CHAPTER 1

CORPS ENGINEER OPERATIONS

The objectives of the carpet-bombing effort in front of the VII Corps were to mask the assault and saturate enemy defensive sectors as far back as their direct-support artillery positions. Following the bombing, the 1st, 9th, and 30th Infantry divisions were to deliver a coordinated assault across a relatively narrow front and punch a hole through which the waiting 2nd and 3rd Armored divisions would launch a pursuit of the presumably routed German forces.

The 1106th Engineer Combat Group was moved up to the VII Corps' left flank to support directly the 30th Infantry Division and the initially trailing 2nd Armored Division as they advanced along high ground on the west bank of the Vire River. On the VII Corps right flank, the 1120th Engineer Combat Group would support the 4th and 9th Infantry divisions in the assault and the follow-on 3rd Armored Division in the pursuit. Our own 1111th Engineer Combat Group would act as the corps engineers in the VII Corps sector, devoting its efforts to opening and maintaining the supply routes and building and maintaining the longer, more permanent timber trestle bridges back along the MSR that would be opened by the advancing infantry and armor and initially cleared by the direct-support engineer combat battalions.

A description of Army breakout plans from the Normandy lodgment in July 1944. From the book, The First Across the Rhine, The Story of the 291st Engineer Combat Battalion. by Colonel David E. Pergrin with Eric Hammel.

THE ROLE OF CORPS ENGINEER FORCES

THE CORPS

The corps is the US Army unit capable of operating at both the tactical and operational levels of war. It is the instrument by which higher echelons of command conduct maneuvers at the operational level. Corps are tailored based on mission, enemy, terrain, troops, and time available (METT-T) to contain all combat, combat support (CS), and combat service support (CSS) unit capabilities required to sustain operations for a considerable period. During force-projection operations, an Army corps may serve as the Army forces (ARFOR) headquarters to a theater command or joint task force (JTF) or as a JTF headquarters itself. The corps may control units from the Air Force, Navy, and Marine Corps, along with allied and coalition nations. A tailored corps engineer brigade is commonly available to the corps to weight its main effort and to perform special CS functions.

THE CORPS ENGINEER BRIGADE

The corps engineer brigade commands and controls all engineer support to the corps and is assigned all engineer units that are not organic to divisions, separate maneuver brigades, and cavalry regiments. The brigade provides mobility countermobility survivability, and general engineering support to the corps based on METT-T. Corps topographic engineering support normally is provided by a topographic engineer company placed indirect support (DS) to the corps from the theater Army (TA) topographic engineer battalion. The corps engineer brigade augments engineers organic to divisions, separate maneuver brigades, and cavalry regiments.

The corps engineer brigade may contain various numbers of engineer groups, corps engineer battalions (mechanized, wheeled, airborne, and light), combat heavy engineer battalions, and separate engineer companies (fixed and assault float bridge, combat support equipment (CSE), light equipment (LE), and topographic). Other specialized engineer organizations will augment the corps engineer effort as the mission dictates. The brigade controls and staff supervises theater engineer forces from EAC operating in the corps area. These may include units such as prime-power battalions; construction support, pipeline construction, dump truck and port construction companies; and utilities, well-drilling, firefighting, and other special teams and detachments.

The corps engineer brigade commander also serves as the corps engineer special staff officer. The corps staff engineer section (SES) assists him by providing engineer functional-area expertise to all corps stiff elements. The SES provides recommendations to the corps staff on the use of engineer assets and ensures that the engineer battlefield functions are fully planned, integrated, synchronized, and executed to support the corps commander's intent and scheme of maneuver. The corps engineer also tasks and prioritizes the work effort of the DS corps topographic company.

In force-projection theaters where no forward-based theater engineer structure exists, the corps engineer brigade could initially function as the theater engineer headquarters and regional contingency engineering manager (RCEM). To do this, the brigade needs special augmentation from an engineer command (ENCOM) and/or the USACE in the areas of construction management, real estate acquisition, and construction contracting support. The brigade would execute this function until an ENCOM, TA. engineer brigade, or engineer construction group arrives in theater.

In the absence of follow-on deployment of an ENCOM, TA engineer brigade, or engineer construction group, the corps engineer brigade (with the special augmentation listed above) may have to act as the theater engineer headquarters indefinitely.

SIMULTANEOUS OPERATIONS

Simultaneous deep, close, and rear corps operations comprise a special and continuous battle space synchronization requirement. The linkage between these operations assures that the aims, timing, and activities associated with these operations are mutually supporting. For commanders, synchronization of simultaneous operations will normally require deliberate planning and staff coordination. Simultaneous operations in depth have a direct impact on the enemy's cohesion. Corps units are no longer restricted to fighting three sequential operations (deep, close, and rear). Nor are in-depth operations conducted solely to establish favorable conditions for the close fight. The corps commander influences these operations by assigning on-order missions and priorities and allocating combat assets. He must describe, in his concept of the operation, how all deep, close, and rear operations will be executed simultaneously, their command relationships, and their relative priorities. The

corps commander will retain reserve forces under his control. The command echelon above corps designates the corps's area of operations (AO). The corps geographically divides its AO into subareas where it will conduct close, deep, and rear operations. The use of lateral, rear, and forward boundaries is intended to better delineate responsibility and commandant control (C2). However, combat operations in the corps area may be nonlinear, and the intermingling of opposing forces may be inevitable. The air and space above the corps's AO constitute a third dimension of the corps's battle space.

Corps engineers support operations throughout the corps's battle space based on the corps commander's intent and METT-T. Engineer support to all corps deep, close, and rear operations focuses on planning, coordination, synchronization, integration, and resource allocation. Successful engineer operations in support of corps operations require a thorough understanding of the terrain, threat capabilities, commander's intent and scheme of maneuver.

Deep Operations

Deep operations allow the corps commander to engage the enemy throughout the depth of the enemy's AO so that the effects appear to the enemy commander as one fight. The corps conducts deep operations to destroy the enemy's cohesion, nullify his firepower, disrupt his C2, destroy his supplies, break his morale, or disrupt his introduction of follow-on forces. Firepower, both lethal and nonlethal, synergistically combines with maneuver in conducting deep operations.

The corps uses a Decide-Detect-Track-Deliver Assess approach that enables the comrnander to take the initiative in selecting high-value targets (HVTs) before they actually present themselves in the target array.

The Decide phase provides the focus and priorities for the collection-management and fire-planning processes. During the Decide phase of deep operations, engineers provide terrain analysis that supports the identification of named areas of interest (NAIs) and target areas of interest (TAIs). Countermobility targets are recommended for nomination by corps staff engineers to the corps Assistant Chief of Staff, G2 (Intelligence) (G2)/Assistant Chief of Staff, G3 (Operations and Plans) (G3) deep operations coordination cell and the corps's joint targeting board. Recommended targets for nomination could include the emplacement of long-range scatterable minefield and the destruction of bridges and other choke points. The use of deep countermobility emplacement systems, such as the Gator, needs to be planned and coordinated at least 72 hours prior to delivery time.

The Detect phase executes the decisions reached in the Decide phase. When target selection standards have been defined, a decision support template (DST) is prepared. When an acceptable target is located, evaluation of the DST may result in an immediate fire mission.

The Track phase occurs when the target is out of range of corps fire-support systems or when future intentions need to be determined. Tracking is accomplished with various national, theater, and corps intelligence and surveillance systems.

The Deliver phase is executed rapidly by having designated fire-support systems respond to corps attack directives when the defined trigger events are detected by sensors.

During the Assess phase, a timely and accurate estimate of the damage resulting from the -ap plication of military force, either lethal or nonlethal, against the target is made.

During the Decide, Detect, Track, Deliver, and Assess phases, corps engineers coordinate, integrate, track, and assess the effectiveness of all countermobility systems used in deep operations. Task-organized corps engineers support deep ground-maneuver mobility by participating in reconnaissance op-

erations and by keeping open the ground routes, drop zones, landing zones, and other means of access needed by deep forces to sustain the fight.

Close Operations

Corps close operations include the simultaneous close, deep, and rear operations of committed divisions, separate maneuver brigades, and cavalry regiments. The outcome of corps close operations will ultimately determine the success or failure of the corps's battle.

The corps engineer brigade augments organic engineers in divisions, separate brigades, and cavalry regiments. Engineer groups, corps engineer battalions, combat heavy engineer battalions, engineer bridge companies, and engineer CSE and LE companies can be task-organized to support maneuver elements according to the corps commander's intent to weight the main effort. Corps engineers may also work in the division area on a task or area basis, such as constructing and repairing main supply routes (MSRs) from corps support group areas to the brigade rear boundary; constructing float and fixed bridging, emplacing corps-directed obstacles; constructing forward corps airfields and aviation support facilities; or providing survivability support for battle command nodes, field artillery, air defense artillery (ADA), and logistics support sites. All corps engineers operating in a division's area will be under the division engineer's control and staff supervision. A corps engineer work line (EWL) may be designated to divide division and corps engineer responsibilities. Corps engineers also support separate corps brigades, such as artillery aviation, air defense, military police (MP), military intelligence (MI), signal, and chemical brigades, in much the same reamer. Major corps combined arms mobility operations, such as large-scale obstacle breaching and river crossings, are supported primarily by corps engineer units.

Topographic engineering support to corps close operations focuses on augmenting division terrain-analysis teams when division requirements exceed organic capabilities. In preparation for close operations, topographic engineers support the corps G2 with weather and terrain amlyses and terrain products that assist in the intelligence preparation of the battlefield (IPB) process. In addition, the DS topographic engineer company produces detailed, large-scale imagery products and other special products depicting areas where combat operations will be conducted. The topographic company survey team provides accurate geodetic survey control points for artillery, aviation, intelligence, and signal positioning.

Mobility support for corps close operations focuses on the movement of large tactical units from the corps rear to the brigade rear boundary. Topographic engineers identify possible mobility corridors. Corps engineer battalions widen lanes through minefields and other obstacles breached by assaulting division engineers, breach obstacles that have been bypassed by assault forces, upgrade combat roads and trails, and keep open key routes designated by the corps G3. Corps engineer bridge companies provide assault float bridging and follow-on fixed bridging support Corps engineer battalions, along with CSE and LE companies, repair battle-damaged roads and airfields. This repair includes forward aviation combat engineering (FACE) support such as constructing low-altitude parachute extraction zones (LAPES) and forward area rearm/refuel points (FARPs).

Countermobility support for corps close operations focuses on reinforcing terrain with obstacles that support the corps commander's intent and maneuver plan. Corps terrain analysts identify threat-sized regimental attack corridors. The corps obstacle plan degrades the enemy's ability to maneuver without hindering the maneuver of friendly divisions, separate brigades, and cavalry regiments. The corps commander will designate obstacle-restricted areas (ORAs), corps reserve forces' counterattack routes, any corps reserve demolition obstacles within the corps sector, and specific terrain

features that must be protected for ongoing and future corps operations such as key MSR bridges. Corps engineer units augment the execution of the corps obstacle plan with division, separate brigade, and cavalry regiment engineers. Corps logistic planners anticipate and push Class IV/V obstacle packages (including mines and demolitions) forward to emplacing corps engineers as soon as mission requirements are known.

Survivability support during corps close operations emphasizes the use of corps engineer battalions and attached engineer CSE and LE companies to protect critical corps communication nodes, command posts (CPs), logistics units, corps artillery fire-direction centers, and ADA. Corps engineer unite also construct protective berms and revetments for corps aviation units and nuclear, biological, chemical (NBC) collective protective shelters for critical corps units.

General engineering support to corps close operations concentrates on lines of communication (LOC) and MSR construction, maintenance, and rehabilitation in the corps's AO by corps engineer battalions and attached CSE and LE companies. Combat heavy engineer battalions may also be attached to the corps engineer brigade to perform vertical and horizontal construction missions. This includes the maintenance and repair of airfields for unmanned airborne vehicles (UAVs) as well as Army aviation, Air Force, and Marine aircraft Corps engineers will also develop logistics sup port areas (LSAs) that include terminal transfer points (TTPs), Class III fuel storage and transfer sites, Class V ammunition supply points (ASPS), enemy prisoner-of-war (EPW) camps, hospital sites, and troop bed-down facilities such as Force Provider.

Rear Operations

Corps rear operations are the activities conducted from the corps rear boundary to the rear boundaries of committed maneuver units. Rear operations are conducted to ensure the corps's freedom of maneuver and continuity of operations, including sustainment and C2. The corps must synchronize the rear operations' functions of terrain management, security, sustainment, and movement with their close and deep operations, in accord with the corps commander's concept and intent.

In support of terrain management, corps engineers conduct terrain analysis to assist in the positioning of corps reserve, CS, and CSS units. The corps engineer coordinates closely with the rear tactical operations center (RTOC) to identify rear security operations and engineer sup port requirements. Corps engineers with combat capability (wheeled, mechanized, airborne, or light) are normally positioned in the rear area where they can control key terrain or improve the defensive capability of key bases and base clusters within the corps area. Corps engineers provide general engineering support to keep LOC open by building, maintaining, and repairing roads and airfields. Corps engineers also provide construction support for the corps support command (COSCOM) and corps aviation brigade facilities in rear areas. They coordinate with other theater engineer units and the host nation to keep railroads, waterways, and other transportation systems open and to provide necessary utility services in the corps area. Corps engineers plan and execute countermobility missions to block critical threat avenues of approach and to deny facilities in support of base and base-cluster self-defense plans. Rear survivability tasks include hardening C2 headquarters and digging in critical CSS facilities. Corps engineers assist in the preparation of area damage control (ADC) plans to facilitate the return of a base or base clusters to mission capability during or after hostile action or natural disasters. This is done by reducing the probability of damage, minimizing its effects, and aiding in the continuation or reestablishment of normal operations. Corps engineers provide mobility support for movement of MP and designated tactical combat forces (TCFs), including breaching and bridging support. Corps engineers with combat capability can also serve as a TCF with additional training augmented by indirect-fire support heavy weapons, communications, and transportation equipment.

CORPS BATTLEFIELD OPERATING SYSTEMS

Corps are the link between the operational and tactical levels of war. They plan and conduct major operations and battles. They create and maintain the conditions for the success of current battles and set up the conditions for the success of future battles. Operational planning concentrates on the design of campaigns and major operations. Tactical operations consist of conducting battles and engagements as parts of campaigns and major operations. The planning and execution of tactical-level battles are the corps' major roles. When conducting operations, the corps will synchronize and integrate operational- and tactical-level operating systems.

The corps engineer brigade is responsible for planning, coordinating, synchronizing, and integrating the five engineer battlefield functions of mobility countermobility, survivability, general engineering, and topographic engineering into each operational- and tactical-level operating system.

Operational Intelligence

Operational intelligence is that intelligence which is required for planning and conducting major operations within a theater of operations (TO). At the operational level of war, the joint and multinational intelligence system concentrates on the collection and analysis of information that will lead to the identification, location, and analysis of the operational center of gravity and operational objectives. Operational intelligence also focuses on production efforts downward and concentrates efforts on fighting priority intelligence requirements (PIR) such as—

- Basic (or finished) intelligence.
- Strategic indications and warning.
- Tactical warning.
- Current intelligence reporting.
- IPB on an operational or theater basis.
- Targeting intelligence.
- Battle damage assessment and post-strike assessment.
- Collection requirements management (synchronization of intelligence product reports).

The corps engineer is critical to this process in the areas of collecting and processing operational information. He is the corps expert on threat breaching, bridging, and obstacle emplacement capabilities. He is responsible for advising the corps commander on the effective use of terrain. He coordinates with the corps G2/G3 for the collection of battlefield terrain information through reconnaissance and other collection sources such as satellite imagery. He coordinates with the theater engineer for corps topographic support requirements for surveying, terrain analysis, and reproduction. He assists in the distribution of terrain-analysis and other special topographic products and he defines the geometry of the battlefield by providing map products and geodetic surveys. The corps engineer evaluates the availability of standard and nonstandard maps and terrain-analysis data bases covering the corps's AO. If shortfalls exist, he and the corps G2 define specific requirements and coordinate the collection and creation of necessary data to build the corps topographic data base. The corps engineer prepares the topographic operations annex (Appendix A) for corps operations plans and orders. In coordination with the corps G2, he tasks and prioritizes the DS corps topographic company's work effort. The corps topographic company uses cartographic techniques to produce image- and map-based special-purpose products. These products include intelligence and operations overlays or overprints, modified combined obstacle overlays (MCOOs), image maps, expedient map revisions, line-of-sight (LOS) products, and precise survey and geodetic positions. The corps engineer also determines the need for a topographic survey to verify data used by military intelligence and fire-support systems. The corps engineer coor-

dinates the DS of one corps terrain-analysis team from the corps topographic company to the corps G2/G3 at the corps analysis control element (ACE). This terrain-analysis team provides the corps G2/G3 with ongoing analyses of the effects of terrain and weather on combat operations as an integral part of the continuous IPB process. A second corps terrain-analysis team from the corps topographic company provides general support (GS) to other subordinate corps headquarters under the corps engineer's staff supervision.

Operational Movement and Maneuver

Operational movement and maneuver is the disposition of joint and/or multinational forces to create a decisive impact on the conduct of a campaign or major operation. This is accomplished by either securing the operational advantages of position before the battle is joined or by exploiting tactical success to achieve operational or strategic results. The corps maneuver elements are its divisions, separate maneuver brigades, cavalry regiment, and aviation brigade. The objective of operational maneuver at corps level is to place or move brigade- or division-sized combat elements into positions where they can bring fires to bear on the enemy with the greatest effect.

The corps engineer synchronizes operational movement and maneuver with operational mobility and countermobility support. He plans the use of corps engineer forces in overcoming operationally significant obstacles, such as those created by nuclear or chemical weapons, and enhancing the movement of friendly forces. He also selects locations for operational obstacle systems and plans for their emplacement by corps engineer forces. Corps engineers augment engineers organic to the maneuver elements. Corps engineers can be task-organized to support maneuver organizations for relatively long-term, continuous support or on a short-term, task basis such as breaching major complex obstacles, crossing rivers, or emplacing corps-directed obstacles. In support of operational movement and maneuver, the corps engineer provides advice on the employment of all scatterable mines in the corps area regardless of the means of delivery. The use of scatterable mines gives the corps the ability to quickly place an obstacle in the face of the enemy in order to fix, turn, disrupt, or block his advance or withdrawal. The corps carefully monitors scatterable-mine emplacement and self-destruct times to be able to attack rapidly through a recently created gap in the friendly obstacle system. The corps commander is the approval authority for the employment of all scatterable mines in the corps area. The authority to emplace mines with long self-destruct times (greater than 24 hours) may be delegated down to division level and with the concurrence of corps, down to brigade level. The authority to emplace mines with short self-destruct times (less than 24 hours) may be delegated as far down as battalion level. The corps commander should allocate the authority to emplace scatterable mines based on both the duration and type of weapon system deploying the mines. The corps engineer ensures that the use of scatterable mines is well coordinated so that a lower echelon does not inadvertently place an obstacle in the path of a future corps maneuver corridor (for example, a corps reserve force's counterattack route).

Operational Fires

Operational fires are the application of firepower and other means to achieve a decisive impact on the conduct of a campaign or major operation. Operational fires are, by their nature, joint (and potentially multinational) activities. They are a vital component of the operational plan, and as such, must be carefully integrated with the commander's operational concept. Operational maneuver and operational fires may occur simultaneously within a commander's battle space but may have very different objectives. An example is simultaneous attacks, where neither function is directly dependent on the success of the other. The Army has significant capabilities for contributing to the joint deep fight or for planning and

conducting its own deep operations, when necessary, using operational maneuver and/or organic operational fires.

