of 5 to 35 mines with a mix of 10 to 25 AT mines and/or 5 to 10 AP mines.

- Minefields and obstacles may be covered by direct and indirect fires.
- All obstacles are considered to be booby trapped.
- Cleared minefield can be reseeded which indicates the presence of mine caches.
- All movements are considered combat operations.
- Clearance operations are conducted during daylight hours.
- MSRs must be swept daily.
- Each convoy has a security escort that can also breach minefield, if required.
- Aviation, fire support, engineer, military intelligence (MI), military police (MP), ADA, civil affairs (CA), and psychological operations (PSYOP) assets are available.
- Light forces can clear 700 meters of a route per hour, using a minimum of four mine detectors, in a deliberate sweep operation.
- Heavy forces can clear 5 to 15 kilometers of a route per hour, using a minimum of three mine-clearing rollers.
- A reserve is available.
- US forces have air supremacy.
- Light, mobile security elements have a mix of M60 machine guns and MK19 30-millimeter grenade launchers.
- A truck platoon is available to move security forces.
- Each light infantry platoon requires three 5-ton trucks for transportation.

TF TASKS TO BE ACCOMPLISHED

The following tasks must be accomplished for route-clearance operations:

- Conduct deliberate sweep operations.
- Detect obstacles.
- Secure the area to be cleared.
- Conduct breaching and clearing operations.
- Conduct route reconnaissance.
- Conduct cordon and search operations.
- Conduct mounted-movement drills.
- Conduct road movement.
- React to enemy contact.
- Conduct a HATK.
- Deploy a reserve.
- Conduct an air-mission brief (AMB).
- Develop a fire plan/suppression of enemy air defenses (SEAD).
- Conduct emergency resupply operations.
- Conduct casualty-evacuation operations.
- Conduct vehicle recovery and evacuation operations
- Collect and disseminate intelligence information.
- Provide C2.
- React to civilians on the battlefield.
- Conduct liaison with civil authorities.
- Respond to press interviews.

RECOMMENDED TASK ORGANIZATION

Figure D-1 shows an example of the company team organization for route-clearance operations. See *Figure D-2, page D-4,* for an example of a graphic illustration of a route-clearance operation.

- **Light/Heavy Team**

  Assault Force (platoon leader/XO)
  2 Infantry platoons (light) on six 5-ton trucks

  Support Force (mechanized platoon leader)
  1 Bradley platoon
  1 Engineer squad
  1 60-millimeter mortar section
  1 Medical team (two front-line ambulances (FLAs))
  1 PSYOP team
  1 Forward observer (FO)

  Breach Force (company commander)
  1 Engineer platoon (-) with organic vehicles (HMMWVs or M113s)
  1 Infantry platoon (light) on three 5-ton trucks
  1 Tank section (two M1s with mine-clearing rollers)

- **Light Team**

  Assault Force (platoon leader/XO)
  2 Infantry platoons (light) on six 5-ton trucks

  Support Force (platoon leader)
  1 AT/MP section with M60/MK19 mix
  1 Engineer squad
  1 60-millimeter mortar section
  1 Medical team (two FLAs)
  1 PSYOP team
  1 FO

  Breach Force (company commander)
  1 Engineer platoon (-)
  1 Infantry platoon (light) on three 5-ton trucks
  1 AT/MP section with M60/MK19 mix

Figure D-1. Sample task organization for route-clearance operations

OPERATIONAL PLANNING CONSIDERATIONS

The following items should be considered by the TF when planning route-clearance operations:

Intelligence

The supporting staff conducts IPB to identify choke points, bridges, tunnels, critical road junctions, and other built-up areas. However, depending on its overall mission, the enemy may not always emplace obstacles at these locations. This is especially true if its goal is to psychologically disrupt our convoys.

- The IPB should focus on the most probable enemy attack method and point obstacle and ambush locations.
- A situation map should be maintained.
- An incident map should be maintained to facilitate a pattern analysis.
- A threat order-of-battle data base should be maintained.
- A detailed R&S plan, incorporating modern battlefield techniques to monitor the route (such as ground sensors, forward-look airborne radar, infrared radar, and satellite images), should be developed.

