

## CHAPTER 1

# Engineer Operations and the Division Battlefield

*The division is the US Army's largest, fixed organization that trains and fights as a tactical team. It is organized with various combat, combat support (CS), and combat service support (CSS) units that make up the combined arms team. A division may be armored, mechanized infantry, light infantry, airborne, or air assault. It is a self-sustaining force capable of independent operations, even for long periods of time, when properly reinforced. Each type of division conducts tactical operations in a low-, mid-, or high-intensity environment. Divisions are the basic units of maneuver at the tactical level.*

*The division engineer organization (DIVEN) focuses on maneuver at the tactical level. Organic division engineers execute mobility, countermobility, survivability, topographic, and limited sustainment engineering missions to support maneuver in the division area. The division engineer integrates nonorganic and corps engineer assets into the division to augment these capabilities as the battlefield dictates. The structure of division engineers allows them to fight as part of the division's combined arms team.*

## ROLE OF DIVISION ENGINEERS

Division engineers serve two critical roles for the division. First, they provide engineer expertise at every echelon of command from the division to the company or team. Second, they provide the structure necessary to command engineer units at these echelons. Both of these roles involve the five engineer battlefield functions: topographic, mobility, countermobility, survivability, and sustainment engineering. As

a combat multiplier, engineer units focus on maintaining the division's freedom of maneuver and attacking the threat's freedom to maneuver on the battlefield. As part of the division staff, the division engineer focuses on integrating and synchronizing engineer missions to support the division commander's intent and scheme of maneuver.

## ENGINEER ORGANIZATIONS

DIVEN organizations are specifically tailored to provide the support necessary to complement the division's capabilities and employment.

### Armored and Mechanized Infantry Divisions

Armored and mechanized infantry divisions (henceforth discussed together under the term *armored division*) provide mobile,

armor-protected firepower. They destroy threat armored forces and seize and control land (including population centers and resources) with long-range and flat-trajectory fires. Armored divisions operate best in relatively open terrain where they can use mobility and long-range, direct-fire weapons to their best advantage. The armored division typically has three ground-maneuver brigades (consisting of tank and mechanized infantry battalions) and an aviation brigade.

The armored division has an organic engineer brigade consisting of three mechanized engineer battalions and a headquarters and headquarters detachment (HHD). Each battalion is normally habitually associated with a ground-maneuver brigade. The DIVEN HHD provides centralized command and control (C2) and planning for the total division engineer effort. The DIVEN commander task organizes division engineer companies and corps assets into forward combat engineer battalions. Each battalion habitually trains and operates with its associated ground-maneuver brigade. The DIVEN commander may detach companies from one battalion to another division engineer battalion (main effort) or to another maneuver unit (cavalry (CAV) squadron). Figure 1-1 shows engineers organic to the armored division and the generic engineer task organization for division defensive and offensive operations.

### **Light Infantry Division**

Due to its ability to deploy, the light infantry division provides the flexibility to rapidly accomplish missions on a global basis. It has the ability to operate in terrain or against a threat unsuitable for armored forces. The division conducts operations by exploiting the advantages of restricted terrain and limited visibility. In mid- to high-intensity conflicts, the light division can be augmented with armored forces. Based on the factors of mission, enemy, terrain, troops, and time available (METT-T), a light infantry brigade (with the appropriate CSS

augmentation) can be task organized to an armored division. The division is designed to conduct autonomous operations for up to 48 hours. The light infantry division typically has three ground-maneuver brigades (three light infantry battalions) and an aviation brigade.

The light infantry division has an organic light engineer battalion. The division light engineer battalion focuses on supporting the division's fight by task organizing elements of his assault and obstacle (A&O) platoon, combat engineer companies, and corps assets. The task organization of division light engineers depends on METT-T and requires much more flexibility. Division light engineers must be concentrated at the critical place and time under centralized control. For example, two division engineer companies could be massed to one maneuver brigade or one division engineer company massed to an infantry battalion if METT-T dictates this level of support. Austere division light engineer companies require augmentation for extended operations. Figure 1-2, page 1-4, shows engineers organic to the light infantry division and generic engineer task organization for division defensive and offensive operations.

### **Airborne Division**

The airborne division can rapidly deploy anywhere in the world. It conducts airborne assaults in the enemy's rear to secure terrain, interdict routes of resupply, or interdict enemy withdrawal routes. It is ideally suited to seize, secure, and repair airfields and to provide a forward operating base for follow-on forces. The airborne division may be the initial force for contingency operations, and it secures the necessary lodgment for force buildup. The division consists of three ground-maneuver brigades (each with three airborne infantry battalions) and an aviation brigade.

The airborne division has one organic division airborne engineer battalion. The division engineer battalion focuses on