Corps engineer operations and corps operational fires are closely linked and mutually supportive. The effectiveness of this link is assured by accurate topographic geodetic control points that define a common grid. These points are placed by surveyors from the DS topographic engineer company using precise geodetic survey techniques. Corps engineers also provide map-based terrain visualization products to support the corps's fire-support plan. Integrating operational fires with obstacles greatly enhances the effectiveness of both. The corps engineer assists with the target identification process, ensuring that corps obstacle planning and operational fires mutually support the commander's intent. The corps engineer provides advice and coordinates the employment and allocation of scatterable mines delivered by field artillery aviation, and tactical air into the corps area.

Operational Protection

Operational protection conserves the force's fighting potential so that it can be applied at the decisive time and place. It includes actions taken to counter the enemy's firepower and maneuver by making soldiers, systems, and operational formations difficult to locate, strike, and destroy. Operational protection pertains to forces everywhere in the theater of war or operations. Operational protection includes such items as providing operational air defense, conducting deception, safeguarding operational forces in major operations, recording all minefield locations, employing operations security (OPSEC), and providing security (including combatting terrorism).

Conducting risk assessments is integral to force protection. Risk assessments identify hazards and examine the resulting risks associated with the mission. Special risk considerations must be made where there is a threat of weapons of mass destruction Risk assessment is dynamic. As circumstances change and the command's experience level increases, risk assessments confirm critical information that affects decisions.

Corps engineers support operational protection by—

- Tracking minefield and unexploded ordnance (UXO) concentrations.
- Preparing operationally significant fortifications.
- Removing operationally significant hazards (including NBC).
- Providing protection for operational logistics sites.
- Providing advice and assisting units in the employment of camouflage concealment techniques.
- Supporting deception operations as required.

Operational Command and Control

Operational C2 is the exercise of authority and direction by a commander to accomplish operational objectives. The control mechanisms support the battle command exercise. The commander's vision and his stated intent guide the organization toward accomplishing their mission or assigned tasks. Battle command focuses efforts, establishes limits, and provides structure to operational functions. The C2 system supports the organization in conducting current operations while planning and preparing for future operations.

Corps engineers support the corps C2 process in various ways. Engineer participation in corps-level planning ensures that the five engineer battlefield missions are properly synchronized and integrated with all corps and JTF

operations. Engineers are incorporated into the corps' staffs at the corps' assault, tactical, main, and rear CPs. The corps engineer staff may provide manning for a JTF engineer staff. Timely production and dissemination of supporting topographic products that depict the terrain, the enemy situation, and the friendly plan ensure that all CPs are operating in the same geodetic framework.

Operational Logistics

Operational logistics consist of those activities required to support the force during campaigns and major operations within a TO. Operational support of the force extends from TO logistics bases to forward CSS units and facilities. The TO logistics base links strategic sustainment to tactical CSS. The primary focus of operational logistics is on reception, positioning of facilities, material management, movement control, distribution management, reconstitution, and redeployment.

The corps engineer assists in establishing and maintaining the corps infrastructure necessary to sustain these missions in coordination with the corps Assistant Chief of Staff, G4 (Logistics) (G4), COSCOM, TA, and foreign/host nation. This includes initial base-development planning that identifies requirements for logistics support and troop bed-down facilities. The corps engineer identifies supporting general engineering requirements and capabilities needed. Based on the corps plan, the corps engineer identifies any significant requirements of bridging, additional construction equipment, Class IV construction materials, and Class V demolitions and mines to corps logistics planners. The corps engineer closely monitors the status of these types of supplies and equipment, ensuring availability to corps operations. The corps engineer, in coordination with the corps G2, also defines stockage requirements for maps to be held by topographic units and quartermaster map distribution units supporting the corps. This service is provided through supporting CSS units, supply point storage, and the distribution of standard topographic products at the corps level.

Tactical Intelligence

Tactical intelligence is that knowledge of the enemy, weather, and geographical features required by the commander in planning and conducting combat operations. It is derived from an analysis of information on the enemy's capabilities, intentions, and vulnerabilities and the environment.

Corps engineers support tactical intelligence operations by collecting and forwarding reconnaissance information concerning friendly obstacle locations, enemy obstacles, routes, bridges, and engineer construction material. Attached corps engineer support to maneuver units engaged in intelligence-gathering missions also contributes to the corps intelligence effort. Corps topographic terrain imagery products that identify specific terrain details are provided to assist in the movement of unit personnel and equipment the emplacement of obstacles, and the siting and protection of weapons systems.

Tactical Maneuver

Tactical; maneuver is the employment of forces on the battlefield through movement and direct fires in combination with fire support, or fire potential, to achieve a position of advantage in order to accomplish the mission. This includes direct-fire systems such as small arms, tank guns, and attack helicopter fires.

Corps engineer support to tactical maneuver operations can be described in terms of augmenting engineers organic to divisions, separate brigades, and cavalry regiments that are engaged in heavy or light maneuvers, cavalry, or aviation operations. Corps engineers support heavy maneuver force operations primarily in the areas of float- and fixed-bridging sup port; construction repair, and maintenance of movement routes during the offense; and survivability and countermobility support during deliberate defenses. Light maneuver force operations normally need extensive augmentation from corps engineer units due to limited numbers of organic engineers in light maneu-

ver units. Critical corps engineer tasks supporting offensive light maneuver operations include opening captured airfields and lodgment facilities with heavy equipment and conducting breaching operations during the offense. All light maneuver operations normally require extensive survivability support from corps engineers. Both hasty and deliberate defensive operations require corps engineer augmentation. Task-organized corps engineer battalions normally augment cavalry regiments by providing the necessary mobility, countermobility, and survivability support. Corps engineers are fully embedded with regimental reconnaissance operations, providing critical terrain and obstacle information to corps intelligence agencies. Corps engineer support to corps aviation maneuver operations includes coordinating and assisting the emplacement of scatterable mines by helicopters and fixed-wing aircraft to block enemy penetrations, turn enemy formations, or protect the flanks of corps counterattacks. Corps engineers also provide general engineering support such as erecting corps aviation logistics and maintenance facilities and constructing helicopter landing pads and FARPs.

Tactical Mobility and Survivability

Tactical mobility and survivability is the capability of the force that permits freedom of movement, relative to the enemy, while retaining the ability to fulfill the primary mission. It also includes those measures the force takes to remain viable and functional by protecting itself from the effects of enemy weapons systems and natural occurrences.

Corps engineers are major contributors to this component. Corps engineers enhance the effestiveness of maneuver unite by providing mobility support, degrading the enemy's ability to move on the battlefield through countermobility support, providing protective emplacements and structures, and constructing and maintaining combat trails.

Tactical Fire Support

Tactical fire support is the collective and coordinated use of target acquisition data, indirect fire weapons, armed aircraft and other lethal and nonlethal means against ground targets in support of maneuver force operations.

Corps engineer support for tactical fire-support operations can be described in terms of field artillery, electronic jamming, Army aviation, and tactical air support. The corps artillery brigade has no organic engineer assets, so it may require corps engineer support in all five engineer battlefield functions. This support may include digging in fire-direction centers, building protective berms, and breaching scatterable minefield. Topographic surveyors work closely with the corps artillery survey planning and coordination element (SPCE) to ensure that target acquisition/collection assets are on a common grid with the delivery assets to effectively respond to HVTs. In support of electronic jamming missions, corps engineers dig in the corps electronic warfare units and topographic engineers provide accurate survey control points for electronic warfare assets. Corps engineers construct protective berms, landing pads, and maintenance structures for Army aviation assets, along with FARPs. Corps engineers support tactical air missions by providing general engineering support in the areas of rapid runway repair and other maintenance of airfields and FARPs.

Tactical Air Defense

Tactical air defense includes all measures designed to nullify or reduce the effectiveness of an attack by hostile aircraft and guided missiles, both before and after they are airborne, to preserve combat power and maintain friendly freedom of action. Portions of the corps ADA brigade will be task-organized to the maneuver elements, as dictated by METT-T to support close operations. The remainder of the ADA brigade, under corps control, will focus on protecting essential rear-area functions and facilities.

Corps engineer support to forward ADA units primarily consists of survivability tasks and will be provided by engineers organic to the maneuver elements or augmenting corps engineer units. Corps engineer support to other ADA efforts also focuses on survivability including digging in fire-direction centers and building protective berms for ADA weapons systems. They also clear fields of fire for ADA weapons systems. Topographic engineers, in coordination with the corps G2, aid in identifying air avenues of approach.

Tactical Command and Control

Tactical C2 is the exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Battle command functions are performed through an arrangement of personnel, equipment, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in accomplishing the mission.

Corps engineers support the tactical C2 process by enhancing the survivability of tactical C2 facilities. Engineers construct bunkers and other structures, such as NBC collective protective shelters, to protect commanders, staff, and critical signal nodes from the effects of enemy fires, thus allowing uninterrupted C2 operations. Corps engineers also provide the general engineering required to support the personnel and systems involved in the C2 process. They construct and repair facilities and install and repair utilities as necessary.

Tactical Combat Service Support

Tactical CSS is the support and assistance provided to sustain forces, primarily in the fields of logistics, personnel services, and health services. This includes arming, fueling, fixing manning the force, distributing supplies, providing general engineering and MP support, and evacuating noncombatants from the area.

Corps engineer support to CSS efforts focuses on survivability and general engineering. Corps engineers build protective berms, shelters, and revetments for critical CSS facilities and activities. They construct and maintain roads and CSS facilities. They may provide essential utilities including sewage, water, and electrical systems. Corps bridge companies have the capability to provide haul support with their bridge trucks when bridge components are off-loaded.

TYPES OF ENGINEER ORGANIZATIONS

CORPS ENGINEER UNITS

Based on METT-T, the corps task organization may contain several types of corps engineer units to weight its main effort and to conduct other battlefield functions. The engineer organizations that are normally assigned to the corps are listed below.

Headquarters, Engineer Brigade (Corps)
Headquarters, Engineer Group (Combat)
Engineer Battalion (Corps) (Mechanized)
Engineer Battalion (Corps) (Wheeled)
Engineer Battalion (Corps) (Light)
Engineer Battalion (Corps) (Airborne)
Engineer Battalion (Combat Heavy)
Engineer Company (Light Equipment)
Engineer Company (Light Equipment) (Airborne)
Engineer Company (Combat Support Equipment)
Engineer Company (Topographic)
Engineer Company (Ribbon Bridge)
Engineer Company (Panel Bridge)
Engineer Company (Medium Girder Bridge)
Engineer Team (Diving, Light)

Headquarters, Engineer Brigade (Corps)

The brigade is comprised of an organic headquarters and headquarters company (HHC), a

DS topographic company and a variety of other subordinate engineer organizations assigned or attached based on METT-T. Figure 1-1 shows a theoretical corps engineer brigade laydown. The brigade also provides staffing for a corps SES that supports each corps's CP.

Headquarters, Engineer Group (Combat)

The combat engineer group is the principal subordinate unit of the corps engineer brigade. The combat engineer group's only organic element is its HHC. The engineer group is designed to provide C2 of five to seven subordinate corps engineer units on either an area or functional basis, either far forward in the division and brigade areas or in the corps rear area. Its mission may include being the crossing-force engineer headquarters for major river-crossing operations or during a major deliberate breach of a complex obstacle system. The combat engineer group can also control GS general engineering in the corps and division rear areas, focusing on the construction of MSRs and logistics support bases. A combat engineer group may be task-organized to support a division when the division's augmented corps engineer strength exceeds the C2 capability of the division engineer and his staff. During this situation, the division engineer brigade or battalion commander normally remains as the division engineer staff officer. The combat engineer group operates as a major subordinate command (MSC) under the division, receiving taskings from the division G3 and division engineer.

Engineer Battalion (Corps) (Mechanized)

The mechanized corps engineer battalion consists of an HHC and three line companies. It is almost identical in capability to the division engineer battalions in an armored or mechanized division, but has a larger staff. It is designed to conduct engineer operations in close combat and can fight as mechanized infantry when properly trained and augmented. Mechanized corps engineers provide mobility support to reconnaissance, intelligence, surveillance, and target acquisition (RISTA) forces. This support can involve breaching natural and man-made obstacles and improving trafficability of routes for cavalry regiments, field artillery, and logistics units. During deliberate breaches at division or brigade level, mechanized corps engineers may provide the engineer support to the breach force, preserving the division engineers for follow-on operations; follow and widen breaches conducted by division engineer units; or breach obstacles bypassed by division engineer units. To weight the offensive main effort, mechanized corps engineer battalions can be task-organized to division engineers. In the deliberate defense, mechanized corps engineers augment division engineers in survivability and countermobility operations. Mechanized corps engineers can emplace ground-emplaced scatterable minefield and conventional obstacles such as road craters and bridge demolitions. The battalion has limited general engineering capability and may require support from other corps engineer units.

Engineer Battalion (Corps) (Wheeled)

The wheeled corps engineer battalion consists of an HHC and three line companies. It is designed to provide engineer support to corps close and rear operations and can fight as motorized infantry when properly trained and augmented. Wheeled corps engineers can execute mobility operations forward of the brigade support areas (BSAs) to maintain supply routes used by logistics units, tactical routes, and combat trails. Engineer CSE companies can be task-organized to the battalion to support these types of missions. Wheeled corps engineer units provide countermobility support to corps close operations to prepare the battlefield for decisive operations. They contribute significantly to the emplacement of the corps obstacle plan. Wheeled corps engineers can be task-organized to division engineers, especially in the deliberate defense. Wheeled corps engineers also support corps close and rear operations with horizontal general engi-

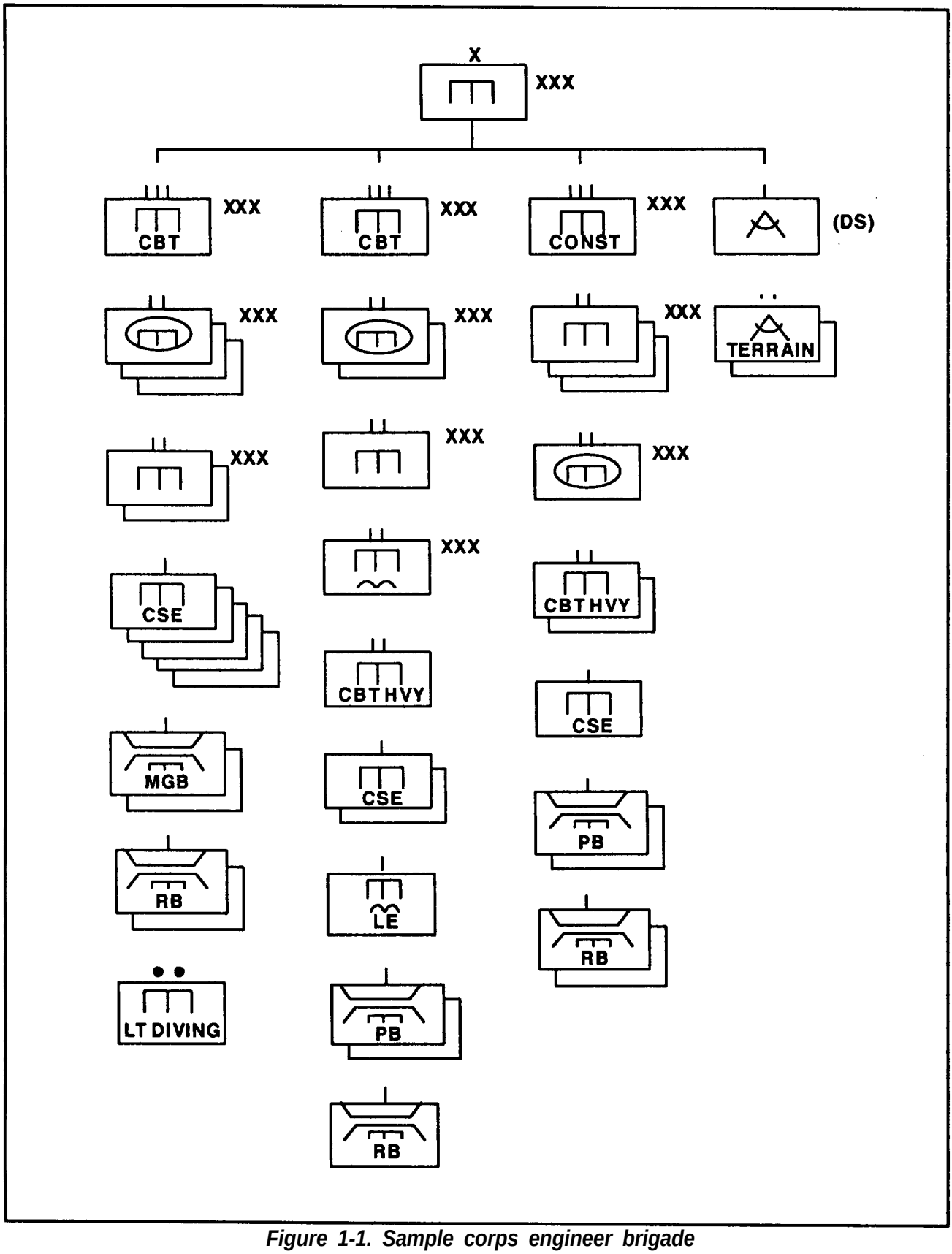


Figure 1-1. Sample corps engineer brigade

neering. They keep LOC open by building, maintaining, and repairing roads, combat trails, forward airfields, and logistics facilities to sustain uninterrupted logistics flow from corps and division logistics units to forward maneuver units. When augmented with additional horizontal and vertical assets, they can construct logistics bases and can perform general engineering operations.

Engineer Battalion (Corps) (Light) and Engineer Battalion (Corps) (Airborne)

These two battalions, though not identical, are very similar in size, equipment, and mission. Both have an HHC and three line companies. They reinforce engineers in light infantry, airborne, and air assault divisions and special operations forces (SOF) units. Their equipment is down-sized and capable of being rapidly deployed anywhere in the world. Light and airborne corps engineer battalions are strategically mobile in order to accompany rapidly-deploying force-projection forces. They are designed in perform engineer support to corps close operations and fight as light infantry when properly trained and augmented. During force-projection operations, these battalions have a limited capability to construct and improve logistics bases; build, maintain, and repair LOC and airfields; and construct individual and vehicle survivability positions for early-deploying contingency forces. The engineer light equipment company and light equipment company (airborne) will often support corps light and airborne engineer battalions. Corps light and airborne engineer battalions have limited obstacle-breaching capability. This constrains them to mainly improving and widening existing breach lanes. In the deliberate defense, these battalions can reinforce light division engineers in countermobility and survivability missions.

Engineer Battalion (Combat Heavy)

The combat heavy engineer battalion executes a wide variety of horizontal and vertical construction missions. It is deployable by ship and is relatively self-sustaining and able to operate independently in remote areas with security force augmentation. The combat heavy engineer battalion is capable of conducting multiple construction missions simultaneously. The battalion is capable of constructing and providing rapid repair and rehabilitation of facilities such as airfields, roads, bridges, and buildings. With augmentation from specialized engineer companies, detachments, and teams, the combat heavy engineer battalion can manage and assist in the construction of ports, pipelines, water wells, power plants, and power-distribution networks to either austere or complete levels. The battalion can construct TO structures (such as those contained in the Army facilities components system (AFCS)) and erect prefabricated structures. The combat heavy engineer battalion is well suited for support to operations other than war (OOTW) such as those conducted during postconflict, humanitarian assistance, disaster relief, and nation assistance. Combat heavy engineer battalions are normally task-organized to the corps engineer brigade or divisions to reinforce their general engineering capability.