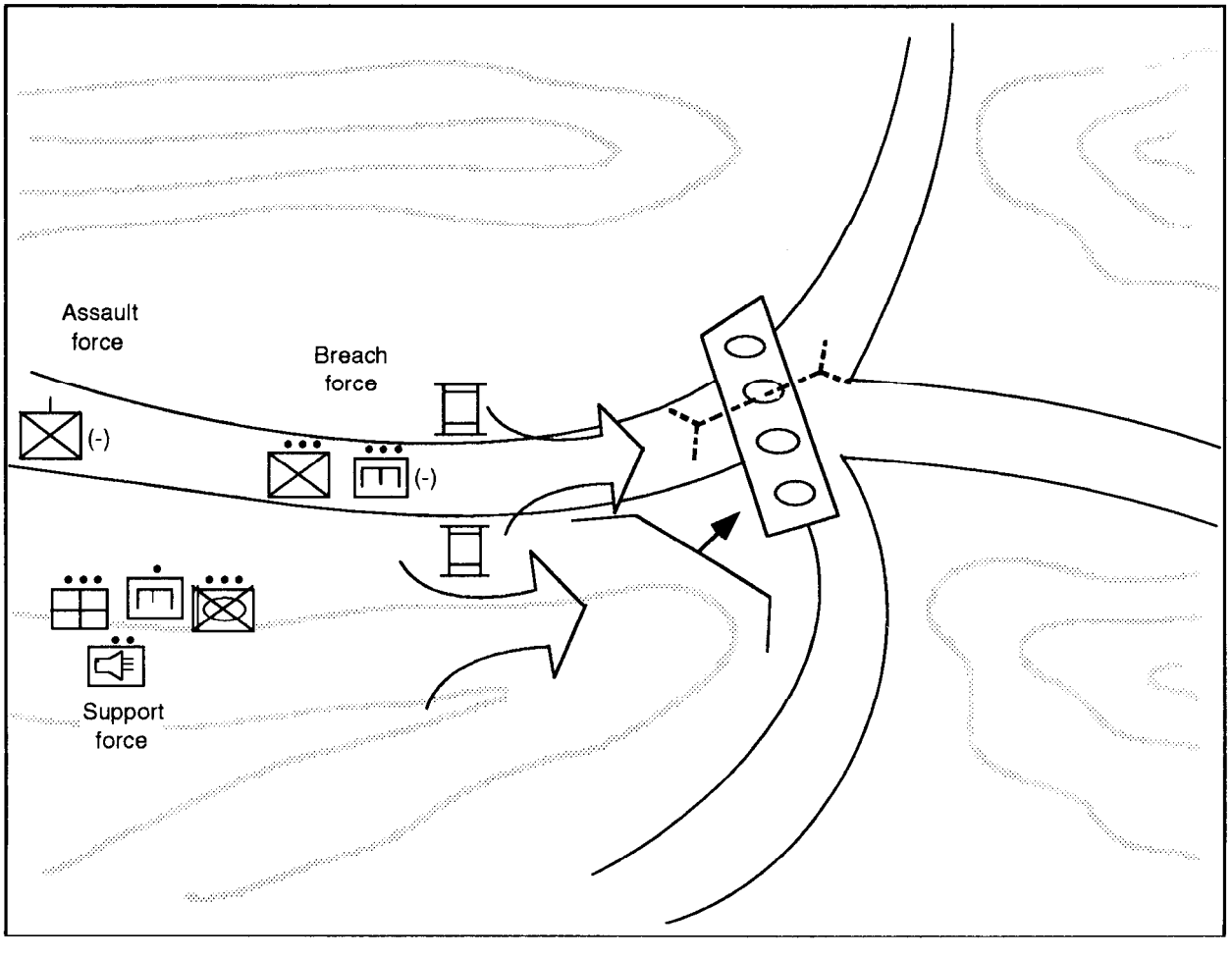


Figure D-2. Route-clearance operations

- The unit should coordinate for "quick fix" and unmanned airborne vehicle (UAV) support.
- A daily flight should be conducted over the area by AH teams to provide up-to-the-minute intelligence. Film the route using an AH-64, if possible.
- The unit should coordinate with the Air Force to check routes periodically (for example, using the C-130 Specter gunship)
- An intelligence update should be provided to company-team leaders before departure. This includes a 1:50,000 enemy situation overlay.