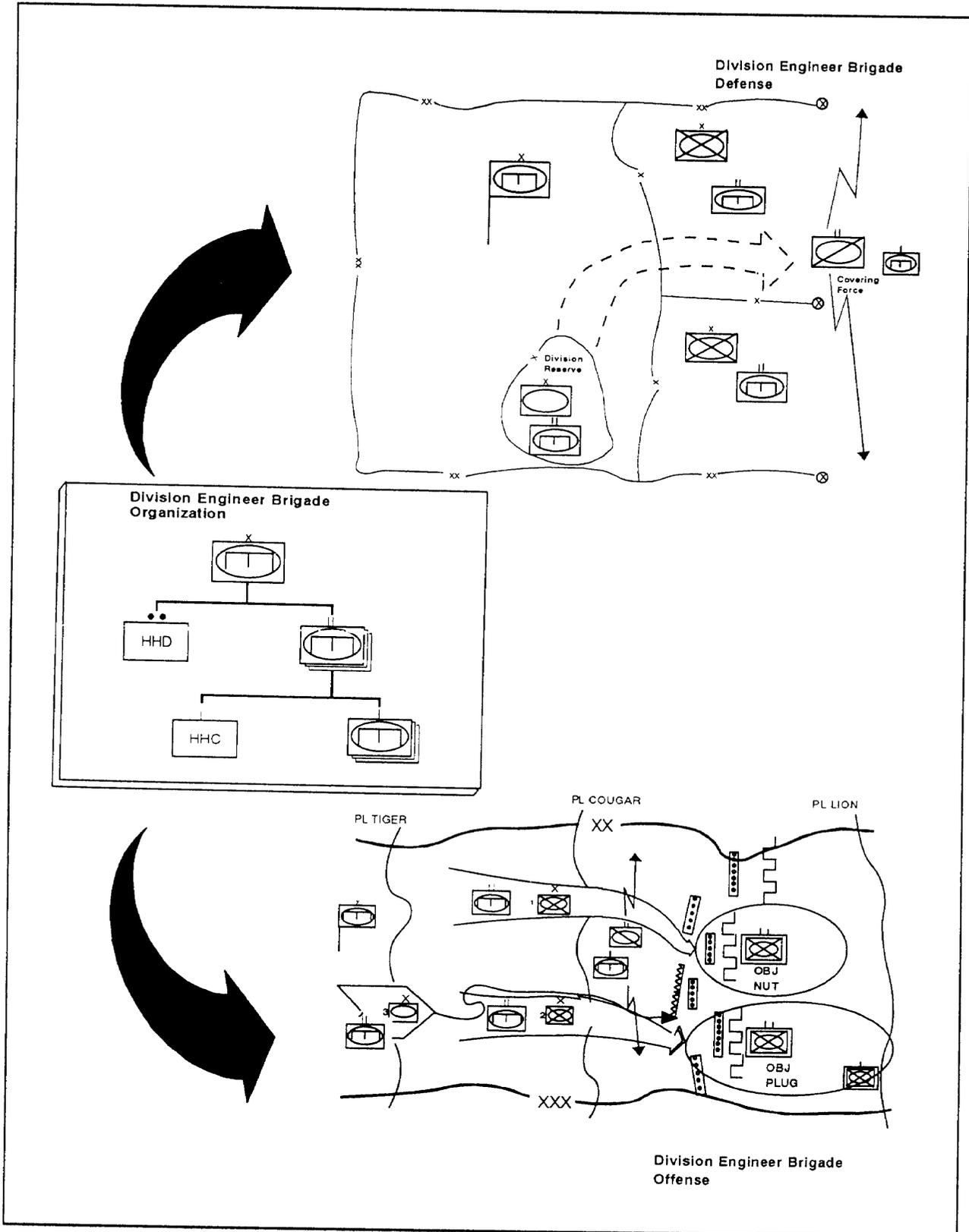


Figure 1-1. DIVEN laydown

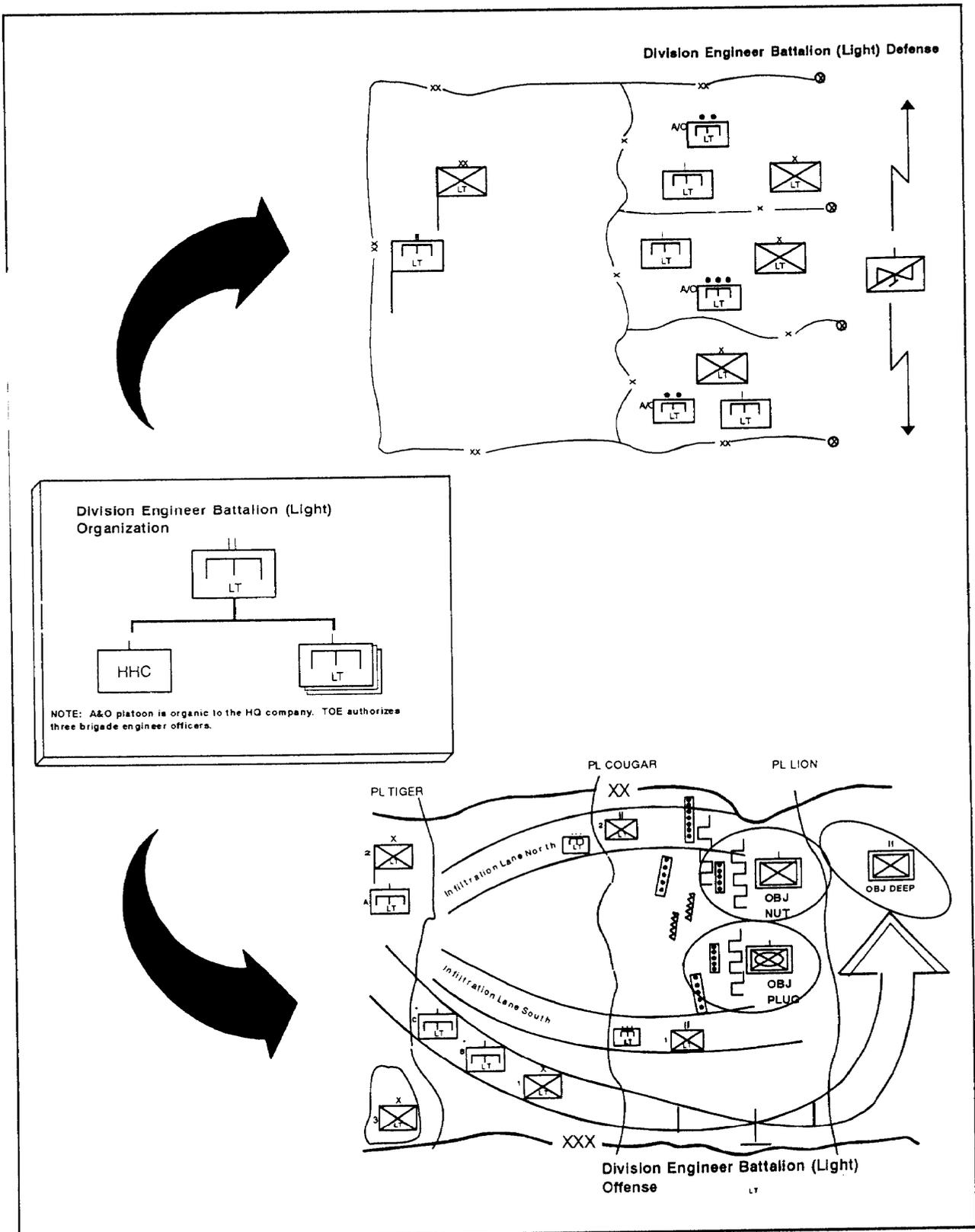


Figure 1-2. Division engineer battalion (light) laydown

supporting the division's fight by task organizing the A&O platoon, combat engineer companies, and corps assets. The task organization of division airborne engineers depends on METT-T and requires flexibility. Division airborne engineer battalions are austere organizations. Organic assets, such as small emplacement excavators (SEEs), Volcanos, and engineer squad vehicles, allow the airborne division engineer battalion to conduct short-term operations. For extended operations, the division airborne engineer battalion normally requires corps augmentation. Figure 1-3, page 1-6, shows engineers organic to the airborne infantry division and the generic engineer task organization for a division offensive and securing an airhead.

### **Air Assault Division**

The air assault division combines strategic mobility with an extremely high degree of tactical mobility within its area of operations (AO). Once on the ground, the air assault

division fights like an airborne or infantry division; however, their air mobility permits rapid aerial deployment and redeployment. The air assault division has more ground and aerial antiarmor assets than other light infantry divisions. The air assault division consists of three ground-maneuver brigades (having three air assault infantry battalions each) and an aviation brigade.