Engineer Company (Light Equipment) and Engineer Company (Light Equipment) (Airborne)

These units support light and airborne engineers and include down-sized, rapidly-deployable engineer equipment. They are normally task-organized to corps or division light and airborne engineer battalions to enhance their horizontal construction capabilities, but may also be task-organized to wheeled or mechanized engineer battalions. These equipment-intensive companies have the capability to perform survivability and general engineering missions. They help the maneuver forces dig in, and can execute earth-moving countermobility missions when supporting a deliberate defense. The corps light equipment companies work with the light and airborne engineer battalions in early deployment with force-projection forces to establish forward logistics bases

until heavier corps and theater engineer assets arrive.

Engineer Company (Combat Support Equipment)

The engineer CSE company is a deployable, equipment-intensive company that possesses significant earth-moving capability. It is normally attached to a corps engineer battalion (wheeled or mechanized) to augment the battalion's horizontal construction capability. It can also operate independently while under the direct control of the combat engineer group. The primary roles for an engineer CSE company are—

- Survivability and tank ditching during deliberate defensive operations in forward brigade areas.
- Horizontal general engineering along MSRs and combat trails in other corps' close-operation areas.
- Horizontal general engineering and survivability in corps' rear areas.

Engineer Company (Topographic)

A topographic engineer company from the theater topographic battalion is placed in DS of the corps. Capabilities of this company include the full spectrum of topographic support, as in the battalion, with personnel and equipment to provide products for the corps's AOs. Depending on the distance from the battalion and the tactical situation, the topographic company may be attached to the corps for administration and nontopographic logistics support. The theater topographic battalion provides topographic supply and intermediate maintenance for topographic equipment. A terrain-analysis element of the company is placed in DS of the corps G3/G2, and another terrain element remains in GS of other customers such as the G4, engineer, and signal. The terrain-analysis element furnishes rapid-response and special-purpose topographic support to the corps staff for operations planning and IPB. The production assets remain available to all in a central location. The surveyors are normally operating throughout the corps area extending geodetic control. Other elements of the company maybe task-organized and placed in support of a supported division or task force for a limited time and for a particular tactical operation. Requirements that cannot be met by the company because of priority workload or complexity are passed to the topographic battalion for completion. Normally, the corps topographic engineer company is centrally located in the corps rear area.

Engineer Company (Ribbon Bridge)

The engineer ribbon bridge company employs a dependable, versatile float-bridge system which can be rapidly emplaced in a close combat environment. The ribbon bridge company is normally task-organized with a corps engineer battalion or combat engineer group as part of river-crossing operations. The ribbon bridge components can be transported by specialized bridge trucks or sling-loaded by medium-lift helicopters to the bridging site. The engineer ribbon brigge company has a secondary mission of providing logistics haul capability using its bridge transport trucks when the bridge is down loaded.

Engineer Company (Panel Bridge) and Engineer Company (Medium Girder Bridge)

These engineer fixed-bridge companies are capable of rapidly emplacing tactical standard bridging, either panel bridges (normally Bailey bridges) or medium girder bridges (MGBs), over wet or dry gaps in a close combat environment. These fixed bridges can be used to replace assault float bridges or to bridge gaps that exceed the capabilities of the armored vehicle launched bridge (AVLB). Normally, these engineer fixed-bridge companies are task-organized to a corps engineer battalion or combat engineer group to support gap-crossing operations. These companies also have a secondary mission of providing logistics haul capability using its organic trucks when the bridge is down loaded.

Engineer Team (Diving, Light)

The engineer diving team (light) is capable of supporting the corps commanders' diving requirements on the battlefield. The team focuses on offensive, defensive, retrograde, river-crossing, deception, and ADC operations. It is capable of underwater construction underwater reconnaissance, underwater obstacle emplacement and reduction, and river-crossing support, all of which require mobile equip ment. It is also capable of supporting diving requirements in ports, harbors, and coastal zones. However, it lacks the heavy equipment required to support major port construction projects, decompression dives, and salvage operations. The team can provide its capabilities in support of OOTW.

CORPS ENGINEER SUPPORT TO DIVISIONS, SEPARATE BRIGADES, AND CAVALRY REGIMENTS

The corps engineer brigade augments engineer units organic to divisions, separate brigades, and cavalry regiments based on METT-T. These organic engineer units are focused on close combat mobility, countermobility, and survivability sup port to maneuver forces. Corps engineers provide additional support in these fictions along with general and topographic engineering support. Engineer organizations organic to divisions, separate brigades, and cavalry regiments that can be reinforced by the corps engineer brigade are listed below.

Division
- Engineer Brigade (Heavy)
- Engineer Battalion (Light)
- Engineer Battalion (Airborne)
- Engineer Battalion (Air Assault)

Separate Maneuver Brigade
- Engineer Company

Cavalry Regiment
- Engineer Company

Headquarters, Engineer Brigade (Heavy)

The armored or mechanized division has an organic engineer brigade with a headquarters and headquarters detachment (HHD) and mechanized division engineer battalions. They normally train and operate with each maneuver brigade in the division forming habitual-support relationships. The armored or mechanized division engineer brigade commander also serves as the division engineer special staff officer. The armored or mechanized division engineer headquarters provides centralized C2 and planning for the total division engineer effort. It recommends the task organization for division engineer battalions and reinforcing corps engineer battalions and separate engineer companies to the division commander or G3 based on METT-T. The armored or mechanized division engineer brigade commander may detach companies from one division engineer battalion to another battalion (main effort) or to another maneuver unit such as the division cavalry squadron. Mechanized corps engineer battalions and CSE companies normally are task-organized to the armored or mechanized division. The armored or mechanized division engineer controls and staff supervises corps engineer assets working in the division AO on a task or mission basis.

Engineer Battalion (Light)

The light infantry division has an organic light engineer battalion with an HHC and three light division engineer companies. These companies establish and maintain a habitual-sup port relationship with each light infantry brigade in the division. The light division engineer battalion commander also serves as the division engineer special staff officer. He focuses on supporting the light division fight by recommending the task organization of elements of the battalion assault and obstacle (A&O) platoon, light combat engineer platoons, and corps' assets to the division commander or G3. The task organization of light division engineers depends on METT-T and requires extreme flexibility. Light division engineers must be concentrated at the main effort location, at the critical time, under centralized control. Austere light engineer companies re-

quire extensive augmentation from the corps engineer brigade for extended and force-projection operations. An engineer group with a corps light engineer battalion, corps wheeled battalions, a light engineer equipment company, and CSEs is normally task-organized to the light infantry division. The light division engineer controls and staff supervises engineer assets working in the light division's AO on a task or mission basis.

Engineer Battalion (Airborne)

The airborne division has one organic airborne division engineer battalion with an HHC and three airborne division companies. These companies establish and maintain a habitual-support relationship with each airborne infantry brigade in the division. The airborne division engineer battalion commander also serves as the division engineer special staff officer. He focuses on supporting the airborne division fight by recommending the task organization of the battalion A&O platoon, airborne combat engineer platoons, and supporting corps' assets to the division commander or G3. The task organization of airborne division engineers depends on METT-T and requires extreme flexibility. Airborne division engineer companies are fairly austere with limited organic equipment assets, including small emplacement excavators (SEFJs), Volcano scatterable-mine systems, and airborne engineer squad vehicles. For extended and force-projection operations, the airborne engineer battalion requires extensive augmentation from the corps engineer brigade. A corps airborne engineer battalion and light engineer equipment company (airborne) are normally task-organized to the airborne division. The airborne division engineer controls and staff supervises corps engineer assets working in the division's AO on a task or mission basis.

Engineer Battalion (Air Assault)

The air assault division has one organic air assault division engineer battalion with an HHC and three air assault engineer companies. These companies develop and maintain a habitual-support relationship with each air assault brigade in the division. The air assault division engineer battalion commander also serves as the division engineer special staff officer. The air assault division engineer battalion commander focuses on supporting the air assault division fight by recommending the task organization of the battalion A&O platoon, air assault combat engineer platoons, and corps' assets to the division commander or G3. The task organization of air assault division engineers depends on METT-T and requires extreme flexibility. The air assault division engineer battalion organization is similar to the airborne division engineer battalion but has enhanced tactical mobility due to access to the air mobility assets organic to the air assault division. For extended and force-projection operations, the air assault engineer battalion requires extensive augmentation from the corps engineer brigade. A corps light engineer battalion and light engineer equipment company are normally task-organized to the air assault division. The air assault division engineer controls and staff supervises these and all other corps engineer assets working in the division's AO on a task or mission basis.

Engineer Company (Separate Maneuver Brigade)

Except for their smaller size, separate armored, infantry, and light infantry brigades have essentially the same characteristics as divisions. These brigades can be used to augment divisions but are capable of operating as independent units. Separate maneuver brigades have an organic engineer company with three engineer platoons and an A&O platoon that develop and maintain habitual-support relationships with battalion task forces in the brigade. The separate brigade also has a brigade staff engineer section which provides centralized planning for the total brigade engineer effort by recommending to the brigade commander or S3 a task organization of separate

brigade engineer squads, platoons, and corps assets based on METT-T. The separate brigade engineer company commander may detach squads from one separate brigade engineer platoon to another platoon (main effort). A corps engineer battalion is normally task-organized to the separate maneuver brigade. When this occurs, the corps engineer battalion normally absorbs the separate brigade organic engineer company as its fourth line company. The corps engineer battalion staff augments the separate brigade engineer staff section for planning and controlling operations. If the task organization of the corps engineer battalion to the separate brigade is long term, the corps engineer battalion commander normally becomes the separate brigade engineer.

Engineer Company (Cavalry Regiment)

The cavalry regiment performs reconnaissance, security, and economy-of-force operations for the corps. The regiment has organic air and ground cavalry units that can operate as combined arms teams over wide areas. The regiment may conduct offensive, defensive, or retrograde operations. It has significant mobile, antiarmor capability and can effectively conduct covering-force, flank-security, or counterattack operations. It may be attached to a division but is capable of independent operations. The regiment has an organic engineer company with three engineer platoons and an A&O platoon that develop and maintain habitual-support relationships with regimental ground squadrons. The regiment also has a separate regimental engineer staff section which provides centralized planning for the total regimental engineer effort. It recommends to the regimental command or S3 the task organization of engineer squads, platoons, and corps assets based on METT-T. The cavalry regiment engineer company commander may detach squads from one engineer platoon to another platoon (main effort). A corps engineer battalion is normally task-organized to the cavalry regiment. When this occurs, the corps engineer battalion normally absorbs the cavalry regiment's organic engineer company as its fourth line company. The corps engineer battalion staff augments the regimental engineer staff section for planning and controlling operations. If the task organization of the corps engineer battalion to the cavalry regiment is long term the corps engineer battalion commander normally becomes the regimental engineer.

THEATER ENGINEER SUPPORT TO THE CORPS

The corps engineer brigade is augmented by other theater engineer organizations from EAC based on METT-T. Theater engineer forces focus primarily on general and topographic engineering operations. Theater general engineering operations include—

- LOC (roads, airfields, ports, railways, and canals) construction, maintenance, and repair.
- Pipeline construction.
- Logistics facility support.
- Rear-area restoration.
- ADC.
- Production and preparation of construction materials.
- Real estate management.
- Support to theater units and C2 facilities.

Theater topographic engineering operations provide the full spectrum of topographic support to all TA assets and, when directed, to joint and multinational commands. Theater engineer organizations (normally assigned to an ENCOM headquarters in a mature theater) can be task-organized to the corps engineer brigade in support of force-projection opera-

tions when required. Theater engineer organizations that can augment the corps engineer brigade are listed below.

Headquarters, Engineer Command
Headquarters, Engineer Brigade (Theater)
Headquarters, Engineer Group (Construction)
Engineer Battalion (Combat Heavy)
Engineer Battalion (Topogtaphic
Engineer Battalion (Prime Power)
Engineer Company (Port Construction)
Engineer Company (Pipeline Construction)
Engineer Company (Construction Support)
Engineer Company (Dump Truck)
Engineer Battalion HHD
Engineer Cellular Teams and Detachments

Headquarters, Engineer Command

The ENCOM is located at TA and is responsible for theater operational engineering, construction, and topography. Its composition is tailored based on METT-T and can consist of a number of theater engineer brigade headquarters, construction engineer group headquarters, engineer battalions (combat heavy, topographic, and prime-power), engineer companies (port construction, pipeline, construction support, and dump truck), and detachments or teams (well-drilling, diving, fire-fighting real estate, utilities, prime-power, power-line construction dredging, asphalt, quarry, and engineer civic action). The ENCOM task-organizes its subordinate units as necessary During force-projection operations, the TA may use a corps engineer brigade headquarters or theater engineer brigade headquarters until an ENCOM is deployed. The ENCOM will deploy in increments to the theater, reaching full status as the theater matures. Until this occurs, the ENCOM or the USACE will augment that headquarters. The ENCOM performs the following functions:

- Planning and coordinating theater engineer operations.
- Assessing theater infrastructure requirements.
- Planning, coordinating, and supervising military and contract construction and engineering services to the Army, other services, and coalition forces in the theater.
- Allocating engineer resources (units, contractors, materials, and equipment) to meet mission requirements.
- Prioritizing the use of available theater engineer assets, including tradeoffs between combat and construction requirements.
- Coordinating topographic and military geographic intelligence support to the force.
- Providing real estate support to the Army, other services, and allies throughout the theater.
- Providing technical assistance to real property maintenance activities (RPMA) throughout the theater.
- Planning construction material requirements and prioritizing their use.
- Providing special engineer support to the theater such as pipeline construction, port construction, dump truck, prime-power, and fire-fighting.

Headquarters, Engineer Brigade (Theater Army)

The TA engineer brigade is the principal subordinate unit of the ENCOM. The engineer brigade has an organic HHC and is tailored based on METT-T. It may have a number of engineer group headquarters, engineer battalions, companies, detachments, and teams. The engineer brigade's AO should coincide with Theater Army Area Command (TAACOM) boundaries whenever possible. During force-projection operations, the engineer brigade, with augmentation from the ENCOM or USACE, may deploy alone. The engineer brigade's C2 capabilities

are similar in those of the ENCOM, with the exception of the topographic support function.

Headquarters, Engineer Group (Construction)

The construction engineer group has an organic HHC and can provide C2 for up to seven engineer battalions, plus a number of separate companies, detachments, and teams. It is the principal subordinate unit of a TA engineer brigade. The construction engineer group FUNCTIONS as the principal construction manager for a given area or given tasks. It has a large planning and design capability. The construction engineer group operating areas normally coincide with area-support-group (ASG) boundaries. In force-projection theaters, a construction engineer group attached to a corps engineer brigade may be all that is deployed for C2 of theater engineers. The engineer group will be weighted with specialized engineer units to execute specific taskings. Construction engineer group C2 capabilities include—

- Planning, designing, coordinating, and supervising general troop construction support to the Army, other services, and agencies within the group's assigned AO.
- Planning, designing, coordinating, and supervising construction or rehabilitation of facilities within the group's area.
- Allocating assigned engineer troops, materials, and equipment to projects.
- Functioning as a corps engineer group.

Engineer Battalion (Combat Heavy)

The combat heavy engineer battalion executes a wide variety of horizontal and vertical construction missions. It is deployable by ship and relatively self-sustaining and able to operate independently in remote areas with security force augmentation. The combat heavy engineer battalion is capable of conducting multiple construction missions simultaneously. The battalion is capable of constructing and providing rapid repair and rehabilitation of facilities such as airfields, roads, bridges, and buildings. With augmentation from specialized engineer companies, detachments, and teams, the combat heavy engineer battalion can manage and assist in the construction of ports, pipelines, water wells, power plants, and power-distribution networks to either austere or complete levels. The battalion can construct TO structures (such as those contained in the AFCS) and erect prefabricated structures. The combat heavy engineer battalion is well suited for support to OOTW such as those conducted during postconflict, humanitarian assistance, disaster relief, and nation assistance. Combat heavy engineer battalions are normally task-organized to the corps engineer brigade or divisions to reinforce their general engineering capability.

Engineer Battalion (Topographic)

The theater engineer topographic battalion provides the full spectrum of topographic support to all TA assets and, when directed, to joint and multinational commands. This includes-

- Terrain analysis.
- Precise positioning (geodetic) surveys.
- Production of mapping, charting, and geodesy (MC&G) products.
- Data-base management (both hard copy and digital).
- Special product storage and distribution.
- Supply of topographic material.
- Intermediate maintenance support of topographic equipment.

The battalion consists of an HHC, one topographic engineer company in GS of the theater, and one topographic company for each supported corps. Requirements for topographic engineer support are developed by the theater intelligence staff and coordinated by the assistant theater topographic engineer (ATTE). The theater engineer is responsible for coordinating and tasking topographic missions. The topographic engineer battalion is functionally organized around data collection assimilation, and analysis. The process is highly automated and relies on high-speed data transmission, graphic display and production capabilities. The battalion works closely with MI units to use current sources of imagery that can be quickly turned into image maps. The battalion uses data bases produced by the Defense Mapping Agency (DMA) and civil and national satellite imagery systems, along with local data sources, to compile and transmit terrain-analysis products to maneuver units. The battalion may provide limited map distribution support until quartermaster map distribution units arrive. Terrain assets of the battalion support company will support SOF.

Engineer Battalion (Prime Power)

The prime-power engineer battalion provides quickly-deployable prime-power companies and teams to force-projection theaters within 72 hours. Prime-power units provide the necessary electrical continuity between tactical generators (TACGENs) and commercial power sources in theater. They also support general engineering operations in the communications zone (COMMZ), providing power generation and power-related technical support to rear-area units (such as air defense), facilities (such as hospitals), and activities (such as Force provider). Prime-power support may extend forward into the corps area at the direction of the theater engineer. Prime-power units also support postconflict operations and OOTW.

Engineer Company (Port Construction)

The engineer port construction company is designed to augment a combat heavy battalion. This results in a task force that has the capability to support joint logistics-over-the-shore (LOTS) operations, provide moorings and anchorage for ocean-going vessels, construct and rehabilitate cargo loading and off-loading facilities, and remove underwater obstacles (to include dredging and demolitions).

Engineer Company (Pipeline Construction)

The engineer pipeline construction company is designed to augment a combat heavy battalion, resulting in a task force capable of providing pipeline construction and major maintenance for the movement of bulk petroleum, oils, and lubricants (POL).

Engineer Company (Construction Support)

The engineer construction support company provides specialized construction capability and construction materials production. Its functions include rock crushing and bituminous mixing and paving for major horizontal construction missions such as paved roads, storage facilities, and airfields. It normally augments a combat heavy battalion.

Engineer Company (Dump Truck)

The engineer dump truck company augments the material-haul capability of construction units for large, long, or extended construction material-haul requirements.

Engineer Battalion (Headquarters and Headquarters Detachment)

The engineer battalion HHD provides C2 of separate theater engineer construction companies, cellular detachments, and teams. The headquarters detachment augments the staff of an ASG in the execution of RPMA for ASG bases, including construction contracting and

host-nation support. It also may serve as a Directorate of Public Works (DPW) for specific theater installations.