Maneuver

The battle drill for the company team when encountering a known or suspected minefield is as follows:

- Light/Heavy Team:
  - The support force maneuvers to a position where it can overwatch the minefield and direct effective fires on possible enemy locations.
  - The assault force dismounts and maneuvers using a covered and concealed route that avoids roads and does not mask supporting fires. The assault force may or may not be employed. If employed to seize terrain or destroy the enemy, it may or may not pass through the breach (METT-T dependent).
  - The breach force moves forward with tanks (with mine-clearing rollers) in the lead. The infantry platoon dismounts to protect the tanks and engineers. The engineer platoon conducts minefield/obstacle-clearance operations and properly marks all lanes.
  - The company commander moves with the breach force or stays with the support force and controls indirect fires into the objective area. Indirect-fire assets capable of obscuring (with smoke) and suppressing the area are ready to use based on the company commander's assessment of the situation.
  - After clearance is completed, the company commander leaves a stay-behind force from the assault force (squad- to platoon-sized) to secure the site until it is relieved by follow-on forces (such as MPs, local forces, or a reserve).
  - The company team then continues route-clearance operations.
- Light Team:
  - Route-clearance operations are the same as those conducted by the light/heavy force with the following exception:
    - Hasty-sweep operations employ engineers well forward and rely on visual indicators.
    - The breach force does not have tanks providing close-in security. It is provided by AT/MP assets armed with M60s. All other breaching procedures remain the same.
    - The support force does not have the Bradley platoon. Overwatch is provided by an AT/MP section with MK19s.

Fire Support

- Priority targets shift in conjunction with company-team movement on the MSR. Smoke is planned for each target.

- The company's 60-millimeter mortar section moves and sets up with the support force.
- Clearance of fires is the responsibility of the maneuver commander in whose sector the target is located.
- Adequate Q-36 coverage is necessary for deliberate breach operations.

Mobility/Survivability

- OBSTINTEL must include the–
  - Description of the mines or explosive devices.
  - Composition of the obstacle.
  - Enemy actions or techniques used during obstacle emplacement.
- Upon visual identification of an obstacle, deliberate sweep operations should begin and continue for 200 meters past the obstacle.
- All mines, obstacles, and explosive devices must be reported, cleared, and marked to facilitate unimpeded movement.
- Lane-marking materials and techniques are standard throughout the route.
- All radios, electronic equipment, and aviation assets must maintain a safe distance during breaching operations.

AD Artillery

- Despite air supremacy, the possibility of air attack should be considered.
- The following passive AD measures should be used:
  - Eliminate glare by using mud, tape, cardboard, or camouflage nets to cover headlights, mirrors, and portions of windshields.
  - Try to reduce dust clouds (reduce speed to reduce dust).
  - Use routes that offer natural concealment.
  - Use air guards.

Combat Service Support

- Clearance operations are supported with a logistical/medical package operation out of the BSA.
- The priority evacuation method is by air; the routine method is by ground.
- An AMB should be conducted with aviation assets for MEDEVAC contingencies (rehearse evacuation request procedures).
- A medical team traveling with the company team should consist of one to two FLAs.
- All personnel wear flak vests.
- All vehicles carrying troops require hardening (sandbagging floors and sides).

Command and Control

- The company team commander has a requirement to operate on three separate frequencies: battalion command network, company team command network, and fire support network.
- Minefield indicators should be designated throughout the TF (see *Figure D-3* for a list of indicators).
- The battalion designates a reserve that is at least platoon-sized and is either mechanized or air-assault capable.

When conducting deliberate sweep (mine detector and visual observation) or hasty sweep operations, the presence of the following indicators may warn individuals of buried mines or hidden booby traps:

- Damaged vehicles.
- Dead animals.
- Avoidance by local population.
- Signs of digging.
- Signs of concrete removal.
- Holes or grooves in the road.
- Boxes or parcels placed along the road or shoulder.
- Parked vehicles and bicycles without operators.
- Wires on the road surface or extending to the shoulder.
- Metallic devices on the roadway surface.
- Evidence of mine-peculiar supplies (such as wrenches, shipping plugs, wrapping paper, and safety collars from fuses).
- Disturbances in previous tire tracks.
- Disturbance of road potholes or puddles.
- Differences in amount of moisture or dew on road surface.
- Differences in plant growth (such as wilting, changing colors, or dead foliage).
- Signs posted on trees that covertly alert the local populace to the presence of mines.

Figure D-3. Minefield indicators

- Rehearsals should include:
  - Actions on the objective/obstacle.
  - Reaction to enemy contact.
  - Reaction to a near/far ambush.
  - Communications exercise (COMEX).
  - Fire support.

Special Operations

- PSYOP teams should be employed forward to assist in dispersing civilians that could block the route.
- PSYOP/CA support the counterintelligence (CI) in conducting civilian interviews.
- Civilians should be directed along the MSR to the displaced-personnel holding areas and the routes that the brigade has indicated for use.