The air assault division has one division air assault engineer battalion. The division air assault engineer organization is similar to the division airborne engineer organization. However, the division air assault engineer battalion has enhanced tactical mobility due to the air mobility assets organic to the division. It also has additional haul assets organic to the engineer company. Figure 1-4, page 1-7, shows engineers organic to the air assault infantry division and the generic engineer task organization for division offensive and hasty defensive operations after a deep strike.

## **CORPS ENGINEER SUPPORT**

DIVEN organizations satisfy the most immediate engineer requirements for the division's close operations. However, the division requires corps-level augmentation for engineer mobility missions such as bridging and large-scale breaching operations, intense counter mobility and survivability missions associated with deliberate defenses, and any significant rear missions such as sustainment engineering support for aviation units and support areas. The division engineer considers the available engineer support from corps in order to fully plan and execute engineer missions in the division's sector. A division can be allocated a wide variety of engineer organizations that are structured to suit the division's needs.

**Corps Engineer Brigade.** The corps combat engineer brigade is a large, flexible organiza-

tion structured to provide engineer C2 at corps level, beginning with a contingency and going through a force projection to a fully developed corps AO. It contains all of the specialized engineer units, engineer battalions, and engineer group headquarters required to support corps-level operations. The mix and type of units assigned to the corps engineer brigade is determined by the number and types of divisions that make up the corps and by METT-T. In many cases, engineer units from echelons above corps (EAC) will be task organized to the corps engineer brigade. See Figure 1-5, page 1-8, for a sample corps engineer brigade assigned to a corps consisting of one light infantry division, three armored divisions, and an armored CAV regiment.