Engineer Cellular Teams and Detachments

Engineer detachments and cellular teams provide flexible, tailorable specialized engineer capability to the theater. These teams and detachments are typically small and have very little organic CSS or staff planning capability Engineer construction material production teams produce crushed rock asphalt paving materials, and lumber, as appropriate, to augment indigenous theater capability. Engineer special-purpose detachments and teams perform critical engineer tasks. These include the following.

- Engineer equipment operation team.
- Well-drilling team.
- Heavy diving team.
- Fire-fighting team.
- Real estate team.
- Utilities team.
- Prime-power detachment.
- Powerline construction team.
- Dredging team.
- Civic-action team.
- USACE water-detection team.
- USACE contingency real estate support team (CREST).
- USACE contract support team.

CHAPTER 2
COMMAND AND CONTROL

(General) Walker knew very well that these forces could not stop a major CCF offensive. His purpose in deploying the 2d Division northeasterly was to give the ROKs moral support and prevent a disastrous ROK bugout. Meanwhile, he continued drawing plans for a deep withdrawal to a line at the Kum River.

On December 22 (1950) Walker called the engineer Pat Strong to Eighth Army's tactical CP in Seoul. He gave Strong orders to prepare for a "scorched earth" policy. He would blow up "every bridge and culvert" on the railways and highways, "every foot of railroad line, " and a huge "tidal lock" at Inchon. Strong was aghast. He viewed these orders as utterly defeatist, "the scorched earth policy of an army that would never return. " He did not have sufficient resources to rebuild these structures should Eighth Army regain the offensive. For that reason he "pleaded" with Walker to restrict demolition to "key bridges" and merely a single span in other bridges and, since the U.S. Navy controlled the seas and would deny the CCF use of Inchon, to spare the tidal lock, which would take "months" to rebuild. But Walker refused to change the order. . .

A description of the withdrawal from the Yalu River, from the book, The Forgotten War, America in Korea 1950-1953, by Clay Blair.

Corps engineer C2 is the exercise of leadership through a system of organizations, facilities, and processes that plans, directs, controls, and coordinates corps engineer operations. Effective corps engineer C2 is crucial to providing the corps commander with responsive engineer support throughout the corps's AO. It enables the corps engineer brigade commander to integrate engineer plans into future operations as well as to synchronize the effort involved in the current fight. This chapter focuses on establishing effective engineer C2 with the corps. It draws on the C2 principles and structure outlined in FMs 101-5 and 100-15.

THE CORPS ENGINEER BRIGADE COMMANDER AND HIS STAFF

COMMAND

Corps battles are the key to tactical and operational campaign success. Personal leadership is the most vital component of combat power and has the most critical impact upon the outcome of battles and campaigns. FM 101-5 describes the essential concepts of command-authority and responsibility. Commanders can delegate authority to subordinate commanders; however, they retain responsibility at all times. Command is personal, and a commander must take his role seriously. Battle command has two vital components: decision making and leadership. Commanders command one level down and monitor two levels down.

The corps engineer brigade commander provides the purpose, direction, and motivation for his soldiers to accomplish the difficult and dangerous engineer tasks that support corps operations. The brigade commander determines what his leadership team and subordinate engineer organizations need to be able to do in war, establishes or reinforces standards, and then resources and trains the corps engineer forces.

The corps engineer's role as both a brigade commander and corps special staff officer provides unique leadership challenges. The brigade commander positions himself where he can best command engineer support for the corps commander. In his role as commander, he is at the scene of the engineer main effort. He promotes command presence that enhances the morale of corps engineer forces. The brigade commander is also the corps commander's engineer special staff officer, directly accessible to the corps decision makers. He assists the corps commander by controlling the total engineer fight, anticipating problems, providing timely recommendations, and participating in initial future planning. He must balance his time commanding and controlling subordinate corps engineer units with his time needed to be with corps decision makers.

CONTROL

FM 100-5 states that commanders use control to regulate forces and functions on the battlefield in order to execute the commander's intent. A commander derives the authority to control another unit from his command responsibility. A supported unit commander, such as the maneuver division commander, has the authority to coordinate directly with supporting commanders in order to synchronize his plan and adjust its execution. The supporting commander must accomplish these tasks for the supported commander and is responsible for the internal control of his unit. Unit task organization, with designated command and support relationships, prescribes the supporting commander's authority over other commanders. Commanders can use forms of procedural controls for indirect purposes to accomplish clear, easily understood tasks. These include maneuver graphics, concepts of operation, mission orders, regulations, doctrine, and standing operating procedures (SOPs) to control subordinate units' actions. Positive controls are used for direct purposes to accomplish complex or vague tasks. These include setting times for mission accomplishment, committing reserves, and implementing changes to plans.

In advance of events, the corps commander establishes the conditions he wants to obtain at the conclusion of the battle or campaign. His concept of the operation includes his intent his vision of the end conditions, why those end conditions are necessary and how the corps will achieve those results. This concept of the corps operation provides the focus for all corps engineer operations and extends the corps commander's intent throughout the entire engineer force. All corps engineer leaders maximize decentralization of engineer support to the corps. They issue engineer orders that clearly indicate what must be done, but provide subordinates with maximum latitude as to how to get it done. They promote bold, innovative, risk taking and the immediate use of opportunities within the context of the corps engineer brigade and corps commander's intent.

The corps engineer brigade commander develops his engineer concept of the operation that provides the basis for engineer task organization, scheme of engineer support tasks to subordinate engineer units, engineer work areas, synchronization, and identification of critical collateral engineer operations. Success in the execution of the engineer concept requires the brigade commander's personal attention and perseverance, his ability to recognize the need for changes or modifications to the engineer concept, and his ability to affect the necessary changes in a timely manner. He formulates a new engineer concept or revises it whenever there is a changing corps mission or situation.

He continuously analyzes his engineer mission and maintains a continuous engineer estimate and engineer battlefield assessment (EBA), modifying his engineer concept over time as the need arises. The corps engineer visualizes the large and complex operation of his own engineer force and corps maneuver and logistics forces (as well as that of the enemy) and projects that visualization into the future. The engineer concept is sufficiently detailed so that the staff can develop the plan and specific engineer missions for subordinate engineer units so that they can take actions to support the plan, even in the absence of subsequent guidance. Several iterations may be required to clearly refine the engineer concept.

An engineer control process achieves agility by overcoming the inherent perception of engineers being "tied to the terrain. " To enhance this agility the engineer brigade commander controls subordinate engineer forces from any location on the battlefield. He provides a responsive control structure by organizing the corps engineer brigade staff, establishing engineer control facilities, and defining the engineer control process used. He effectively uses his engineer control organizations to hear, see, and understand all engineer battlefield missions within the corps. The corps engineer control system provides timely and accurate information through the use of periodic engineer situation reports (SITREPs) and other engineer battle information systems that monitor corps engineer support to the battlefield. Face-to-face discussions between the corps engineer and subordinate engineer commanders often tell much about the engineer situation. The corps engineer control system rapidly transforms the engineer brigade commander's decisions into specific directions through the corps operation order (OPORD) and engineer annex to engineer units augmenting divisions, separate brigades, and the cavalry regiment, as well as through corps engineer brigade orders to engineer units under engineer brigade control.

The corps engineer brigade commander and his staff understand the terrain and their opponent well. They know the available strategic and operational imagery products and topographic systems that provide the necessary terrain information to corps planners. The brigade commander and his staff provide recommendations to the corps commander on how to defeat various threat engineer capabilities such as bridging, breaching, and obstacle-emplacement systems.

The corps engineer brigade commander and his staff understand and are proactive with corps logistics operations. Continuous engineer input with corps logistics planners ensures that corps engineer forces are properly supported and sustained throughout campaigns and battles. In addition, extensive survivability or general engineering support to corps logistics forces is also planned and executed in a timely manner.

A well-trained, smoothly-functioning corps engineer brigade staff requires that the brigade commander develop, train, guide, and demand high standards of performance from all members of the staff in peacetime to ensure that they are properly prepared for war. This demands realistic, difficult training exercises in support of the corps, with all key engineer players present and performing their engineer functions as they would in battle. The ability to synchronize thought with the corps engineer brigade commander is more than just understanding the commander's intent. It is that single unity of thought developed through interaction with the brigade commander so that the engineer staff thoroughly understands his thought processes and how he would react in any given situation.

CORPS ENGINEER COMMAND AND CONTROL ORGANIZATION

The corps commander exercises control through the Army Battle-Command System (ABCS) from several CPs and a command group. ABCS is the battle-command system used by all tactical echelons up through the corps (see Figure 2-1 for the ABC S). The corps also provides the link between ABCS and the battle-command systems of the joint or multinational C2 systems that area part of the Army Information Systems Network (AISN) (see Figure 2-2). CPs support the corps commander by providing the structural framework to facilitate planning, directing, controlling, and coordinating the corps's operations. A separate entity called the corps command group is also formed and has specific functions and characteristics. Figure 2-3, page 2-6, graphically depicts corps and engineer CP locations.

The corps engineer brigade normally establishes a separate brigade CP under the control of the deputy brigade commander (DBC). In addition to establishing the brigade CP, corps engineer planning-and-control capability is available at each corps CP (assault, tactical, main, and rear) and is available to the corps command group as

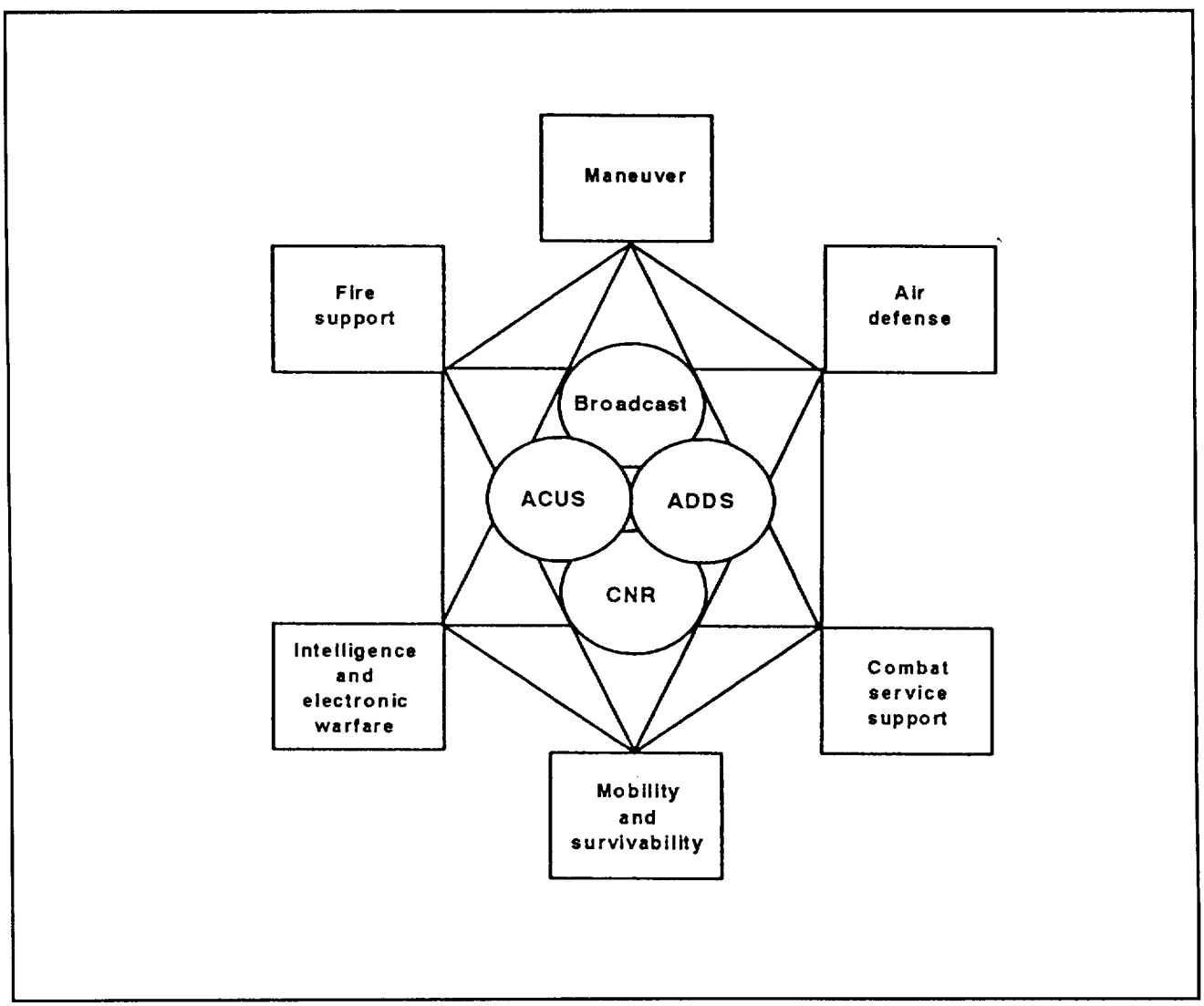


Figure 2-1. **Army** ***Battle-Command System (ABCS) architecture***

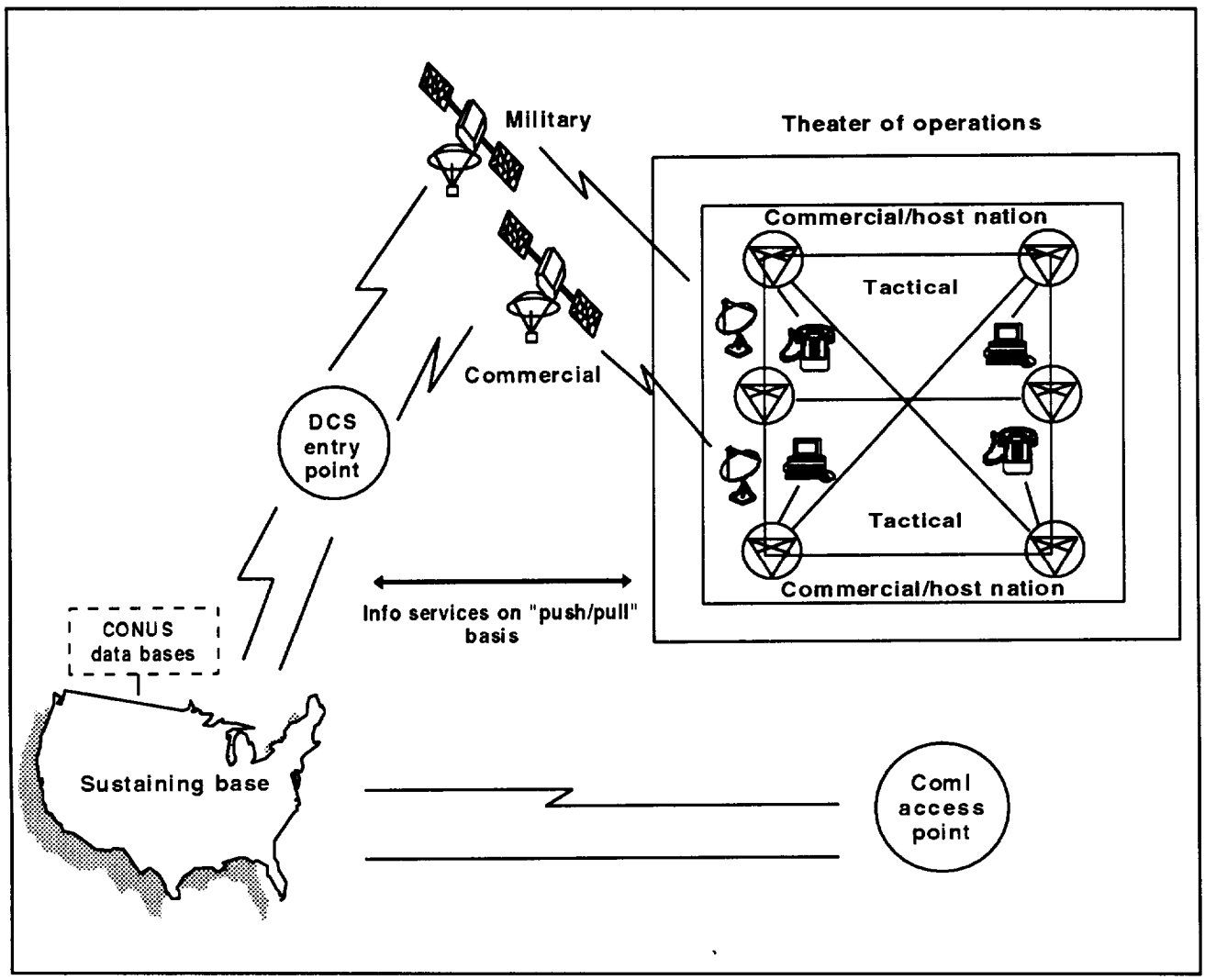


Figure 2-2. Army Information systems network

required. The corps engineer brigade has an SES element located within each corps CP. This engineer staff is under the control of the Assistant Corps Engineer (ACE), who integrates engineers into the corps planning process. The ACE provides advance warning of future corps operations through engineer channels to the corps engineer brigade headquarters and to engineer staffs at divisions, separate brigades, and the cavalry regiment. The ACE also receives current engineer force information from the organic division and separate maneuver forces. This allows the ACE to have a total picture of the overall engineer situation. The brigade CP provides current corps engineer force information to the ACE and engineer staff elements at each CP. Figure 2-4, page 2-7, shows the relationships between the brigade CP, the corps CP engineer staffs, and the brigade command group.

Corps engineer groups also establish separate group CPs under the direction of the group executive officer (XO). The group CP provides current engineer force information to the brigade CP. The group CP is structured similar to the brigade CP.

Corps engineer battalions and companies also establish separate CPs under the direction of the battalion or company XOs.