REFERENCES

The manuals listed in *Figure D-4, page D-8,* provide additional information on route-clearance operations.

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Figure D-4. References for route-clearance operations

FLS SEIZURE/CLEARANCE OPERATIONS

MISSION

A battalion TF is to seize and clear a FLS in a forced-entry operation so follow-on air-land forces can develop LOC.

OVERVIEW

To clear the FLS, the battalion focuses one company team as the main effort on the FLS. The remainder of the battalion conducts clearance-in-zone operations, securing intermediate objectives on terrain that dominates or overmatches the FLS. During clearance operations, the TF finds that the FLS is in one of the following conditions:

- Destroyed beyond repair.
- Minimally damaged, requiring only small repairs.
- Cleared of all obstructions.

FACTS AND ASSUMPTIONS

In this situation, the following facts and assumptions apply:

- Noncombatants are in the area.
- Noncombatants stay near airfield control facilities.
- ROE are in effect.
- FLS is capable of landing C- 130 aircraft.

- FLS was used in the last 30 days or less by some sizable aircraft.
- Enemy activity in the area is minimal.
- Enemy teams, squads, and platoons conduct decentralized operations in the area; they can mass to a company-level operation within 24 hours.
- Enemy makes extensive use of ADA assets, minefield, indirect fires, and snipers in controlling the airfield.
- Clearance operations are conducted during limited visibility or at night.
- US forces have air supremacy.
- Air Force, aviation, fire support, engineer, MI, MP, ADA, CA, and PSYOP assets are available; however, they require task organization for this operation.

TF TASKS TO BE ACCOMPLISHED

The following tasks must be accomplished for FLS seizure/clearance operations:

- Conduct forced-entry operations.
- Secure DZ/LZ.
- Establish LAPES zones.
- Conduct cordon-and-search operations.
- Develop a fire plan/SEAD.
- Conduct a HATK.
- Secure intermediate objectives around the airhead.
- Conduct initial reconnaissance of the FLS.
- Conduct deliberate sweep operations.
- Detect obstacles (such as mines, craters, wire, and abandoned vehicles).
- Conduct breaching/clearing operations on the FLS.
- Remove vehicles and equipment from the FLS.
- Repair damage to the FLS or turnaround apron.
- Conduct liaison linkup with the Air Force CCTs.
- React to civilians on the battlefield.
- Conduct casualty-evacuation operations.

RECOMMENDED TASK ORGANIZATION

Figure D-5, page D-10, shows an example of how a battalion TF could be task-organized.

See Figure D-6, page D-11, for an example of a graphic representation of the FLS seizure/clearance operation.

OPERATIONAL PLANNING CONSIDERATIONS

The following should be considered by the TF when planning a FLS seizure:

Intelligence

- The IPB should focus on the enemy's most probable COA in the immediate area around the FLS/DZ.
- The case study provides intelligence on the FLS and surrounding terrain, to include borrow pit sites.
- Aerial imagery, photographs, and daily flights over the area should be coordinated.
- Updated intelligence in the area can be obtained through coordination with human intelligence (HUMINT) and SOF elements.

Assault Force

2 Infantry companies (+) (for light forces add an infantry platoon from the support force and a light armor platoon (Sheridans))
2 Stinger teams

Support Force

1 Infantry company (-)
1 Engineer squad
1 Advanced trauma lifesaving team (ATLS)
1 Stinger team
1 81-millimeter mortar section
1 PSYOP/CA team

Breach/Clearance Force

1 Infantry company
1 Engineer platoon (+)
LARP team
Airfield assessment team
1 Air Force CCT

Figure D-5. Sample task organization for FLS seizure/clearance operations

- Threat order-of-battle data base, to include typical obstacle materials on or around the FLS, should be maintained.
- A situation map with incidents in the area should be maintained to facilitate a pattern analysis.
- Intelligence updates should be provided to all TF leaders before forced-entry operations, to include 1:50,000 enemy situation overlay (situation template).

Maneuver

- The entire battalion TF conducts forced-entry operations by either a parachute or an air assault.
- The assault force conducts cordon-and-search operations, securing intermediate objectives that support or overwatch breach-force operations to eliminate long-range direct fires and observed indirect fires.
- The lead elements of the breach/clearance force initially conduct a hasty reconnaissance of the FLS to secure it, removing direct fires. Then the engineer platoon (-) conducts a deliberate sweep with the security provided by an infantry company.
- The support force is the reserve and provides security for the TF C2 elements and the brigade tactical CP. This force has the redundancy to breach/clear the FLS or to secure intermediate objectives, if required.