**Combat Engineer Group.** An engineer group is a flexible C2 headquarters with

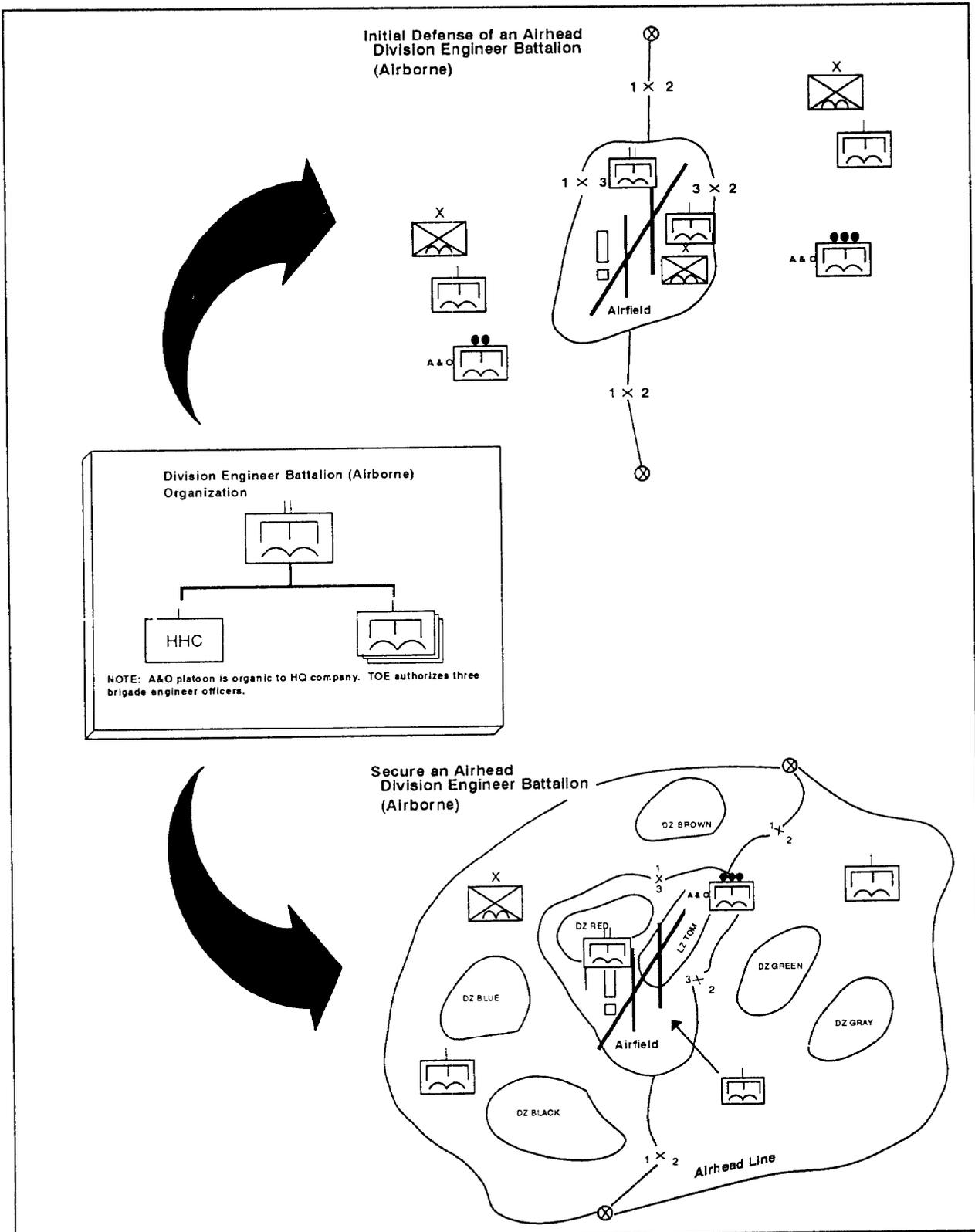


Figure 1-3. Division engineer battalion (airborne) laydown

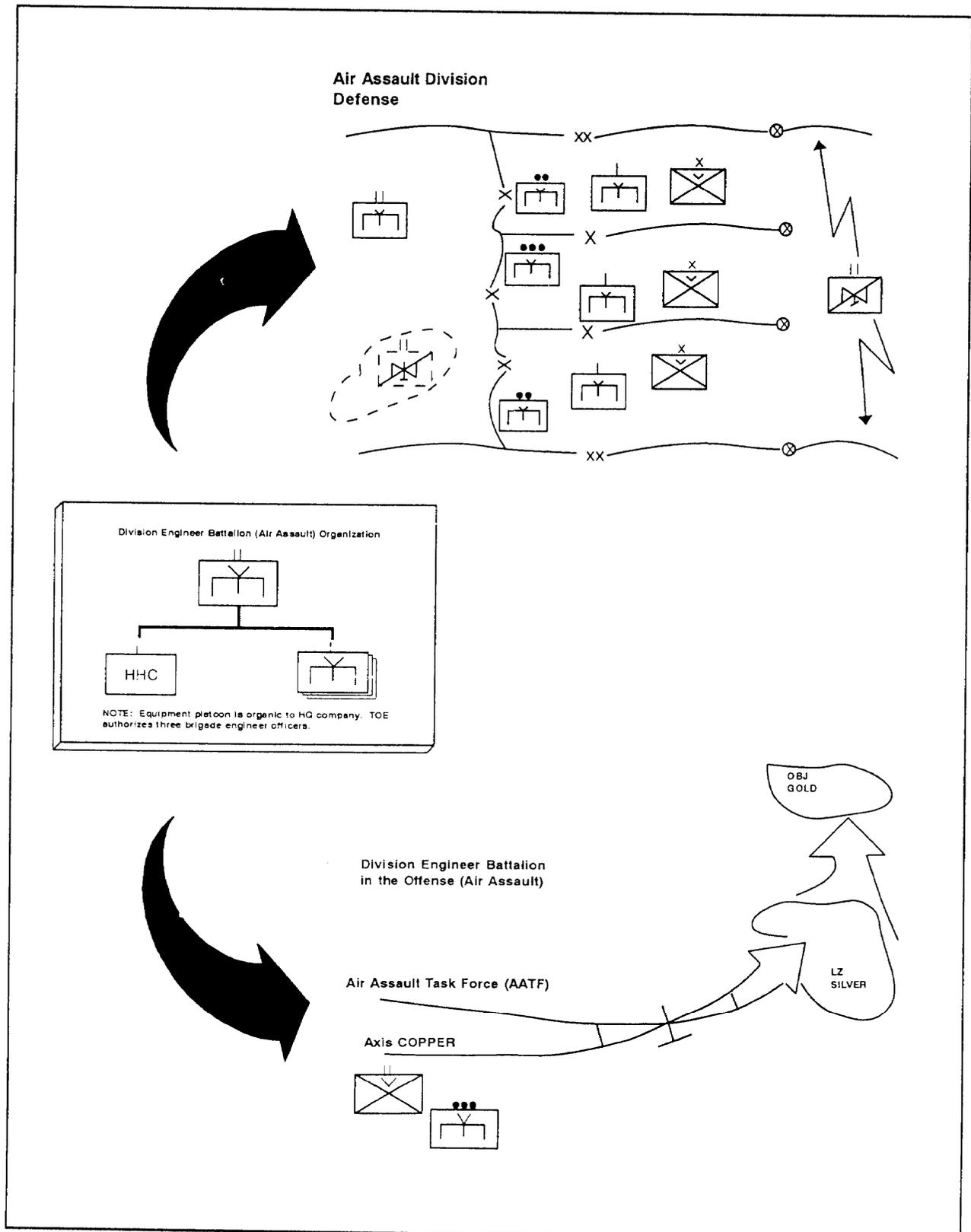


Figure 1-4. Division engineer battalion (air assault) laydown

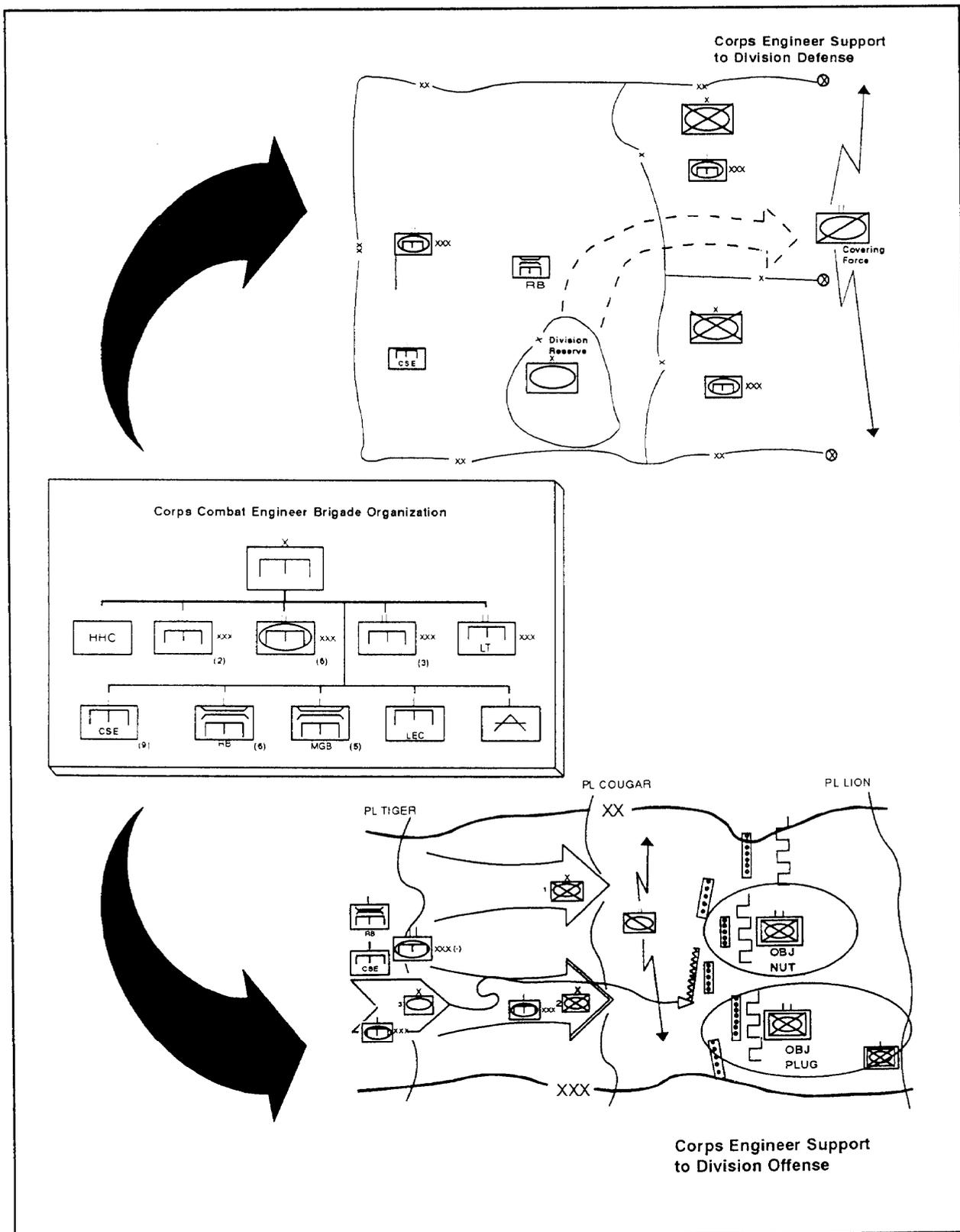


Figure 1-5. Corps engineer units augmenting DIVENS (armored division)

engineer battalions and companies assigned to it based on the analysis of METT-T.