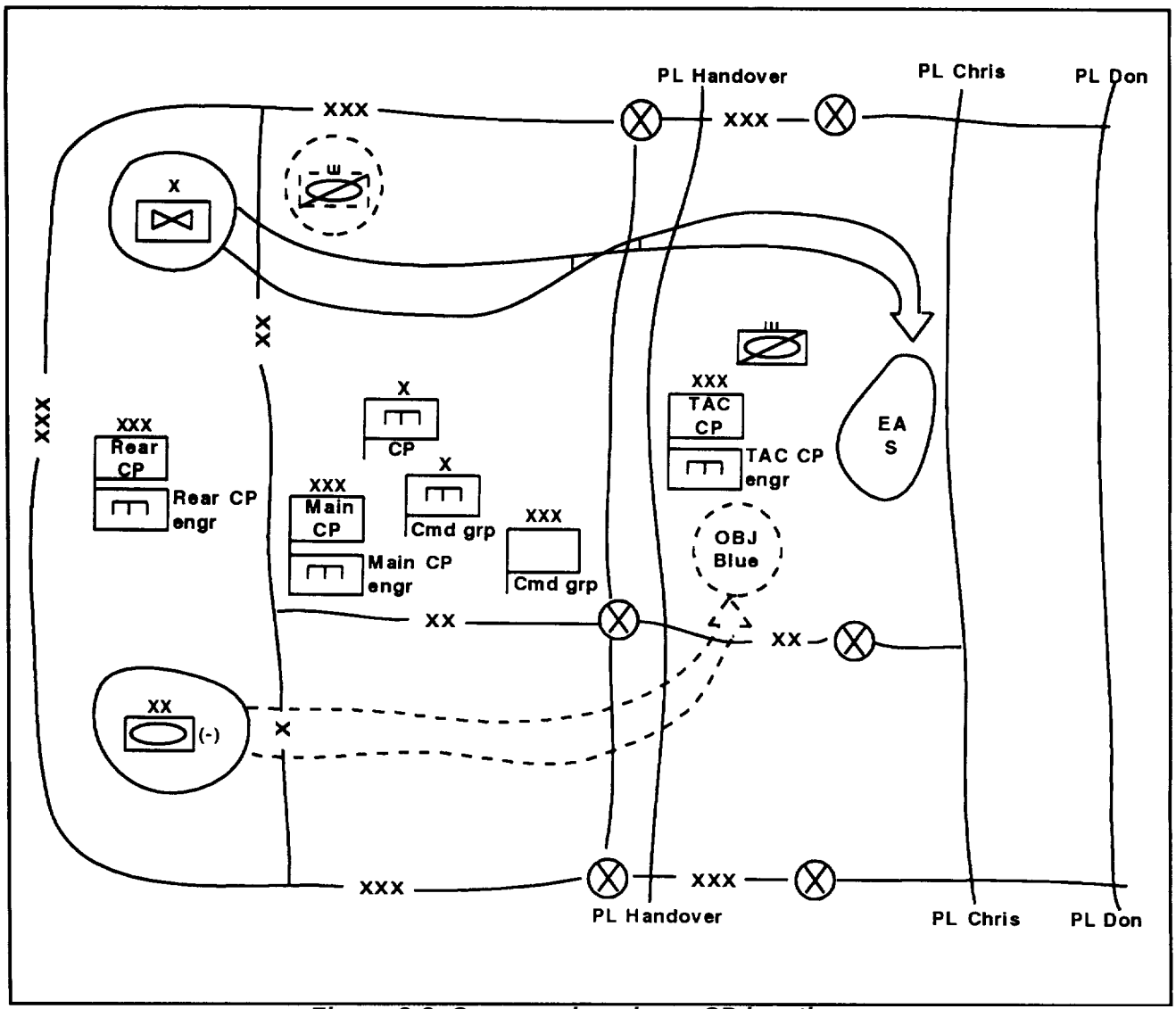


Figure 2-3. Corps and engineer CP locations

CORPS ENGINEER BRIGADE

The corps engineer brigade commander commands and controls corps engineer forces through the brigade command group and the brigade CP. Each are mutually supportive and provide timely information to the corps SES.

Corps Engineer Brigade Command Group

The corps engineer brigade forms a command group consisting of the brigade commander and those accompanying him on the battlefield. The brigade commander normally concentrates on the current engineer fight. He may locate forward with either the corps command group, the corps tactical CP, or the brigade CP. In some cases, the brigade commander may move to the decisive point of engineer operations to act as the eyes for the corps commander. The brigade commander coordinates closely and controls the engineer fight with his subordinate group and separate battalion commanders. The brigade commander may use the brigade command sergeant major (CSM) as a second set of eyes for current engineer operations. The CSM maybe positioned on a secondary engineer effort or with the brigade corn mander at the engineer main effort. The CSM

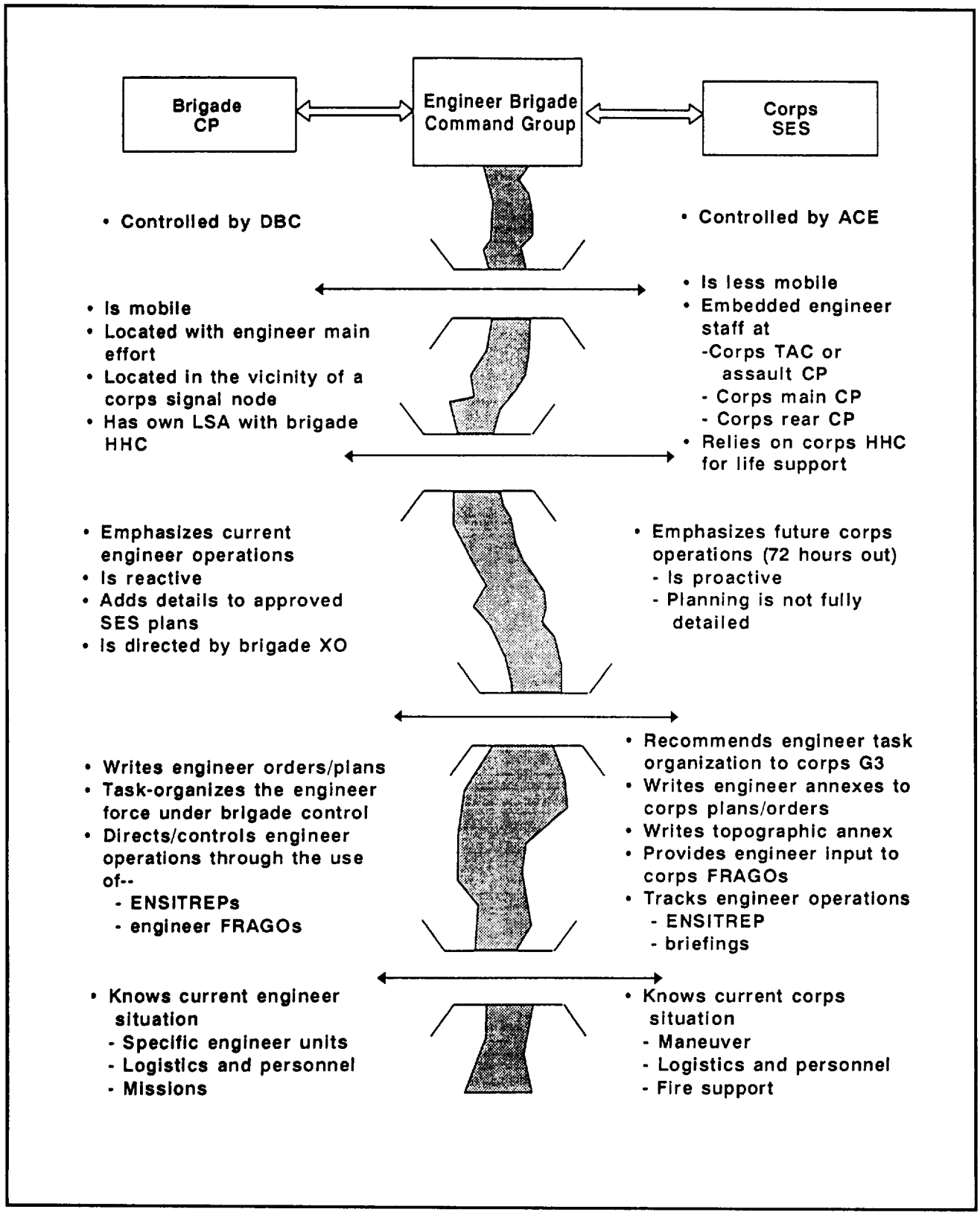


Figure 2-4. Corps engineer C2 relationships

monitors the status of engineer brigade soldiers, including their health, welfare, morale, and individual training proficiency. To be effective, both the brigade commander and the CSM require dedicated transportation and communications capabilities.

Corps Engineer Brigade Command Post

The corps engineer brigade headquarters establishes a mobile brigade CP in the vicinity of the corps engineer main effort. The brigade CP is directed by the DBC, who provides appropriate leadership, intent and guidance to the brigade CP staff. The brigade CP remains focused on current engineer operations by maintaining close coordination with corps engineer groups, separate battalions, and companies. The brigade CP consists of three elements--the corps engineer brigade tactical operations center (TOC), a signal element, and a life-support area.

Brigade TOC. Because of its size and breadth of responsibilities, the corps engineer brigade TOC has multidisciplined cells that enhance engineer coordination and synchronization. These include a current-operations cell, a plans cell, and a CSS cell. The brigade XO directs the brigade TOC.

Current-operations cell. The brigde TOC current-operations cell consists of Operations and Training Officer (US Army) (S3) personnel. Intelligence Officer (US Army) (S2) personnel, the brigade chemical officer, and representatives from the brigade Supply Officer (US Army) (S4), Adjutant (US Army) (S1), and Civil Affairs Officer (US Army) (S5). The cell's primary function is to monitor the current status of corps engineer units, including their missions, logistics, personnel, and host-nation support. The current-operations cell writes and maintains engineer brigade orders. It also maintains current threat information (including threat engineer capability). This cell works closely with the engineer staff in the corps main CP current-operations cell and maintains communications with the engineer staff at the corps assault tactical (TAC), and rear CPs. The current-operations cell also maintains continuous contact with brigade liaison officers (LOs) detailed to subordinate engineer headquarters or supported corps, joint or multinational forces and contracting agencies. The cell is responsible for brigade CP OPSEC. If, in support of corps rear operations, the corps engineer brigade commander is designated as a base cluster commander, the current-operations cell performs the additional mission of being a base cluster operations center (BCOC) for the commander. The BCOC coordinates rear-area tactical-operations support for the base cluster with the designated corps rear-area operations center (RAOC).

Plans cell. The brigade TOC plans cell consists of brigade S3 and S2 personnel and representatives from the brigade S4, S5, and S1 sections, along with liaison personnel from the corps topographic engineer company that is in DS to the corps. The plans cell writes detailed engineer plans that support approved corps plans, including construction estimates. The corps topographic company provides terrain imagery products in support of this planning. Corps EBA products and engineer reconnaissance collection plans are developed here. This cell works closely with the engineer plans cell at the corps main CP, the corps G2, and the terrain-analysis team supporting the G2.

CSS cell. The brigade TOC CSS cell consists of the brigade S4, S1, S5, chaplain, and Staff Judge Advocate (SJA) sections. The cell's primary function is to track critical engineer logistics and personnel items that support corps engineer operations. This may include critical engineer Class V demolitions and mines. Class IV supplies, critical engineer equipment shortages and maintenance, critical engineer personnel shortages, corps MSR conditions, and host-nation support. The CSS cell works closely with the corps G4, Assistant Chief of Staff, G5 (Civil Affairs)(G5) Assistant Chief of Staff, G1 (Personnel) (G1), COSCOM, and the engineer staff at the corps rear CP to resolve CSS issues. The chaplain and SJA are

considered part of the corps engineer brigade commander's personal staff and may accompany him when required.

Signal element. The corps engineer brigade communications section is responsible for connecting the brigade CP into the signal support network which includes the combat net radio (CNR), the area common user system (ACUS), the automated data distribution system (ADDS), and broadcast interface. Engineer communications systems must provide timely, accurate, secure, and reliable information flow to and from the corps engineer brigade commander, his staff, corps staff engineer elements, and higher and lower echelons. The brigade signal officer (BSO) continuously coordinates engineer signal requirements with the corps signal brigade and the corps signal officer. He is responsible for information system security (ISS) at the brigade CP. The communications section also establishes base cluster communications networks when required.

Life-support area. The corps engineer brigade HHC commander is responsible for providing secure working and living facilities for brigade CP personnel. This includes food and field services, supply and maintenance capability. The company commander is responsible for planning a tactical base defense, establishing a base defense operations center (BDOC), and interfacing with designated BCOCs and/or RAOCs. Normally, the brigade TOC is located in the vicinity of the life-support area. The company commander coordinates force protection and other security measures with the brigade TOC current-operations cell.

CORPS STAFF ENGINEER SECTION

The SES represents the corps engineer during all aspects of corps planning and execution. The SES provides embedded, timely engineer staffing support to the corps command group and each corps CP (assault, TAC, main, and rear) as required. The SES also provides timely information to the corps engineer brigade command group and the brigade CP.

Engineer Support to the Corps Command Group

The corps command group's primary purpose is to keep the corps commander informed. When separated from the corps CPS, the command group will normally consist of the corps commander and representatives from the G3, G2, and fire-support elements. The command group provides corps leadership, intent, and guidance through a small, secure, mobile CP.

The corps engineer provides representation to the command group, especially during major corps operations requiring extensive engineer support such as major river crossings, obstacle-breaching operations, and large-scale defensive preparations.

Engineer Support to the Corps Assault and Tactical Command Posts

During force-projection or fast-moving operations, the corps will normally deploy an assault CP with the subordinate maneuver units while the corps main and rear CPs initially remain at a fixed location (the home station, the intermediate staging base (ISB), or the corps rear area). After the corps main and rear CPs deploy forward, the assault CP normally becomes the TAC CP. The corps assault and TAC CPs focus on conducting corps close operations. Deep and rear operations are monitored only for their effect on close operations. The assault and TAC CPs are small and mobile, with reduced electronic signature. They are under the corps G3's control. They may be located well forward in the corps areas (such as in the vicinity of the main CP of a division conducting the corps's main attack) or with a counterattacking force during the defense. Integrated engineer support to the corps assault and TAC CPs are provided by an element from the corps engineer brigade headquarters' SES. This engineer cell fully integrates current corps engineer operations with current maneuver, intelligence, fire-support, aviation, ADA, chemical, and CSS operations. The cell's major functions are—

Ž Synchronizing engineer support of corps close operations.

Ž Writing engineer portions of corps warning orders (WARNO RDs) and fragmentary orders (FRAGOs) in support of corps close operations.

• Maintaining the current engineer situation and EBA information supporting corps close operations.

Ž Assessing the current engineer support to the tactical situation.

Ž Assisting in the acquisition of terrain imagery products needed to support corps close operations.

Ž Monitoring the status of engineer logistics support and updating logistics requirements for corps close operations.

Ž Providing close operation engineer situation information to the corps main CP engineer cell.

Ž Monitoring corps deep and rear operations for effects on engineer support to corps close operations.

• Tracking and consolidating current threat and friendly obstacle information and providing it to the corps main CP engineer cell.

Engineer Support to the Corps Main Command Post

The corps fights one simultaneous battle across the full range of the battlefield--deep, close, and rear. The normal organization of the corps CPs reflects these related activities. The main CP is organized, manned, and equipped to sustain awareness of the corps's total battle space. It predominately focuses on deep and future operations and monitors close and rear operations. The corps main CP synchronizes the battle-command system, providing continuity for corps operations. The main CP has a broader orientation and is more future oriented than the assault or TAC CPs. The main CP synchronizes the entire corps battle, conducts corps deep operations, and plans all future operations. It is normally located in a built-up area, if the situation permits, and is positioned in the forward portion of the corps rear area. The corps main CP is controlled by the corps chief of staff and is comprised of six cells: current operations, intelligence, plans, corps deep operations coordination cell (CDOCC), CSS, and headquarters cells.

Integrated engineer support to the main CP element is provided by elements from the SES under the direction of the ACE. The ACE remains focused on engineer support to future corps operations, maintaining close coordination between all corps CP engineer sections. The ACE is normally located at the corps main CP. Engineers are integrated into the current operations, plans, corps deep operations coordination, and intelligence cells of the main CP.

Main CP current-operations cell. The main CP current-operations cell's primary function is to synchronize current corps deep, close, and rear operations. It also controls deep maneuver operations and maintains the current corps situation. The main CP current-operations cell also allocates resources to current operations based on the corps commander's guidance; develops branches to current operations; and provides current situation information to higher, lower, and adjacent headquarters. In addition, the cell monitors close and rear operations through communications with the corps assault, TAC, and rear CPs. The bulk of the SES operations element is integrated into this cell. The major engineer functions in support of the main CP current-operations cell are to—

• Monitor the execution of current engineer orders and the status of engineer work in the corps area by maintaining

close communications with the brigade CP.

Ž Monitor the status of ongoing deliberate corps river-crossing and large-scale obstacle-breaching operations (including crossing-site conditions, emplaced bridging, and cleared-lane information). Provide this information to engineers located at the corps rear CP and the brigade CP.

Ž Write engineer portions and annexes to related current corps FRAGOs in coordination with the corps assault or TAC CP engineer element.

Ž Monitor the status of corps-directed obstacle zones, directed or reserved obstacles, denial targets, and scatterable mines employed by the corps.

Ž Monitor the current corps engineer logistics status, including tactical bridging and breaching equipment, engineer construction equipment and supplies, mines and demolitions, and map supplies. Provide this information to corps logistics planners and engineers located at the corps assault or TAC and rear CPs.

Main CP plans cell. The plans cell develops future operation plans as sequels to the current corps operation. The cell monitors the current situation for its impact on future operations and makes appropriate adjustments. It fully integrates future corps engineer operations with future maneuver, intelligence, fire-support, aviation, ADA chemical, logistics, and corps deep operations. The major engineer functions in support of the main CP plans cell are to—

• Plan engineer support to future corps deep, close, and rear operations (sequels) by developing courses of action for each; preparing engineer estimates and EBAs; determining limitations of engineer units providing future support; developing supporting engineer task organizations; recommending engineer work priorities based on the corps engineer brigade commander's and corps commander's intent; and writing appropriate engineer annexes to approved corps plans.

Ž Make available all pertinent topographic and terrain imagery products needed in planning future corps operations.

' Recommend corps-level control measures, to include obstacle zones, ORAs, directed or reserved obstacles, scatterable minefield delegation authority, and corps denial targets.

' Plan engineer support for corps tactical movements.

Ž Monitor the current corps engineer situation, the current threat engineer situation, and the ongoing EBA for its impact on future operations, and then adjust future engineer operational support plans as needed.

Ž Advise the corps engineer on the status and content of ongoing corps plans that are not approved or published and ensure that the corps engineer's intent and guidance is input into these working plans.

Ž Provide future corps operations information to engineer elements located at the corps assault, TAC, and rear CPs along with the brigade CP plans cell as required.

' Coordinate approved future plans with requisite theater engineer planning staffs.

' Review subordinate engineer orders and plans for compliance with the corps en-

gineer's intent and corps engineer brigade plans and orders.

Main CP CDOCC. The key to fighting simultaneously in depth is a battle-command organization that can synchronize all available means to simultaneously conduct deep, close, and rear operations. To ensure unity of effort, a single organization within the main CP, the CDOCC, is responsible for the employment of all aspects according to the commander's guidance. The CDOCC is permanently manned, as a minimum, by G3 plans, electronic warfare (EW), fire support, intelligence, and Army airspace command and control (A2C2) representatives. Additional representatives, such as the corps engineer, psychological operations (PSYOP), air defense, and air liaison, are brought in as required. The CDOCC coordinates deep operations for the corps, interfacing with the joint targeting coordination board and the corps targeting cell to provide linkage to joint and organic fires. After the commander assigns decisive points for attack by subordinate headquarters, the cell monitors and coordinates the execution of corps deep operations. The major engineer functions in support of the CDOCC are to—

- Determine high-payoff countermobility targets for nomination in support of corps deep operations.
- Monitor the employment of deep air- and artillery-delivered scatterable mines, including self-destruct times and footprint locations.
- Recommend and coordinate the employment of corps-directed artillery and air-delivered scatterable minefield in support of current corps operations.
- Synchronize corps fire support with current large-scale corps engineer operations such as river crossings, large-scale breaching, and obstacle-emplacement.
- Determine mobility and survivability requirements to support corps field artillery brigade and aviation brigade operations and movements.