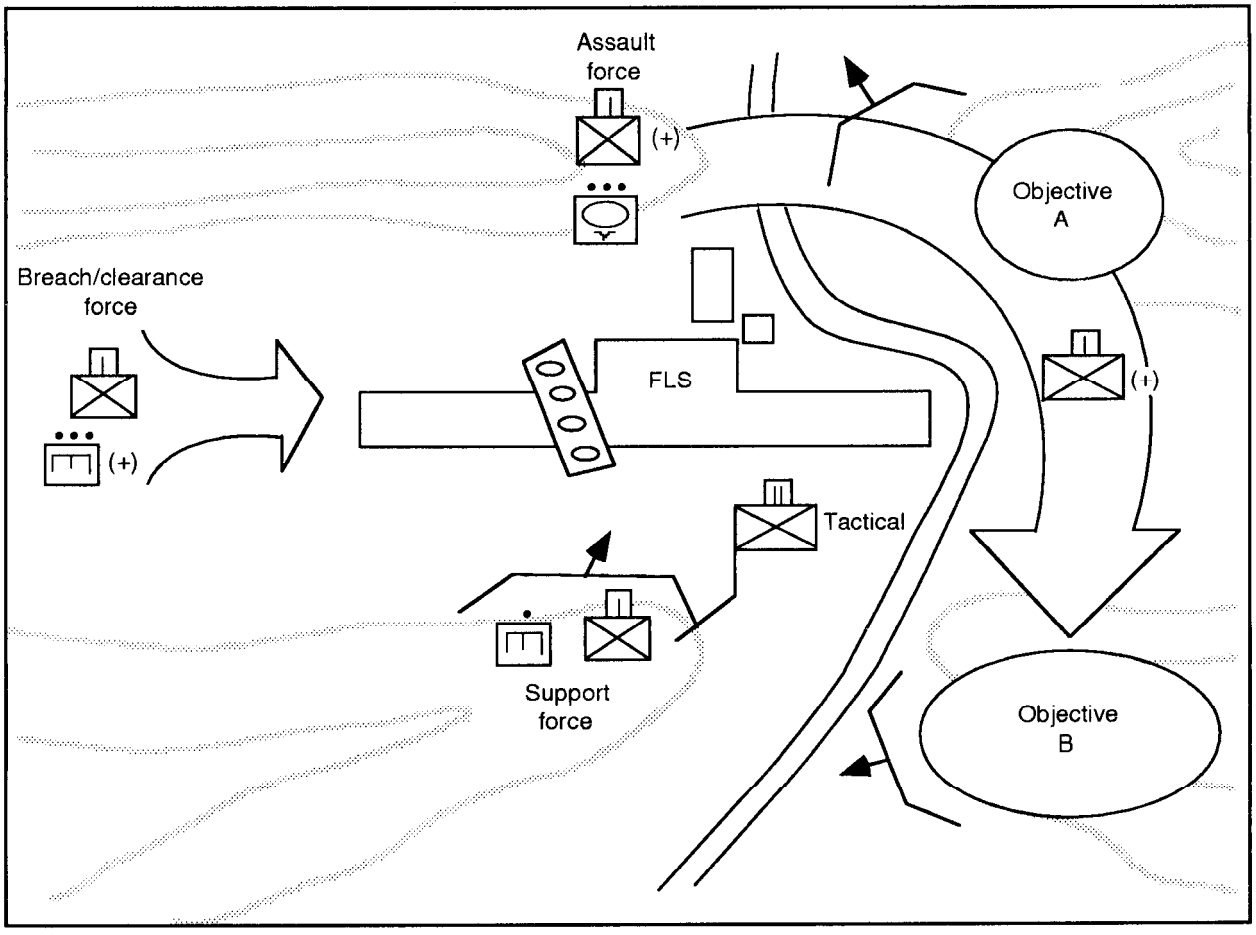

Figure D-6. FLS seizure/clearance operations

- In order to build up combat power in the AO, the critical mission for the battalion TF is to clear and maintain the FLS.
- Marking the FLS is according to the division TSOP and is coordinated with the Air Force CCTs. This should be covered in detail in coordinating instructions of the OPORD.

Fire Support

- Priority of fires will be with the assault force.
- Special consideration must be taken when planning the SEAD so the FLS is not damaged by friendly fires. To accomplish this, it may be necessary to place no-fire zones on the actual FLS.
- The company's 60-millimeter mortar section moves with their organic company, and the battalion's 81-millimeter mortar section sets up with the support force.
- The TF commander is responsible for clearing fire in the AO.