Engineer groups are primarily designed to support divisions. In such a role, the group may become the engineer headquarters for a light division when the division receives significant augmentation from the corps engineer brigade. The group may also become the engineer headquarters for a special-purpose mission, such as a river-crossing operation, for either light or armored divisions. When not required for a front-line mission, the group normally assumes responsibilities in the corps or division rear, where it directs engineer missions supporting corps units such as the corps aviation brigade, corps artillery, and corps support command.

When the combat engineer group enters the division sector, it comes under the control of the division. The division engineer advises the division commander on the best way to use the group. This pertains to both

light and armored forces. In special cases, the division commander may transfer DIVEN organizational responsibilities to a combat engineer group that has been task organized to the division on a long-term basis. Normally, this is only done for airborne, air assault, or light divisions when corps engineer augmentation surpasses the C2 capability of the DIVEN battalion headquarters.

A combat engineer group is used most frequently within a division to act as a headquarters for all corps combat engineers, bridge companies, combat support equipment (CSE) and light equipment companies (LECs), and EAC units such as combat-heavy battalions that have been task organized to a division on a mission basis.

Typical corps engineer organization support and laydown for armored and light divisions are depicted in Figure 1-5 and Figure 1-6, page 1-10. (See Figures 1-1 through 1-4, pages 1-3 through 1-7, for DIVEN assets.)

## CLOSE, DEEP, AND REAR OPERATIONS

Since the location of engineer functions on the battlefield dictates different planning requirements, coordination, and execution techniques, division engineer leaders must understand the relationship between engineer functions and close, deep, and rear operations (Figure 1-7, page 1-11).

### Close Operations

A division's close operations include the simultaneous close, deep, and rear operations of its subordinate brigades and battalions. The outcome of the division's close operations will ultimately determine the success or failure of the division battle. Deep and rear operations are focused primarily on creating conditions favorable for winning the close operation.

Close operations are usually the main effort for division engineer planning and execution. The elements of combat power (maneuver, firepower, protection, and leadership) are critical for success in close operations. They are also essential to understanding the dual roles of the DIVEN commander as a division staff officer and the DIVEN organization commander.

The division engineer plans, coordinates, and synchronizes mobility and counter-mobility operations to ensure the division freedom to maneuver. Mobility and counter-mobility operations also increase and protect division firepower. This preserves the division's freedom of action, reduces friendly force vulnerability, and helps gain the advantage of position. The division engineer also plans, coordinates, and