Main CP intelligence cell. The main CP intelligence cell requests, collects, and analyzes threat, terrain, and weather information from all sources in order to produce and distribute combat intelligence. It conducts continuous IPB to support planning for future operations and to use as the basis for target development. As part of the deep-targeting process, the main CP intelligence cell implements the corps intelligence-collection plan and notifies the main CP fire-support and current operations cells when HVTs are detected and tracked. A topographic engineering officer from the SES is normally located in the main CP intelligence cell. His major engineer functions in support of the cell are to—

- Advise corps main CP personnel on the effective use of terrain.
- Provide weather and terrain analyses and terrain products that assist in the corps IPB process and the identification of NAIs and TAIs for corps deep operations.
- Coordinate corps topographic support requirements for surveying, terrain analysis, and reproduction with the theater topographic battalion.
- Task and prioritize the work effort of the DS corps topographic company.
- Coordinate the collection of battlefield terrain information with the corps G2/G3.
- Evaluate the availability of standard and nonstandard maps and terrain-analysis data bases covering the corps's AO. Where shortfalls exist, he determines specific requirements and coordinates the collection and creation of nec-

essary data to build the corps topographic data base.

- Prepare the topographic operations annex for corps plans and orders.

Ž Coordinate the support of two corps terrain-analysis teams from the corps topographic company; one in GS to the corps and the other in DS to the corps G2/G3.

Engineer Support to the Corps Rear Command Post

The corps rear CP conducts corps rear operations with the corps deputy commanding general (DCG) being responsible for the conduct of corps rear operations. The DCG commands and controls those units that are task organized to conduct rear operations, when required. This C2 function synchronizes rear security operations, terrain management within the corps rear area, sustainment of the corps, control of administrative moves, ADC, and other associated functions in the corps rear area.

The corps rear CP contains three components: a headquarters, an operations cell, and a CSS cell. The rear CP is normally located in close proximity to the COSCOM CP for security, life support, and ease of coordination, but both CPs are separate and distinct.

Integrated engineer support to the corps rear CP is provided by an element from the SES of the corps engineer brigade headquarters. Engineers integrate themselves into each cell of the corps rear CP as required.

Rear CP headquarters. The headquarters is composed of the DCG, his personal staff, and other personnel as designated. The corps deputy chief of staff is normally designated as the corps rear CP chief of staff to control rear CP operations. Engineer support to the headquarters provides rear engineer information, as required, through informal information and decision briefings.

Rear CP operations cell. The rear CP operations cell exercises staff responsibility for terrain management and security functions. It monitors the corps close and deep operations in order to assume control, if required, and to ensure that rear operations are responding to current and future corps requirements. The rear CP operations cell has three sections: intelligence, operations, and terrain management.

Engineers are integrated into each section, providing needed ADC expertise and obtaining needed imagery products for rear terrain management. In addition, engineers monitor the status of foreign/host-nation and contracting support for real estate acquisition and construction equipment and supplies. They also maintain the status of large-scale construction operations. They provide this information to the corps G4 and G5, the COSCOM, theater engineer planners, corps main CP engineer elements, and the corps engineer brigade S5. Engineers closely coordinate with the corps RTOC concerning base cluster defense requirements.

Rear CP CSS cell. The CSS cell consists of personnel from the corps G1, Adjutant General (AG), G4, G5, and other staff offices charged with the planning and execution of personnel and logistical operations for the corps. The CSS cell synchronizes corps sustainment operations and plans movements throughout the corps rear area. Engineers monitor the status of general engineering missions along with conditions of MSRs throughout the corps rear area. Engineers also coordinate closely with the corps movement control center (MCC) and MP to facilitate battlefield circulation.

CORPS ENGINEER GROUP

The corps engineer group C2 organization is similar to that of the corps engineer brigade CP. Depending on METT-T, corps engineer groups may be task organized in GS on an area basis in the corps rear, or they may be in a command or support relationship to a division,

separate brigade, or cavalry regiment. Because of these wide-ranging possibilities of missions, the engineer group C2 organization must remain flexible and mobile in order to provide responsive engineer information flow and direction. The engineer group C2 organization can be described in terms of the engineer group command group and three CPs: a main CP (group main CP), a tactical CP (group TAC CP), and a rear CP (group rear CP).

Corps Engineer Group Command Group

The engineer group forms a command group that consists of the group commander and those accompanying him on the battlefield. The group commander normally concentrates on the current engineer fight. He may locate forwar with a forward corps engineer battalion conducting the engineer main effort or at the group main CP. In some cases, the group commander may move to the decisive point of engineer operations to act as the eyes for the corps engineer brigade commander. The group commander coordinates closely and controls the engineer fight with his subordinate battalion and separate company commanders. He may use the group CSM as a second set of eyes on the current engineer operations. The CSM may be positioned on a secondary engineer effort or with the group commander at the engineer main effort. The CSM monitors the status of engineer group soldiers, including their health, welfare, morale, and individual training proficiency. To be effective, both the group commander and the CSM require dedicated transportation and communications capabilities.

Corps Engineer Group Command Posts

The corps engineer group normally establishes one CP, the group main CP. However, METT-T may dictate the need for the engineer group to establish a TAC or rear CP out of group assets.

Corps engineer group main CP. The engineer group headquarters establishes a mobile group main CP in the vicinity of the engineer group main effort. The group main CP is directed by the engineer group XO. When the group commander is not located at the group main CP, the XO provides appropriate leadership, intent, and guidance to the group CP staff The group main CP consists of three elements: the engineer group TOC, a signal element, and a life-support area.

Group TOC. Because of its size and breadth of responsibilities, the group TOC has multidisciplined cells that enhance engineer coordination and synchronization. These cells include the group main CP current-operations cell, plans cell, and CSS cell.

Current-operations cell. The group TOC current-operations cell consists of group S3 and S2 personnel, the group chemical officer, and rep resentatives from the group S4 and S1. The cell's primary function is to monitor the current status of corps engineer group units, including their missions, logistics, personnel, and host-nation support. The current operations cell writes and maintains corps engineer group orders. It also maintains current threat information (including threat engineer capability). This cell works closely with the engineer staff in the corps engineer brigade CP current-operations cell, subordinate engineer unit CP personnel, LOs detailed from the corps engineer brigade, and supported maneuver forces. The current-operations cell also maintains continuous contact with group LOs detailed to subordinate engineer units or supported corps maneuver forces. The cell is responsible for group CP OPSEC. If, in support of corps rear operations, the corps engineer group commander is designated as a base cluster commander, the current-operations cell performs the additional mission of being a BCOC for the commander. The BCOC coordinates rear-area tactical-operations support for the base cluster with the designated corps RAOC.

Plans cell. The group TOC plans cell consists of group S3 and S2 personnel and representatives from the group S4 and S1 sections. The plans

cell writes detailed engineer group plans, including construction estimates, and develops EBA products and engineer reconnaissance collection plans. This cell works closely with the engineer plans cell at the corps engineer brigade CP, the brigade S2, and subordinate engineer units.

CSS cell. The group TOC CSS cell consists of the group S4, the engineer equipment maintenance officer (EEMO), S1, and chaplain sections. The cell's primary function is to track critical engineer logistics and personnel items that support corps engineer group operations. This may include critical engineer Class V demolitions and mines, Class IV supplies, critical engineer equipment shortages and maintenance, critical engineer personnel shortages, MSR conditions, and host-nation support. The CSS cell works closely with the corps engineer brigade S1, S4, and S5; subordinate engineer CSS staff elements; and COSCOM support units. The chaplain is considered part of the corps engineer group commander's personal staff and may accompany him when required.

Signal element. The engineer group communications section is responsible for connecting the group main CP and, if established, a group TAC CP into the signal support network, including the CNR, the ACUS, the ADDS, and broadcast interface. Engineer communications systems must provide timely, accurate, secure, and reliable information flow to and from the corps engineer group commander, his staff, the brigade CP subordinate engineer unit CPs, and supported maneuver forces, when required. The group signal officer continuously coordinates engineer signal requirements with the corps engineer BSO. The group signal officer is responsible for ISS at the group CP. The communications section also establishes base cluster communications networks when required.

Life support area. The engineer group HHC commander is responsible for providing secure working and living facilities for group main CP personnel. This includes food service, supply, and maintenance capability. The company commander is responsible for planning a tactical base defense, establishing a BDOC, and interfacing with designated BCOCs and/or RAOCs. Normally, the group TOC is located near the life-support area. The company commander coordinates force protection and other security measures with the group TOC current-operations cell.

Corps engineer group TAC CP. The engineer group commander determines the need for forming a group TAC CP based on METT-T. For example, a group TAC CP may be needed to command and control engineer support to an attacking light division, providing forward engineer command and staff presence. The group TOC provides the nucleus of personnel to form a group TAC CP under the group S3's control. Vehicles and communications systems needed to forma group TAC CP are taken from organic engineer group equipment. The group TAC CP must be as maneuverable and survivable as the supported force, and it must be able to communicate the necessary engineer information to higher, lower, and adjacent echelons in a timely manner.

Engineer group rear CP. The engineer group commander determines the need for forming a group rear CP based on METT-T. For example, a group rear C P may be located in the vicinity of the division support command (DISCOM) to control engineer logistics support from the corps. The group TOC CSS cell provides the nucleus of personnel to work in the group rear CP under the group S4's control. Vehicles and communications systems needed to form a group rear CP are taken from organic engineer group equipment. The group rear CP must be as maneuverable and survivable as the supported force, and it must be able to communicate the necessary engineer information to higher, lower, and adjacent echelons in a timely manner.

Engineer Group Command and Control Special Employment Considerations

The engineer group normally employs the C2 organization described previously. There are

several circumstances which may modify the way the engineer group conducts its C2 mission. A few of these are described in the following paragraphs, including C2 of corps engineer support to a division and C2 of large-scale mobility or construction operations.

Group C2 of corps engineer support to a division. Light divisions have austere organic engineer capability. Because of this, they are normally augmented by a corps engineer group that commands and controls several corps engineer battalions and separate engineer companies. In most cases, armored and mechanized divisions have an organic engineer brigade that can adequately control corps engineer unite operating in the division area. An engineer group may be task organized to an armored or mechanized division in order to control specific engineer missions such as large-scale mobility operations. An engineer group may also be required when the number of task-organized corps engineer units to the division exceeds the division engineer brigade's C2 capability. When an engineer group is task organized by METT-T to control corps engineer support to a division, several key considerations must be made, including—

- How will the engineer group commander work with, and possibly for, the division engineer?
- Will the engineer group receive missions through the Assistant Division Engineer (ADE) staff and division G3, or will it be tasked directly by the division engineer brigade or battalion S3?
- Ž Will EWLs be established, defining the areas where corps engineers will work in the division area?
- Will division engineers be task organized in a mix with corps engineers?
- ' Will any portion or all of division engineer unit battalions be placed under the control of the engineer group?
- Ž Will the engineer group need to form a group TAC CP? If so, where will it and the group main CP be located?
- ' Does the group have high precedence assigned to its communications links supporting the division?
- ' How long will the engineer group be supporting the division?
- ' What command and support relationships are to be used for the engineer group and subordinate corps engineer units?
- ' What communications and other equipment support will the engineer group need to provide adequate C2 interface with the division?
- ' What are engineer LO requirements?
- ' What logistics control considerations are needed to support an engineer group and its subordinate units in the division area?

An engineer group may provide the manpower to staff a light division rear CP due to austere organic capability The following should be considered:

- What is the relationship between the engineer group, the assistant division commander for support (ADC-S), the division G4, and the DISCOM commander?
- How long will the engineer group be supporting the light division rear CP?
- Who will control ongoing corps engineer support missions to the light division?

Group C2 of engineer support to large-Scale mobility operations. Corps engineer groups are especially suited to control the massive engineer support required of large-scale mobility operations such as obstacle breaching and deliberate river crossings as described in FMs 90-13 and 90-13-1. The engineer group can provide positive control of engineer units and equipment during these operations. When an engineer group is task organized by METT-T to command and control corps engineer support to large-scale obstacle-breaching or deliberate river-crossing operations, several key considerations must be made, including—

- Will the engineer group be task-organized as part of the maneuver crossing force?
- Will the engineer group accompany the maneuver force following the crossing?
- Will the engineer group commander be the crossing-force engineer?
- Will the engineer group need to form a group TAC CP?
- Will the engineer group remain in GS to the corps, providing crossing support on an area basis to all units passing through the crossing area?
- Will the engineer group commander serve as the crossing-area engineer?
- What is the relationship between the group commander and engineers crossing with the maneuver force?
- Where should the group TAG and main CPs be located for maximum control of the engineer forces in the crossing area?
- Does the group have high precedence assigned to its communications links supporting the crossing?
- How long will the engineer group be supporting the crossing?
- What command and support relationships are to be used for the engineer group and subordinate corps engineer units?
- What are engineer LO requirements?
- What engineer control measures are needed throughout the crossing area?
- How much engineer group C2 will be needed during crossing rehearsals?
- What communications and other equipment support will the engineer group need to provide adequate C2 interface with the crossing force and follow-on forces?
- What C2 logistics considerations are needed to support the corps engineer group and subordinate units in the crossing area?

Group C2 of large-scale construction operations. Engineer groups are especially suited to control the massive engineer support required for large-scale construction operations in the corps area such as forward logistics bases, airfields, and so forth. The engineer group can provide positive control of engineer units and equipment during these operations. When an engineer group is task organized by METT-T to command and control corps engineer support to large-scale construction operations, several key considerations must be made, including—

- Will the engineer group need augmentation from theater engineers for construction management, contracting, and real estate acquisition capability?
- Will the engineer group remain in GS to the corps for an extended period of time? If not, how will the group pass ongoing

construction missions to follow-on theater engineer forces?

- How will the engineer group acquire host-nation construction support? What are liaison requirements?
- Does the group have high precedence assigned to its communications links supporting the construction effort?

CORPS ENGINEER BATTALION

Corps engineer battalions (mechanized, wheeled, airborne, and light) may be task organized in various ways, including providing GS to the corps on an area basis, along an MSR, or supporting logistics bases in the corps rear; supporting forward maneuver brigades and the cavalry regiment in a DS, operational control (OPCON), or attached status; or controlling separate engineer companies, theater engineer teams, and detachments. Because of these wide-ranging possibilities of missions, the corps engineer battalion C2 organization must remain flexible and mobile to provide responsive engineer information flow and direction. The corps engineer battalion C2 organization can be described in terms of the corps engineer battalion command group and corps engineer battalion CPs. Each maybe separated or collocated depending on METT-T.

Corps Engineer Battalion Command Group

The corps engineer battalion forms a command group consisting of the battalion commander and those accompanying him on the battlefield. The battalion commander normally concentrates on the current engineer fight. He may locate forward with a forward corps engineer company conducting the engineer main effort or at the battalion main CP. In some cases, he may move to the decisive point of engineer operations to act as the eyes for the corps engineer group or brigade commander. The battalion commander coordinates closely and controls the engineer fight with his subordinate company commanders.

The battalion commander uses the battalion CSM as a second set of eyes on current engineer operations. The CSM maybe positioned on a secondary engineer battalion effort or with the battalion commander at the engineer battalion main effort. The CSM monitors the status of engineer battalion soldiers, including their health, welfare, morale, and individual training proficiency. Both the battalion commander and the CSM require dedicated transportation and communications capabilities.

Corps Engineer Battalion Command Posts

Based on METT-T the corps engineer battalion may establish one or all of the three types of CPs (main, TAC, and rear).

Battalion main CP. The corps engineer battalion establishes a main CP in the vicinity of the engineer battalion main effort. The main CP is directed by the engineer battalion XO. When the battalion commander is not located at the battalion main CP, the XO provides appropriate leadership, intent, and guidance to the battalion main CP staff. The battalion main CP staff consists of the following battalion personnel: the XO, the S3, the assistant S3, the operations sergeant, the S2, the intelligence sergeant, the chemical noncommissioned officer (NCO), the S4, and a representative from the S1. The main CP's primary function is to monitor the current status of corps engineer battalion missions, logistics, and personnel. The main CP staff writes and maintains corps engineer battalion orders. It also maintains current threat information (including threat engineer capability) and executes EBA products and engineer reconnaissance collection plans and is responsible for CP OPSEC. The main CP staff works closely with the engineer staff in the corps engineer group main CP, supported maneuver CPs, and subordinate engineer unit CP personnel. It also maintains continuous contact with battalion LOs detailed to subordinate engineer units or supported corps maneuver forces. If, in support of corps rear operations, the corps engineer battalion

commander is designated as a base cluster commander, the operations cell performs the additional mission of being a BCOC for the commander. The BCOC coordinates rear-area tactical-operations support for the base cluster with the designated corps RAOC.

The corps engineer battalion communications section is responsible for connecting the battalion main CP, battalion rear CP and, if established, the battalion TAC CP into the signal support network, including the CNR, the ACUS, the ADDS, and broadcast interface. Engineer communications systems must provide timely accurate, secure, and reliable information flow to and from the corps engineer battalion commander, the battalion staff at each CP, the group main CG subordinate engineer unit CPs, and supported maneuver forces, when required. The battalion signal officer continuously coordinates engineer signal requirements with the corps engineer group signal officer and is responsible for ISS at each CP. The communications section also establishes base cluster communications networks when required.

Battalion TAC CP. The corps engineer battalion commander determines the need for forming a battalion TAC CP based on METT-T. For example, a battalion TAC CP maybe needed to command and control engineer support to a division maneuver brigade, separate maneuver brigade, or cavalry regiment, providing forward engineer command and staff presence. The battalion TOC provides the nucleus of personnel to work in the battalion TAC CP under the battalion S3's control. Other personnel that may be required at the TAC CP include the battalion S2 and the signal officer. Battalion TAC CP vehicles and communications systems must be compatible with the maneuver force being supported. A secure communications three-net capability is required (higher, lower, and supported).

Battalion rear CP. A battalion rear CP is formed to control engineer logistics support from the corps, It maybe located in the vicinity of a brigade forward support battalion (FSB) headquarters or in the vicinity of a COSCOM supply point Depending on METT-T T, the battalion rear CP may collocate with the battalion main CP. The battalion rear CP must be as maneuverable and survivable as the supported force, and it must be able to communicate the necessary administrative and logistics engineer information to higher, lower, and adjacent echelons in a timely manner. The battalion rear CP is under the HHC commander's control and consists of the EEMO, S1, S4 representative, surgeon, and chaplain. The battalion rear CP's primary function is to track critical engineer logistics and personnel items that support corps engineer battalion operations. This may include critical engineer Class V demolitions and mines, Class IV supplies, critical engineer equipment shortages and maintenance, critical engineer personnel shortages, MSR conditions, and host-nation support. The battalion rear CP works closely with the corps engineer group CSS cell, subordinate engineer CSS staff elements, and COSCOM support units. The chaplain is considered part of the corps engineer battalion commander's personal staff and may accompany him when required. The battalion surgeon supervises battalion medical-support operations. The HHC commander provides food-service, supply and maintenance support to each CP. He is also responsible for planning a rear base defense, establishing a BDOC, and interfacing with designated BCOCs and/or RAOCs. The company commander also coordinates force protection and other security measures for the battalion rear CP.

Command and Control of Corps Engineer Battalion Support to a Division, Division Brigade, Separate Brigade, or Cavalry Regiment

Light divisions, separate maneuver brigades, and cavalry regiments have austere organic engineer capability Even armored or mechanized divisions with an organic engineer brigade do not possess all of the engineer capability they need. Any of these may be reinforced

by corps engineer battalions. When a corps engineer battalion is task organized by METT-T to support a division, division brigade, separate corps brigade, or cavalry regiment, several key considerations must be made, including—

- How will the engineer battalion commander work with and possibly for the division, brigade, or regimental engineer? Which one will be the division, brigade, or regimental engineer?
- Will the engineer battalion receive missions through the maneuver unit G3/S3, or will it be tasked directly by the organic engineer staff?
- Will EWLs be established, defining the areas where corps engineers will work in the division, brigade, or regimental area?
- Will division, brigade, or regimental engineers be task organized in a mix with corps engineers?
- Will any portion of the division, brigade, or regimental engineers be placed under the corps engineer battalion's control?
- Will the engineer battalion need to form a battalion TAC CP? If so, where will it and the battalion main CP be located?
- Does the battalion have high precedence assigned to its communications links while operating in the division, brigade, or cavalry regiment area?