Mobility/Survivability

- OBSTINTEL should be developed early during the IPB. It must include the–

- Description of mines or explosive devices.
- Composition of obstacles (craters, ditches, or wire).
- Actions or techniques used by the enemy during emplacement.

- Initial reconnaissance elements should mark and report any obstacles encountered on or around the FLS. The CCT normally has this completed early.
- The priority of engineer effort should be directed toward opening a FLS long enough to land a C-130 (a minimum of 2,500 feet). Then they should clear the taxiways and turnaround apron.
- The engineer platoon masses to conduct a deliberate sweep of the FLS to ensure that all obstacles are identified and removed.
- The engineer platoon should organize the sweep teams similar to those in *Figure D-7*.
- The engineer platoon can clear a path 8 meters wide and 700 meters long in an hour, using a minimum of four mine detectors (see *Figure D-7a)*. If the platoon is task-organized with four additional mine detectors, it can clear a path 16 meters wide and 700 meters long in an hour (see *Figure D- 7b)*. This assists the sweep team by reducing the initial runway sweep to one deliberate pass.
- The mines that are identified are exploded in place, if possible.
- The LARP team moves behind the sweep team on the cleared FLS to repair any craters or holes in the FLS.
- The LARP team removes parked vehicles from the FLS by either "hot wiring" them or pushing them off with heavy equipment.
- The airfield assessment team assesses the FLS with the Air Force CCT during clearance operations to certify that the FLS is serviceable before any type of aircraft lands.
- The airfield assessment team continues to assess the FLS once the airfield is open to aircraft to determine the number of C- 130s that can land on the FLS before it needs maintenance.
- The engineers continue to sweep the turnaround apron area once the FLS is cleared. When the airfield sweep is complete, they sweep the proposed LOC.

AD Artillery

- Despite air supremacy, the possibility of air attack should be considered.

Combat Service Support

- No resupply is conducted until the FLS is clear.
- MEDEVAC is by air, once the FLS is clear. The ATLS team collocates with the support force and treats casualties until the FLS is opened.
- Fuel supplies could become critical if major repairs are needed on the FLS.

Command and Control

- The TF maintains a company-team reserve that is located with the support force.
- The engineers with the breach/clearance force report through the company team and back to the battalion the area and distance they have cleared.