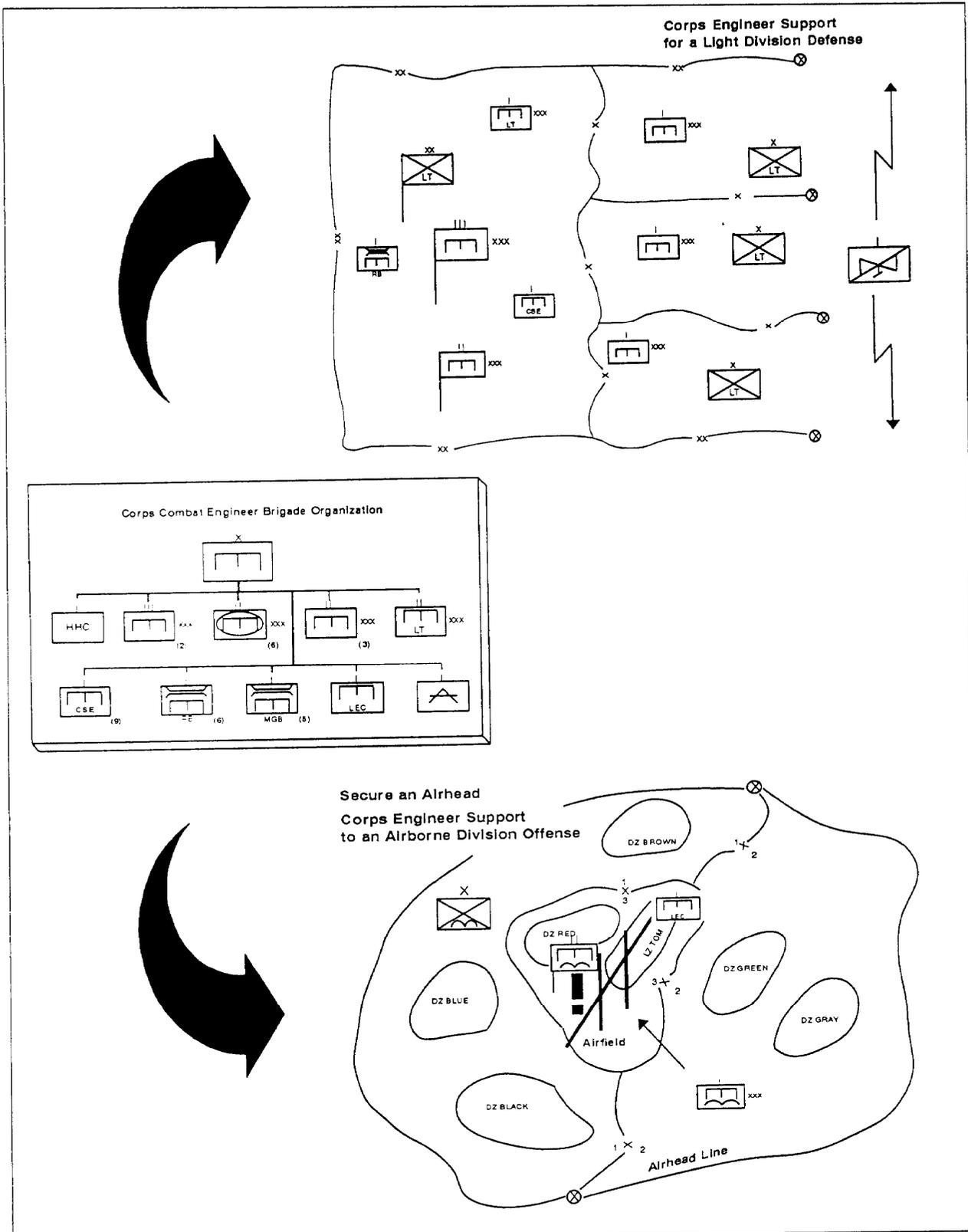


Figure 1-6. Corps support to light forces operations

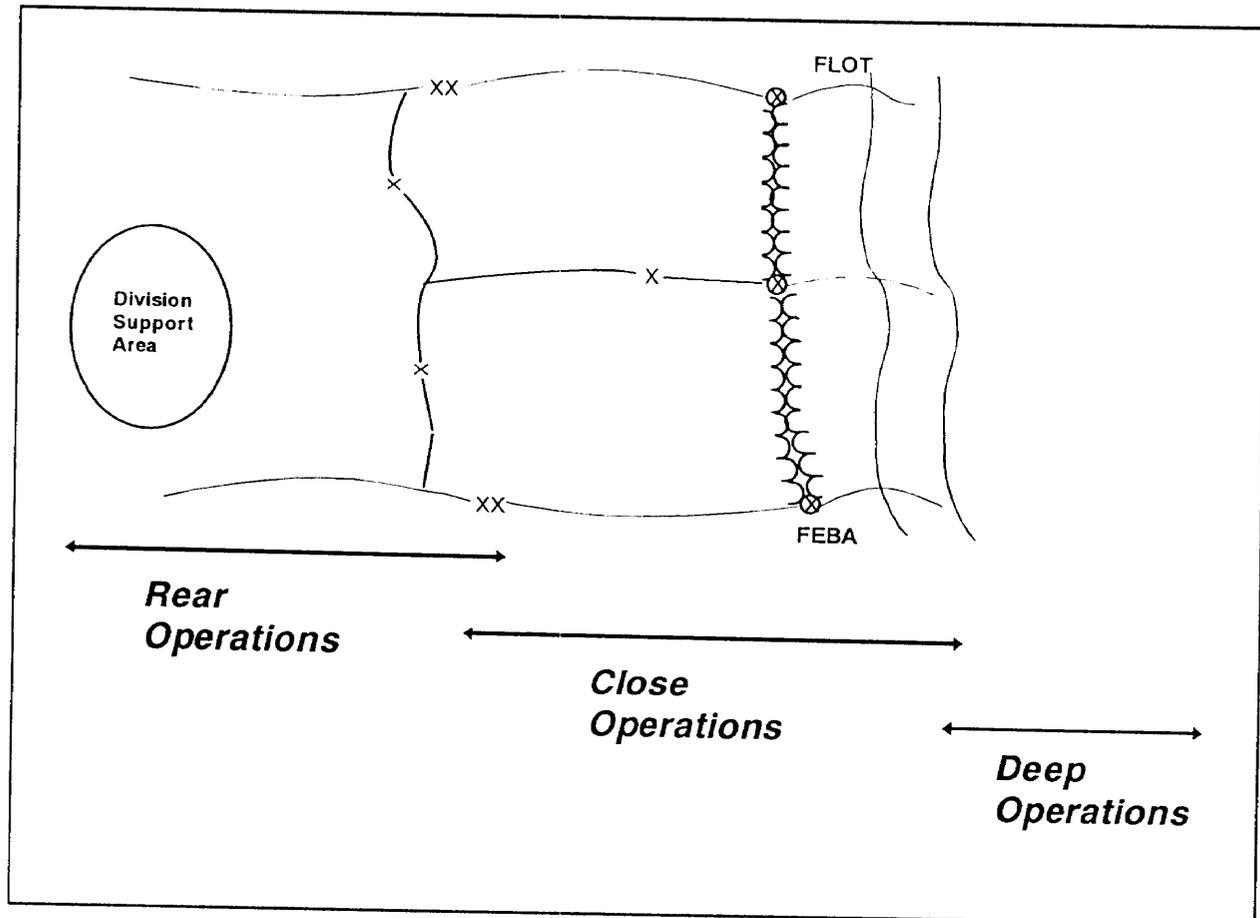


Figure 1-7. Battlefield framework

synchronizes survivability operations to support the protection of division forces. This ensures that division forces have adequate fighting positions and camouflage, can reposition and resupply, and can conduct deception operations as necessary. Finally, the division engineer enhances division leadership by being technically and tactically competent. This enables him to provide purpose, direction, and motivation for the engineer forces operating for the division during combat.

Division engineer units perform a significant role in enhancing the elements of combat power at the tactical level. Division engineers enhance maneuver by breaching obstacles to preserve freedom of movement and by placing obstacles to gain the advantage of position. They affect firepower

by properly integrating obstacles with direct- and indirect-fire systems and fire-control measures. Division engineer units protect division forces by providing technical expertise and labor, augmented by the supported force, to construct survivable firing positions for weapon systems, fortifications, protective obstacles, and strongpoints. All missions carried out by division engineer units increase the division's war-fighting capability. This gives individual soldiers confidence in the division plan and, ultimately, confidence in their leaders.

## Deep Operations

The division engineer's effort in deep operations focuses on disrupting the timing of committed threat forces, shaping future close operations, and preventing or hinder-

ing enemy uncommitted forces or resources from influencing the close operation. The division engineer plans for deep operations by supplementing the commander's intelligence preparation of the battlefield (IPB) process and by the employment of engineer assets. Supplementing the IPB involves extensive terrain analysis (topographic engineering) and high-value target (HVT) analysis or nominations. The employment of engineer assets focuses on situational obstacle planning and on using scatterable mines against HVTs or along critical choke points. If deep operations include the use of ground forces (such as a raid or securing an airfield), engineer forces must be integrated where required. In support of this deep operation, division engineers conduct breaching, assault bridging, lane marking, forward aviation combat engineering support, and counter mobility support for a hasty defense.

### **Rear Operations**

Division engineers support the division commander's intent for rear operations by ensuring the freedom of maneuver and the continuity of operations through sustainment. They rely heavily on additional corps engineer support. The division engineer integrates and synchronizes mobility and sustainment engineering operations for lines of

communication (LOC) construction and maintenance, survivability of critical C2 nodes or assets, and countermobility for base cluster defenses.

Division engineers upgrade main supply routes (MSRs) and other routes for movement of sustainment and C2 traffic and for repositioning the division's reserves and fire support. Numerous other sustainment activities (such as facilities maintenance and construction for CSS and aviation) require engineer support in case of rear area damage. Engineers assist the supported unit in constructing fortifications, protective obstacles, and hasty fighting positions for critical C2 nodes, CS or CSS organizations, and base cluster defenses.

Engineers support the division by providing assets to enhance force protection. Force protection involves those protective measures (predetonation fences cover-from-view screens; sacrificial areas, walls, and roofs; blast zones; barricades; and building evaluations) taken against low-level threats or typical terrorist acts. For countermobility operations, engineers not only advise units but also construct obstacles in support of base cluster defenses.

## **DIVISION ENGINEER ROLE IN THE BATTLEFIELD OPERATING SYSTEM**

The division engineer must understand the battlefield operating systems (BOSs) and his role in support of each system. It is this role that drives the interaction between the division engineer and other combined arms staffs and helps to identify engineer missions supporting all facets of the division plan. A complete understanding of the BOS is essential for synchronization of engineer operations and unity of effort.