Ž How long will the engineer battalion be supporting the division, brigade, or regiment?

- What command and support relationships are to be used for the engineer battalion and subordinate corps engineer units?
- What communications and other equipment support will the engineer battalion need to adequately provide C2 interface with the division, brigade or regiment?

Ž What logistics control considerations are needed to support a corps engineer battalion in the division, brigade, or cavalry regiment area?

CORPS ENGINEER COMPANY

Corps engineer companies (line, bridge, LE, and CSE) may be task organized in various ways, including providing GS to the corps on an area basis, along an MSR, at river-crossing sites, or supporting logistics bases in the corps rear; supporting forward maneuver brigades and cavalry regiments in a DS, OPCON, or attached status; or being attached to corps or division engineer battalions. Because of these wide-ranging possibilities of missions, the corps engineer company C2 organization must remain flexible and mobile to provide responsive engineer information flow and direction. The corps engineer company C2 organization can be described in terms of the company command group, a company CP and a unit trains element. Each may be separated or collocated, depending on METT-T.

Corps Engineer Company Command Group

The corps engineer company forms a command group consisting of the company commander and those accompanying him on the battlefield. The company commander normally concentrates on the current engineer fight. He may locate forward with a forward corps engineer platoon or section conducting the engineer main effort or at the company CP. In some cases, the company commander may move to the decisive point of engineer operations to act as the eyes for the corps engineer battalion, group, or brigade commander. The company commander coordinates closely and controls the engineer fight with his subordinate platoon and section leaders.

The company first sergeant (1SG) remains focused on the sustainment of current engineer operations. He is normally located with the company CP but may be located at the unit trains element, if established, or a corps CSS location. The company 1SG maintains close coordination with platoon and section sergeants, the engineer battalion S4, and supported maneuver S4s. Both the company commander and the company 1SG may move to the company CP during critical times during current engineer operations to provide guidance and control to unforeseen events. The company commander also uses the company 1SG as a second set of eyes on current engineer operations. The 1SG may be positioned at a secondary engineer company effort or with the company commander at the engineer company main effort. The 1SG monitors the status of engineer company soldiers, including their health, welfare, morale, and individual training proficiency. Both the company commander and the 1SG require dedicated transportation and communications capabilities.

Corps Engineer Company Command Post

The corps engineer company headquarters establishes a mobile company CP in the vicinity of the engineer company main effort. The company CP is normally directed by the engineer company XO or operations sergeant. When the company commander is not located at the company CP, the XO provides appropriate leadership, intent, and guidance to the company CP staff.

Company CP personnel consist of the following company personnel: the XO, the operations sergeant, the chemical sergeant, and representatives from the supply and maintenance sections. The company CP's primary function is to monitor the current status of corps engineer company missions, logistics, and personnel. The company CP writes and maintains company orders. It also maintains current threat information (including threat engineer capability) and executes EBA products, engineerreconnaissancecollectionplans, and OPSEC procedures. The company CP works closely with higher engineer headquarters, supported maneuver CPs, and subordinate platoons and sections leaders. It also maintains continuous contact with LOs detailed from higher engineer headquarters or supported corps maneuver forces. If, in support of corps rear operations, the corps engineer company commander is designated as a base commander, the company CP performs the additional mission of being a BDOC for the commander. The BDOC coordinates rear-area tactical-operations support for the base with the designated BCOC and corps RAOC.

The corps engineer company communications section is responsible for connecting the company CP into the signal support network including the CNR, the ACUS, the ADDS, and broadcast interface. Engineer communications systems must provide timely, accurate, secure, and reliable information flow to and from the company commander, company CP, unit trains element, higher engineer headquarters, subordinate platoons and sections, and supported maneuver forces, when required. The company communications sergeant continuously coordinates engineer signal requirements with the higher engineer communications personnel and is responsible for ISS at the company CP. The communications section also establishes base defense communications networks when required.

Unit Trains Element

The corps engineer company may form a unit trains element to control engineer logistics support from the corps or to establish an engineer equipment park or construction supply point. The unit trains element is normally collocated with the company CP. However, depending on METT-T, the unit trains element may be formed in the vicinity of a COSCOM supply or maintenance point or with an engineer battalion rear CP. The unit trains element must be able to communicate the neces-

sary engineer information to higher, lower, and adjacent echelons in a timely manner. It is under the 1SG's control and consists of the company supply and maintenance sections, The unit trains element's primary function is to track and provide critical engineer logistics and personnel items that support corps engineer company operations. This includes arming, fueling, feeding, and maintaining operations. The unit trains element works closely with higher engineer headquarters' S4 sections, subordinate platoon and section sergeants, and COSCOM support units. If required, the unit trains may be split between a field trains and combat trains.

CORPS ENGINEER PLANNING PROCESS

The corps uses the standard tactical decision-making process described in FM 101-5 to support the corps commander's activities and to achieve the desired results. As stated in FM 101-5, tactical decision making, as a form of problem solving, is a dynamic, multidimensional process. Tactical decision makers must be flexible, allowing decisions about current operations to occur simultaneously with plans and decisions concerning future operations. Tactical decision making at the corps occurs within the context of the eight troop-leading procedures (TLPs) and encompasses the estimate of the situation and IPB processes. The eight TLP steps are—

1. Receive or perceive a mission.
2. Issue a WARNORD.
3. Make a tentative plan.
4. Initiate movement.
5. Reconnoiter.
6. Complete the plan.
7. Issue the order.
8. Supervise and refine.

Figure 2-5 shows the relationships between TLPs, the estimate of the situation, and the IPB. The corps uses the three standard tactical decision-making processes described in FM 101-5: deliberate, combat, and quick. The corps commander chooses the process to be used based on the time available and his staff's experience (see Figure 2-6, page 2-24). Figure 2-7, page 2-25, shows the continuous nature of the process and the time relationship of the activities that constitute the corps's deliberate decision-making process. The times shown are based on a 72-hour proactive, intuitive-driven, and predictive corps planning cycle.

ENGINEER ESTIMATE

The corps engineer uses the engineer-estimate process to assist decision making by the corps commander. The engineer estimate is a staff estimate process. It is the primary tool for facilitating engineer planning and the early integration of mobility, countermobility, survivability, general, and topographic engineering considerations into the estimate of the situation and the corps plan. The engineer estimate drives the coordination between the corps engineer brigade staff and the corps staff. The engineer estimate process is a methodical series of activities that engineer commanders and their staffs use to examine engineer battlefield support possibilities in parallel with the corps planning process. These standard, logical, and effective thought processes enhance the commander's and staffs abilities to develop, select and implement effective courses of action. The engineer estimate also drives the timely development of necessary engineer instructions through the corps order or engineer annex to maneuver forces and through engineer orders to corps engineer units. The engineer-estimate process is simply an exten-

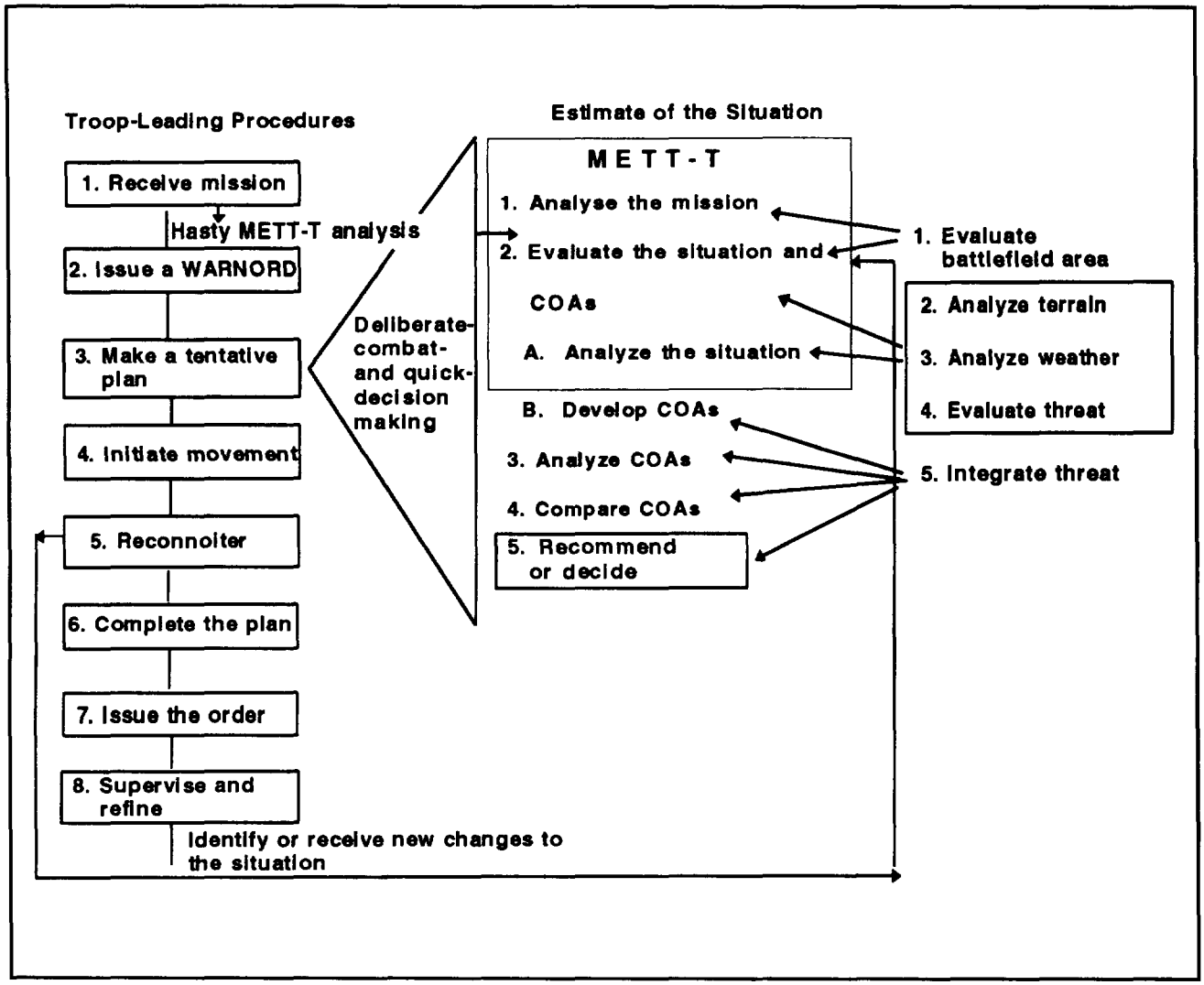


Figure 2-5. Relationship between TLPs, the estimate of the situation, and IPB

sion of the corps tactical decision-making process. For the corps to receive timely and effective engineer support, engineers must be fully integrated throughout the corps planning process. The steps of the tactical decision-making process, using the corps estimate of the situation and the engineer estimate, are shown in Figure 2-8, page 2-26. The arrows show which steps have two-way input as well as where the engineer estimate relies heavily upon the estimate of the situation for information. The corps engineer staff must understand all aspects of the corps plan. In particular, it must thoroughly understand the commander's intent and concept for maneuver, fire support, and engineers. While the engineer-estimate process-outlines specific steps, it is a flexible process with each step being continuously refined based on changes in the current situation and future missions. Appendix B contains a more detailed discussion of the engineer estimate.

CORPS PLANS AND ORDERS

A critical by-product of the engineer estimate is the integration of engineer missions and instructions into the base corps plan or order, engineer annex, and engineer unit orders and plans.