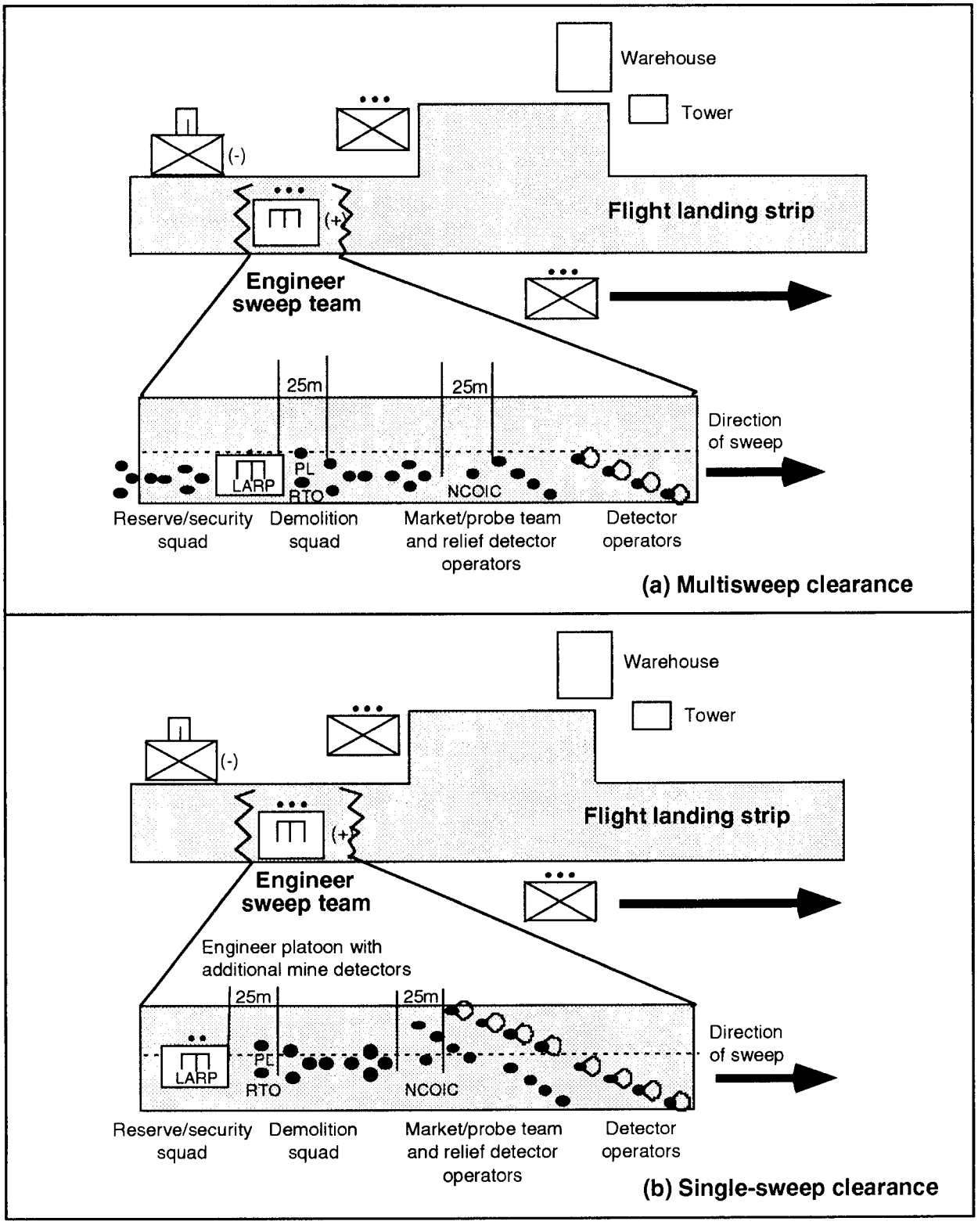

Figure D-7. FLS clearance-team operations

- FLS marking techniques need to be disseminated throughout the TF.
- Combined arms rehearsals should include–
  - Actions on the objective/obstacles.
  - Reaction to contact.
  - Reaction to near/far ambush.
  - Deliberate sweep operations.
  - COMEX.
  - Linkup with Air Force CCT.
  - Fire support.

Special Operations

- Intelligence updates should be obtained from SOF units in theater before conducting forced-entry operations.
- A PSYOP team should be employed to control and disperse civilians who could hinder FLS seizure/clearance operations.
- Holding areas should be established to control dislocated civilians.

REFERENCES

The FMs listed in *Figure D-8* provide additional information on FLS seizure/clearance operations.

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Figure D-8. References for FLS seizure/clearance operations

Glossary

lLT	first lieutenant
lSG	first sergeant
1st	first
2d	second
3d	third
A&B	assault and barrier
A&O	assault and obstacle
AA	avenue of approach
ACE	armored combat earthmover, M9
AD	air defense
ADA	air defense artillery
ADAM	area denial artillery munition
ADAO	air defense artillery officer
ADC	area damage control
ADP	automated data processing
AH	attack helicopter
AHB	attack helicopter battalion
AMB	air-mission brief

AO	area of operation
AP	antipersonnel
ASL	authorized stockage list
ASP	ammunition supply point
AT	antitank
AT-4	84 millimeter, light antitank weapon
ATP	ammunition transfer point
attn	attention
AVLB	armored vehicle-launched bridge
BHL	battle handover line
BMEC	brigade main engineer cell
bn	battalion
BOS	Battlefield Operating System
BP	battle position
BREC	brigade rear engineer cell
BSA	brigade support area
C2	command and control
CA	civil affairs
CCM	cross-country mobility
CCP	casualty collection point

CCT	combat control team
CDS	container delivery system
CEV	combat engineer vehicle
CI	counterintelligence
CO	commanding officer
COA	course of action
COMEX	communications exercise
COMSEC	communications security
CONUS	continental United States
COSCOM	corps support command
CP	command post
CS	combat support
CSA	corps support area
CSE	combat support equipment
CSG	combat service group
CSR	control supply rate
CSS	combat service support
DA	Department of the Army
DATK	deliberate attack
DISCOM	division support command
DIVEN	division engineer

DS	direct support
DSA	division support area
DST	decision support template
DTED	digital terrain elevation data
DTG	date-time group
DZ	drop zone
EA	engagement area
EAD	echelons above division
EBA	engineer battlefield assessment
EM	enlisted men
engr	engineer
EOD	explosive ordnance disposal
EPW	enemy prisoner of war
equip	equipment
FA	field artillery
FAA	forward assembly area
FACE	forward aviation combat engineering
FARP	forward area rearm/refuel point
FASCAM	family of scatterable mines
FEBA	forward edge of the battle area