### **Intelligence**

Division intelligence assets provide the capability to locate and attack the threat in support of close, deep, and rear operations. The IPB is the major product resulting from the planning process that links the intelligence BOS with other operating systems. The IPB orients all planning and execution for the division. The division engineer uses

the engineer battlefield assessment (EBA) to provide input to the IPB. He focuses on terrain analysis and the threat's mobility, countermobility, and survivability capabilities. The division's terrain detachment plays a key role in assisting the IPB and developing terrain products for the EBA and IPB processes. The division engineer nominates named areas of interest (NAIs) and priority intelligence requirements (PIRs) to the Assistant Chief of Staff, G2 (Intelligence) (G2) to confirm or deny critical engineer characteristics of the enemy situation and terrain.

Engineer forces can act as an intelligence collection asset for technical or tactical reconnaissance. Technical reconnaissance missions focus on collecting information about a target, area, or route. This type of reconnaissance gathers engineer information about the target without regard to the enemy. It is usually conducted under a low-level threat and in areas physically controlled by friendly forces. Engineer forces can anticipate the following technical reconnaissance missions: river crossing (unopposed), engineer resource, bridge, route and road, forward landing strip, tunnel, ford and ferry crossing (unopposed), and water resource.

Division engineers supplement the combined arms reconnaissance effort through tactical reconnaissance. Tactical reconnaissance is conducted against a target in areas where enemy contact is likely and the reconnaissance mission is an integral part of confirming or denying the IPB. Division engineers can anticipate the following tactical reconnaissance missions: enemy obstacle, enemy engineer activity, river, landing zone (LZ) or pickup zone (PZ), terrain specific, situational obstacle locations, reserve or directed obstacles (bridge demolitions and road craters), and military operations on urbanized terrain (MOUT) (building evaluations and utility facility reconnoiters). For tactical reconnaissance, division engineers are normally task organized to maneuver reconnaissance elements.

## Maneuver

Maneuver at division level places or moves battalion- and brigade-size combat forces into positions where they can bring direct and indirect fires to bear on the enemy with the greatest effectiveness. The relationship of engineer functions and maneuver differs significantly in the offense and the defense. However, a common thread in the two missions is enhancing the division's ability to concentrate combat power.

In the offense, the division engineer focuses on mobility with river-crossing and breaching operations. This enables the division to go where it wants to and concentrate combat power against a threat weakness or create a weakness. The engineer's planning and integration impact on the total scheme of maneuver. For example, the force allocation ratios for the breach organization (support, breach, and assault forces) and the synchronization of the breaching fundamentals (suppress, obscure, secure, and reduce (SOSR)) have a direct impact on the task organization and subordinate breaching tasks. The division engineer also plans for counter mobility support to protect the flanks with situational obstacles and for the transition to a hasty defense.

In the defense, the division engineer focuses on mobility, countermobility, and survivability operations. This allows the division to fight from survivable positions against the threat's fires and to use obstacles to attack the threat's ability to maneuver. The combination of the two allows the division to mass fires to complete the threat destruction. The division engineer plans obstacle zones that are tied directly to the division's maneuver scheme. The division commander's intent provides focus to the countermobility effort. It also provides the necessary obstacle control for tactical repositioning.

Engineer forces breach enemy obstacles, clear routes, construct tactical and protective obstacles, build fortifications, and

construct fighting positions. All activities are directly related to and supportive of the decisive commitment of combat power.

## **Mobility and Survivability**

Mobility and survivability (M/S) operations provide mobility to division units; degrade the enemy's ability to move on the battlefield; and provide protection to division personnel, equipment, and supplies.

The M/S BOS requires the combined efforts of all combat, CS, and CSS forces. Missions in this BOS are not the total responsibility of the engineer force. Conducting a breach operation is an example of a mobility mission requiring a total combined arms effort. Engineer involvement is only one aspect of the operation (reduction of lanes through the obstacle). The bulk of support requires the synchronized effort of all arms to suppress, obscure, and secure the obstacle. Emplacing fighting positions is an example of a survivability mission. While engineers provide the equipment and soldiers to construct the positions, the type and level of survivability is largely based on the Intelligence Officer's (US Army) (S2's) analysis of the threat and the maneuver commander's priorities. Furthermore, while the engineer digs the position, the location and orientation of each position are based on the direction of the team commander.

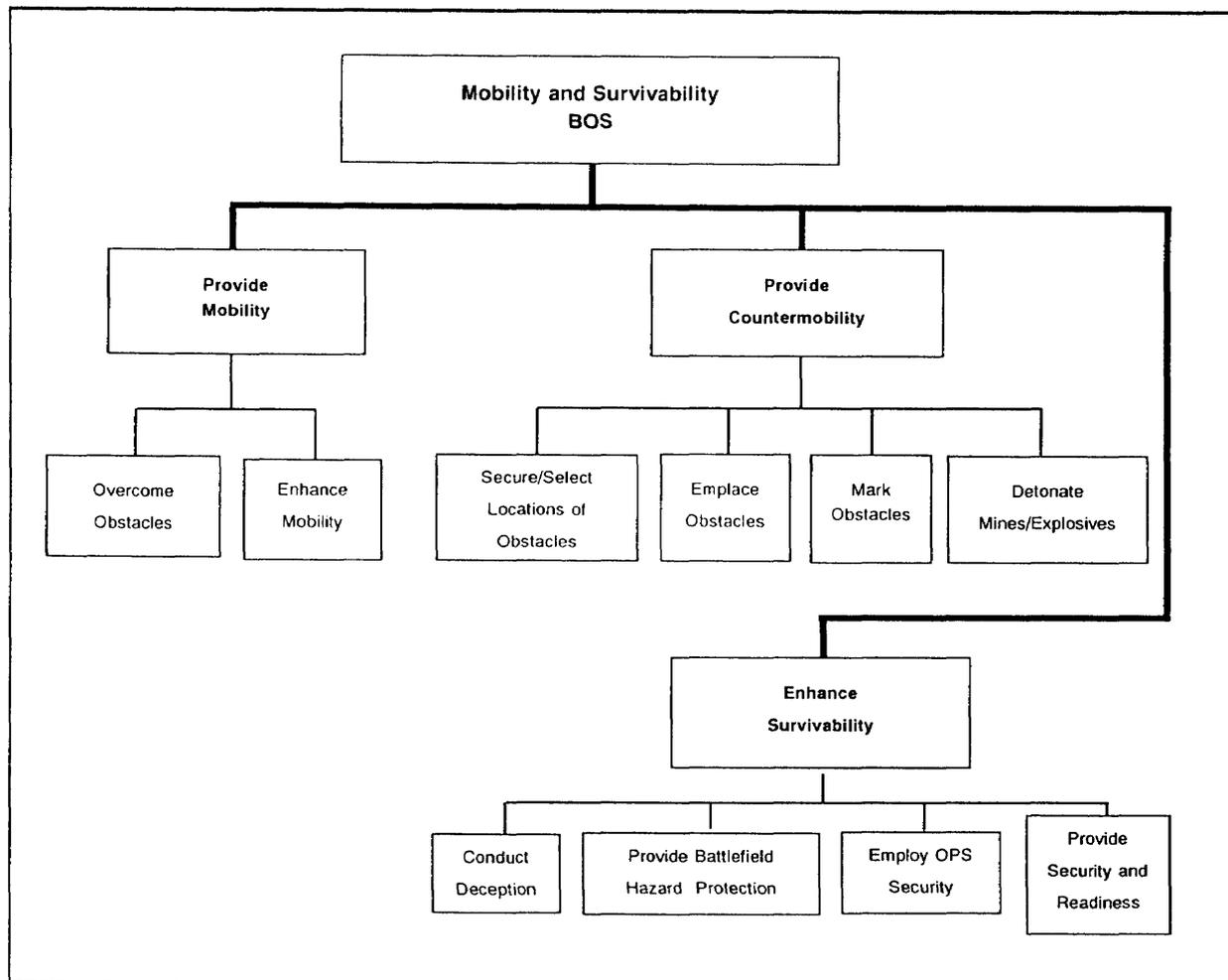
The division engineer has two roles in the M/S BOS. The first is to advise the division headquarters on M/S operations. The second is to assess and assign engineer missions in support of this BOS, as well as all other BOSs. Figure 1-8 illustrates some of the engineer tasks that support the M/S operating system. Chapters 3, 4, and 5 discuss both the division engineer's functions and engineer unit missions in support of the M/S BOS for offensive, defensive, and other tactical operations.