FLA	front line ambulance
FLOT	forward line of own troops
FLS	flight landing strip
FM	field manual; frequency modulated
FOB	forward operating base
FRAGO	fragmentary order
freq	frequency
FSB	forward support battalion
FSCL	fire-support coordination line
FSCOORD	fire-support coordinator
FSO	fire-support officer
FSP	forward supply point
G2	Assistant Chief of Staff, G2 (Intelligence)
G3	Assistant Chief of Staff, G3 (Operations and Plans)
GS	general support
GSR	ground surveillance radar
HATK	hasty attack
HHC	headquarters and headquarters company
HMMWV	high mobility, multipurpose wheeled vehicle
HN	host nation
HQ	headquarters

HUMINT	human intelligence
HVT	high-value target
INTSUM	intelligence summary
IPB	intelligence preparation of the battlefield
IR	intelligence requirements
ISB	intermediate staging base
JAAT	joint air attack team
JTF	joint task force
LAPES	Law Altitude Parachute Extraction System
LARP	light airfield repair package
LAW	light antitank weapon
LD	line of departure
LEC	light equipment company
LO	liaison officer
LOC	lines of communication
LOGPAC	logistical package
LOGSTAT	logistical status
LT	light
LZ	landing zone

m	meter
M/CM/S	mobility, countermobility, and survivability
M/S	mobility and survivability
MAF	Marine amphibious force
MBA	main battle area
MC	mobility corridor
MCOO	modified combined obstacle overlay
MEDEVAC	medical evacuation
MEE	mission-essential equipment
METT	mission, enemy, terrain, and troops
METT-T	mission, enemy, terrain, troops, and time available
MI	military intelligence
MICLIC	mine-clearing line charge
MOPMS	Modular Pack Mine System
MOUT	military operations on urbanized terrain
MP	military police
MRB	motorized rifle battalion
MRE	meals, ready-to-eat
MRR	motorized rifle regiment
MSB	main support battalion
MSR	main supply route
MTC	movement to contact

MTOE	modified table of organization and equipment
MTP	mission training plan
NA	not applicable
NAI	named area of interest
NBC	nuclear, biological, and chemical
NCO	noncommissioned officer
NCS	net control station
NVD	night-vision device
OBSTINTEL	obstacle intelligence
OCOKA	observation and fields of fire, cover and concealment, obstacles, key terrain, avenues of approach
OCONUS	outside the continental United States
OIC	officer in charge
OMF	obstacle/mine/fortification
OOTW	operations other than war
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
OPSEC	operational security
OPTEMPO	operational tempo
org	organization

PAC	Personnel and Administrative Center
PCI	precombat inspection
PIR	priority intelligence requirements
PL	phase line
PLL	prescribed load list
POL	petroleum, oils, and lubricants
PP	passage point
pri	priority
PSC	personnel services company
PSYOP	psychological operations
PZ	pickup zone
Q-36	A target acquisition asset used to acquire indirect-fire targets by using its weapons- locating radar
R&S	reconnaissance and surveillance
RAAM	remote antiarmor mine
RFI	request for information
ROE	rules of engagement
RRP	replacement receiving point
RRR	rapid runway repair
RTO	radio/telephone operator
S1	Adjutant (US Army)

S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
SALUTE	size, activity, location, unit, time, and equipment
SAM	surface-to-air missile
SCATMINE	scatterable mine
SEAD	suppression of enemy air defense
SEE	small emplacement excavator
SMAW	shoulder-launched, multipurpose assault weapon
SME	subject matter expert
SOF	special operations forces
SOI	signal operation instructions
SOP	standing operating procedure
SOSR	suppress, obscure, secure, and reduce
SPT	support
sptd	supported
ST	student text
TACON	tactical control
TAI	targeted area of interest
TF	task force
TLP	troop-leading procedures

TNT	trinitrotoluene
TOE	tables of organization and equipment
TOW	tube-launched, optically tracked, wire-guided
TSOP	tactical standing operating procedure
TTP	tactics, techniques, and procedures
UAV	unmanned airborne vehicle
us	United States
UXO	unexploded ordnance
WARNORD	warning order
XO	executive officer

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FM 5-7-30
28 DECEMBER 1994

By Order of the Secretary of the Army:

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General, United States Army
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07589

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