## **Fire Support**

Fire support integrates the full range of fire-support systems to support the division's maneuver scheme and to preserve freedom of maneuver by fighting deep, close, and rear operations. Overwhelming counterfire is also a critical element of fire support. The challenge to the division engineer is the timely and effective integration of the engineer battlefield functions. Offensive and defensive operations have different fire support integration concerns with engineer missions.

In the offense, the division engineer focuses integration efforts with fire support in three areas: suppression, obscuration, and counterfires. For breaching operations, suppression is the massing of all available fires on threat personnel, weapons, or equipment. The division engineer coordinates indirect fires to isolate the breaching site and to protect the breach force. He ensures that well-synchronized fire-control measures are planned for timely massing, lifting, and shifting. Obscuration hampers the threat's observation and target acquisition and conceals friendly activities and movement. The division engineer coordinates 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 in on the enemy and makes the initial penetration. The division engineer coordinates fire-support counterfires with breaching and river-crossing operations during critical periods of vulnerability. This protects the combat power of support, breach, and assault forces.

In the defense, the division engineer focuses on integrating obstacle effects and indirect fires. For each obstacle effect, specific integration techniques of indirect fires are required. For example, to achieve a disrupt obstacle effect, the engineer coordinates indirect fires to cover the obstacles while direct fires target the bypass. In contrast, to



*Figure 1-8. M/S battlefield operating system*

achieve a turn effect, artillery groups are massed at the point at which the turn is to be initiated and then throughout the rest of the obstacle effect. The division engineer ensures the scheme of fires and obstacles are mutually supportive.

The division engineer also coordinates with the fire-support representative regarding the use of indirect-fire assets to deliver scatterable mines and situational obstacles. While the field artillery delivers some types of scatterable mines, the engineer is the principal advisor to the maneuver commander for the tactical employment of all scatterable mines, regardless of the means of delivery. The engineer, in conjunction

with the operations and fire-support officers, plans and coordinates the employment of scatterable mines and the fires that cover them. Field artillery scatterable mines may be used to employ situational obstacles. Again, the engineer plans and coordinates the employment of situational obstacles in conjunction with the operations and fire-support officers.

Engineer forces assist fire-support assets in several ways. Providing mobility support for repositioning artillery assets is critical for their survivability against the threat's counterfire efforts. Constructing survivable firing positions for artillery assets is another engineer function. Constructing survivable

artillery firing positions becomes a high priority for light forces due to their lack of artillery mobility. Forward aviation combat engineering is another concern of preserving the fire support.

## **Air Defense**

Air defense (AD) degrades or reduces the effects of enemy air attack on friendly units, supplies, and facilities. The division engineer coordinates this protection with M/S functions. He focuses integration efforts in three distinct areas. The first area is AD protection for critical engineer assets, such as the Class IV/V (obstacle) supply point, concentrations of engineer construction equipment, and tactical bridging assets. The second area is coordinating AD protection of large formations at critical choke points, such as during breaching and river-crossing operations. The third area for coordination is AD protection for engineer forces. The division engineer must be able to interface with the AD officer on integration issues in terms of vulnerability, criticality, recuperability, and the air threat against engineer operations.

Engineer forces construct fighting positions for forward AD assets, protecting them not only against the threat's suppression of enemy air defenses (SEAD) operations but also against direct and indirect fires.

## **Combat Service Support**

CSS sustains the fight. The division engineer focuses his integration efforts on three different areas of CSS operations. The first area is the sustainment of engineer battlefield functions. Battlefield requirements for close, deep, and rear operations must be anticipated and then integrated and pushed forward into the fight. The second area is the engineer mission support to the division's CSS operations. As discussed

earlier in the rear operations section of the battlefield framework, division engineers play a significant role in sustaining the division. Finally, engineer unit sustainment must be integrated. This encompasses both division and corps engineer forces and is discussed in Chapter 6.

## **Command and Control**

C2 allocates, prioritizes, and synchronizes assets to employ and sustain combat power. The division engineer must integrate C2 of all engineer battlefield functions into the division C2 process for close, deep, and rear operational support. The integration of engineer C2 activities at each division command node creates a responsive, synergistic relationship between division engineer support, engineer unit C2, and division units. It must maximize use of division C2 and engineer C2 channels to achieve responsive support. Timely and effective engineer task organizations, annexes, fragmentary orders (FRAGOs), operation orders (OPORDs), and operational updates are all products of effective integration of engineer missions and C2. Chapter 2 provides additional discussion on the integration of engineers and maneuver C2.

Engineer forces may also assist in hardening division C2 by constructing fortifications for critical division command, control, and communications (C3) nodes. Continuous, uninterrupted C3 is vital to maintaining the initiative and acting within the enemy's own decision cycle. As the battlefield becomes increasingly nonlinear, engineers play a more vital role in constructing or hardening existing facilities that give division C3 nodes an edge against the enemy's deep operations. The division engineer must be sensitive to these needs and must constantly coordinate with the division Assistant Chief of Staff, G3 (Operations and Plans) (G3) and the communications-electronic signal officer (CESO) to identify C3 survivability requirements early.