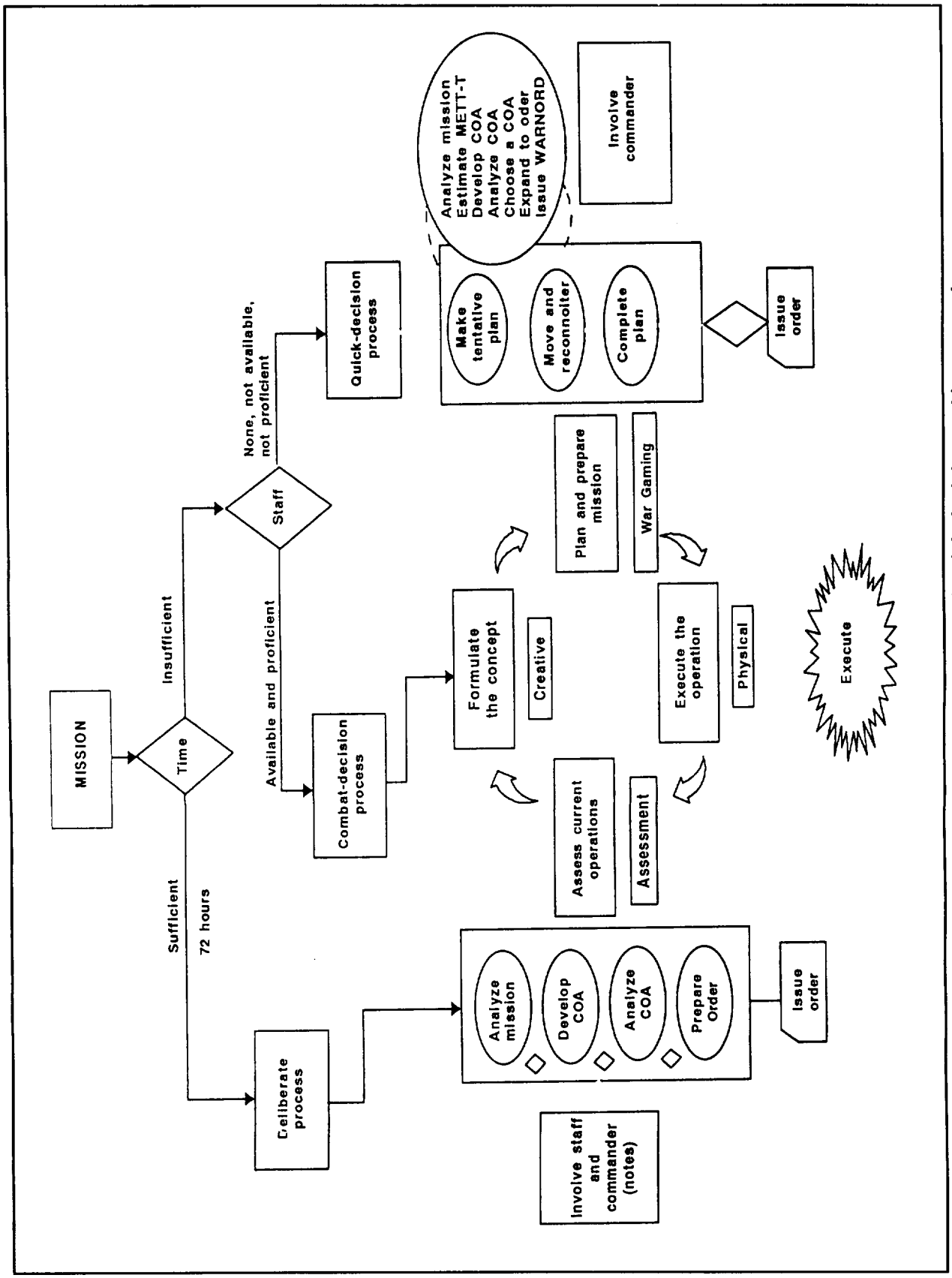


Figure 2-6. Corps deliberate, combat, and quick decision-making procedures

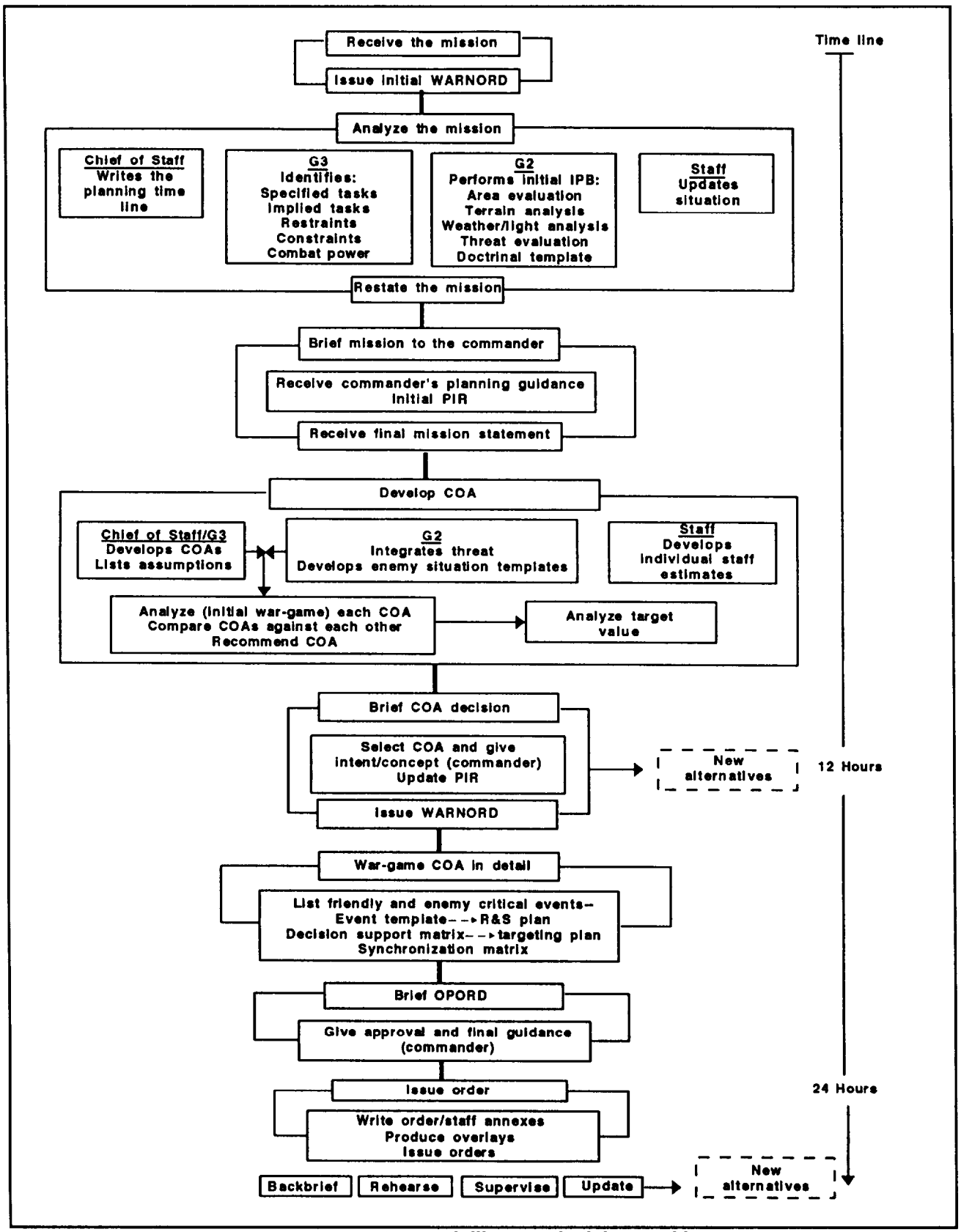


Figure 2-7. Corps deliberate decision making

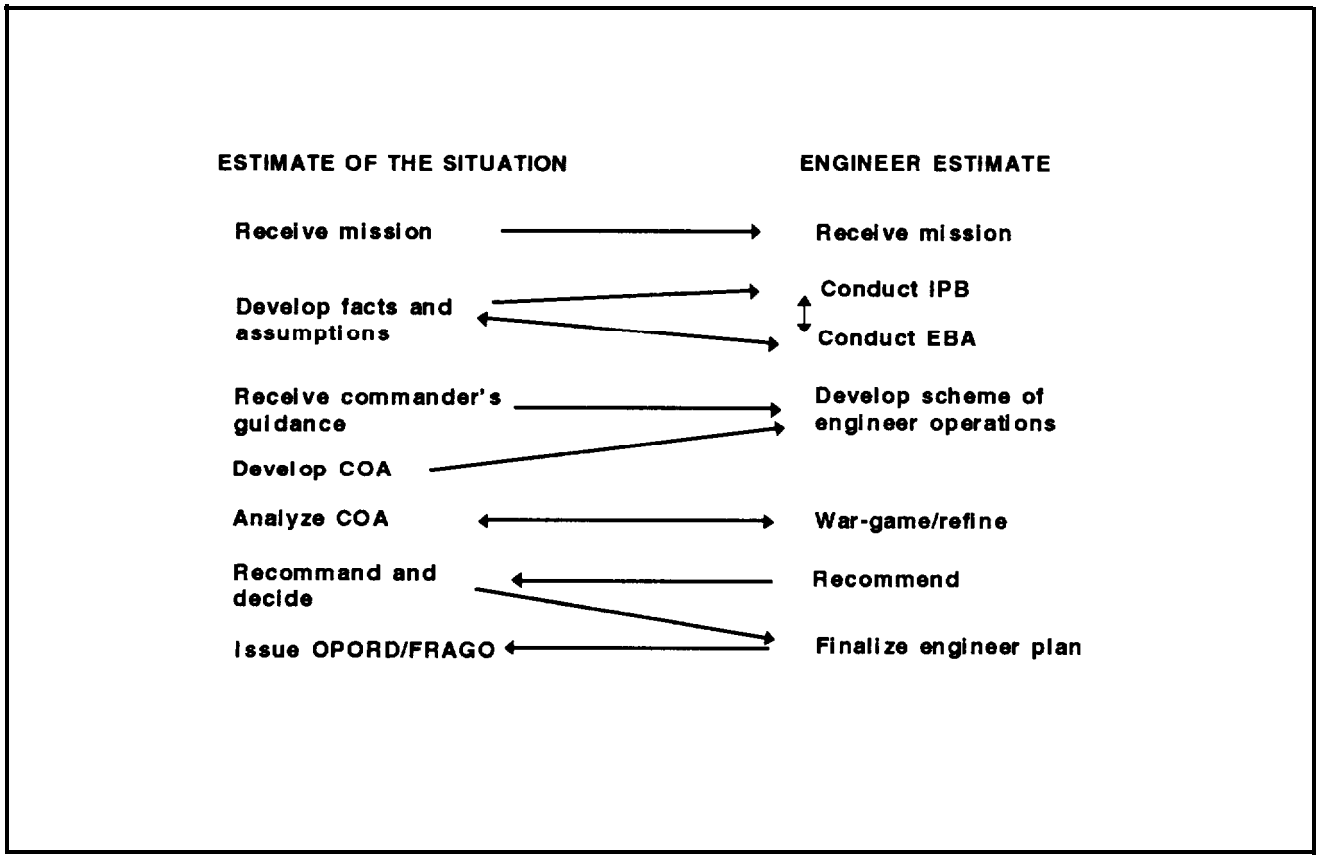


***Figure** 2-8. Estimate of the situation and the engineer estimate*

Engineer Information Needed in the Corps Plan or Order

The SES ensures that engineer missions and instructions that are critical to the success of the corps mission are included in the appropriate sections of the corps base plans or orders. This information should not be consolidated in the engineer annex because it tends to obscure critical engineer information and instructions from division, separate brigade, and cavalry regiment commanders. The engineer annex is not used to duplicate this information, but to expand the information and assign specific tasks to corps units.

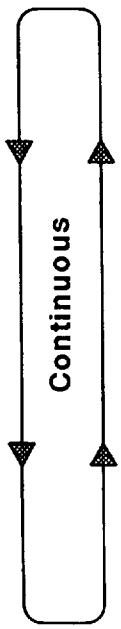
For example, if a deliberate breach through threat obstacles is critical to the corps plan it will appear as a critical task to the breaching division. Likewise, the execution of Air Force-delivered scatterable mines in support of deep-attack targeting may be included in a corps FRAGO. Instructions contrary to tactical SOPS would be included in coordinating instructions of the base plan. The commander's concept of the operation could also include the scheme of engineer support to the corps plan The engineer priority of effort and support found under the execution (engineer) paragraph also supports the corps commander's concept of the operation.

The engineer-estimate process identifies the critical engineer information and mission-essential tasks needed for inclusion in the base order. Table 2-1 illustrates how key components of the engineer-estimate process drive engineer input into the corps base order.

Engineer Annex to the Corps Plan or Order

Corps plans or orders have a detailed engineer annex attached that contains critical engineer

Table 2-1. Engineer input to the corps OPORD



Engineer Estimate	Input	Corps OPORD Paragraph
Conduct IPB/EBA	Critical aspects of the terrain and enemy engineer activity impacting on the maneuver plan	1. Situation a. Enemy Forces Intel Annex
Analyze mission	Mission-essential engineer tasks assigned to maneuver units or separate engineers	3. Execution b. Maneuver Units c. Combat Support Units
Develop scheme of engineer operations	Concept of engineer operations to support corps plan Task organization of engineer forces and command/support relationships Allocation of engineer mission resources to maneuver units Graphic control measures needed for obstacle control, river-crossing, and large-scale breaching operations	3. Execution a.(6) Engineer Task Organization 4. Service Support CSS Annex Overlays: Operations Engineer CSS
War-game and refine	Additional coordinating instructions to maneuver units needed to synchronize engineer effort	3. Execution d. Coordinating Instructions
Recommend course of action	None	None
Finalize engineer plan	Special engineer supply considerations Special engineer C2 arrangements	4. Service Supoprt 5. Command and Signal

information and engineer-specific instructions that are either too voluminous or not appropriate for inclusion in the corps base order or plan. The corps engineer annex is written by the SES and assists the division, separate brigade, or cavalry regiment staff engineers; the corps engineer brigade; and the COSCOM. The annex may take the form of written instructions, matrices, overlays, or a combination of these. Appendix A discusses the engineer annex's format and content in more detail. Sample matrices and overlays are also provided. Table 2-2, page 2-28, illustrates how the engineer annex's content is derived from information found in the engineer estimate.

Topographic Annex to the Corps Plan or Order

The corps prepares a topographic annex to all contingency plans (CONPLANs), operation plans (OPLANs), and/or OPORDs. This annex provides the direction needed by the corps's subordinate elements to obtain support from topographic units and guidance for the employ-

Table 2-2. Engineer annex content and engineer estimate

Engineer Annex Format	Content	Engineer Estimate
Task Organization	Task organization of engineer units--includes who they support and in what command/support relationship (must track with base order)	Scheme of engineer operations • Force allocation • Task organization
1. Situation a. Enemy Forces	Aspects of the weather, terrain, and enemy activities that significantly impact on engineer missions	Intelligence preparation of the battlefield
b. Friendly Forces	Missions and plans of higher and adjacent engineers that impact on the plan	Engineer battlefield assessment • Terrain • Enemy engineer capability
c. Attachments and Detachments	Changes in task organization that occur during the execution	Higher HQs' OPORD and engineer annex
2. Mission	Mission statement of supported unit	Restated mission from supported unit
3. Execution a. Scheme of engineer operations (1) Obstacles (2) Situational obstacles	Concept of engineer operations to support maneuver plan Details on use of obstacles and scatterable mines	Scheme of engineer operations Scheme of engineer operations
b. Subunit instructions	Missions to engineer units • task organized to divisions • under corps troops	Mission analysis
c. Coordinating instructions	Instructions common to two or more engineer units	Refinement and war gaming of engineer plan
4. Service Support a. Command-regulated supplies b. Class IV/V supplies c. Transportation d. Health services e. Personnel support	Allocation of engineer mission resources Method of mission sustainment Method of unit sustainment	Scheme of engineer operations Allocation of resources Finalization of engineer plan
5. Command and Signal	Location of engineer CPs Special C2 arrangements Required reports	Finalization of engineer plan

ment of those units. The format for the topographic annex is shown in Appendix A. This format is the same as that used by the unified and specified (U&S) commands, which is Annex M (MC&G) of the Joint Services Operations Plans (JSOPs). Note that all the references in this appendix refer to a general OPORD. Proper preparation of the annex demands detailed identification and definition of all requirements for topographic products and services, whether provided by the DMA or field units. The preparation of the topographic annex is not limited to topographic products, but applies to any products and services in the MC&G field which are required to support the command's CONPLANs, OPLANs, and/or OPORDs.

CORPS ENGINEER SYNCHRONIZATION

Effective synchronization of corps engineer activities and plans with the corps's operational and tactical warfare components is critical for campaign and battle success. The corps develops and uses a DST and a synchronization matrix as a "playbook" for each operational and tactical warfare component. The IPB process is the basis for the DST and synchronization matrix. Time-phased templates depicting enemy situations at critical terrain features and or/events throughout the corps's AO are developed from the IPB process. Using these templates and the corps commander's intent, the corps staff identifies and enters decision points or events on the DST and synchronization matrix Significant enemy or friendly events may be designated as decision points. As OPLANs are developed, the staff develops the DST and the synchronization matrix by identifying major execution options during war-gaming. Specific and detailed options are then developed for every decision point. Options are formulated by each staff section responsible for each of the operational or tactical warfare components. Specific options listed on the DST and synchronization matrix become the battle plan. Many of the battle plan options maybe contradictory and/or complementary. When an option is executed, the responsible staff section implements and supervises the specific details of that option. The G3 and the corps commander review the battle plan with the staff to approve specific phases. They specify which option will be executed based on the situation and which option will be implemented on order. The product of the review is a coordinated DST and the synchronization matrix. The ACE ensures that engineer functions are properly synchronized during war gaming with each corps DST and synchronization matrix component as required.

The engineer brigade staff synchronizes corps engineer unit operations support in much the same manner. Using the corps commander's intent and concept of the operation, the brigade staff develops specific and detailed engineer support options for every phase of the operation. Options are war-gamed by each staff section. Specific options are listed on the engineer synchronization matrix becoming the engineer support plan. The S3 and the engineer brigade commander review the engineer support plan with the staff to approve specific phases. They specify which option will be executed based on the situation and which option will be implemented on order. When an option is executed, the responsible staff section implements and supervises the specific details of that option. The product of the review is a coordinated synchronization matrix and graphic engineer DST. A copy of each is provided to subordinate corps engineer headquarters and the SES. The DST and the synchronization matrix can be effectively used to write appropriate engineer orders or plans and to formulate corps engineer task organizations. A sample engineer DST and the synchronization matrix are shown in Figures 2-9 and 2-10, pages 2-30 and 2-31.

CORPS ENGINEER TASK ORGANIZATION

'Risk-organizing corps engineer forces is a critical step in the engineer C2 process. Because of the difficulty of moving corps engineer forces quickly on the battlefield, it is critical that en-

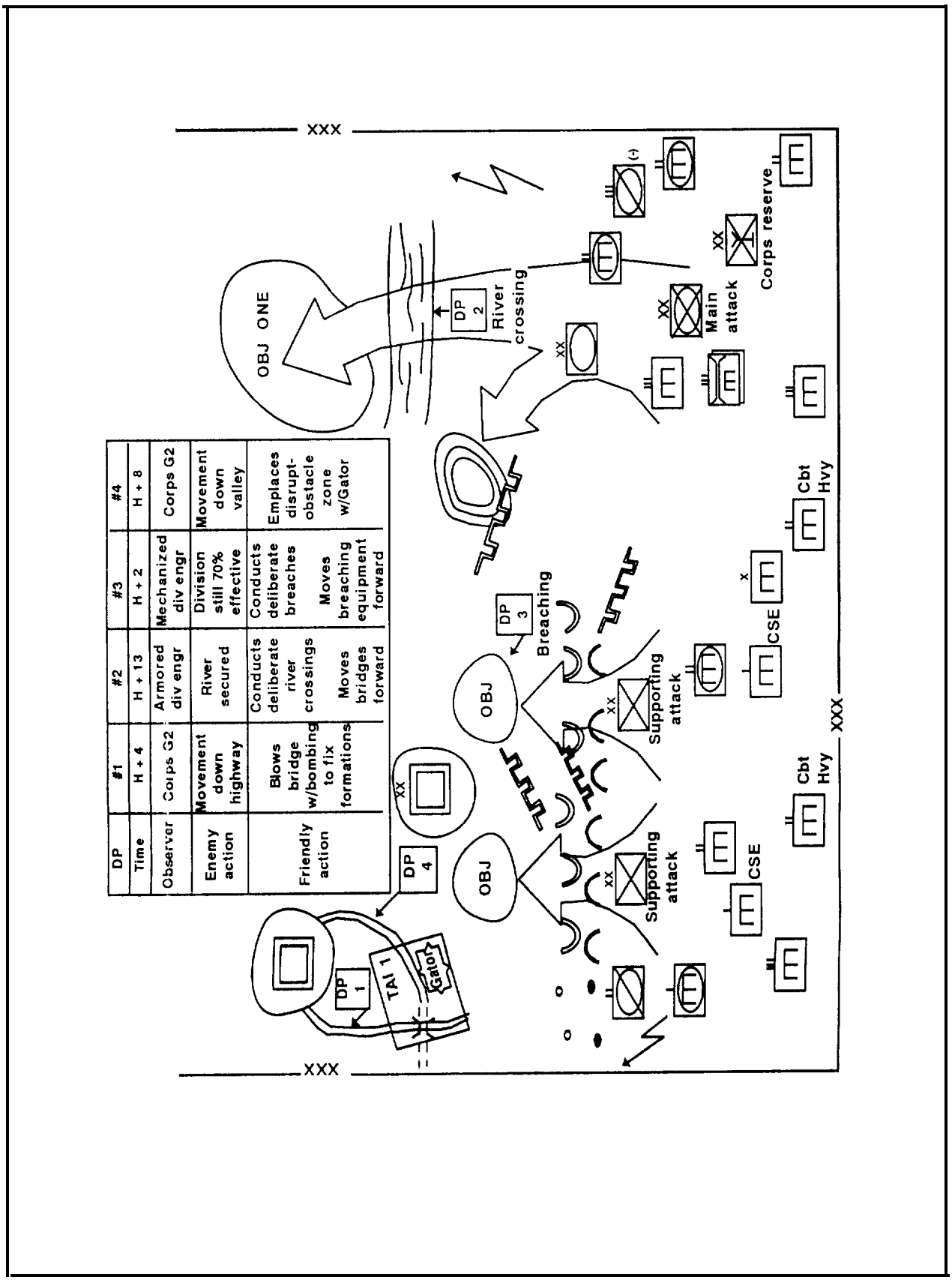


Figure 2-9. Engineer decision support template

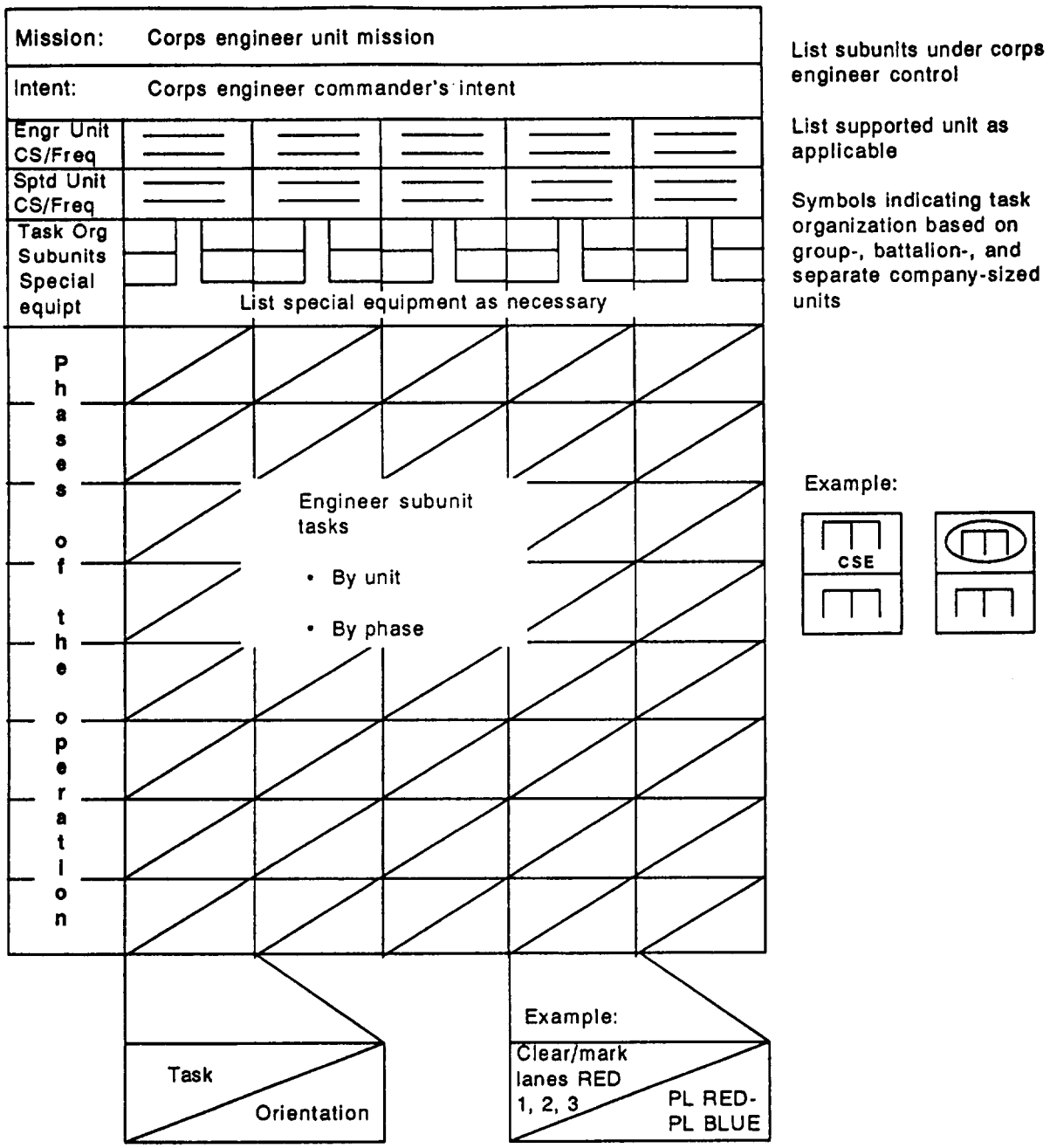


Figure 2-10. Engineer synchronlzation matrix

gineers are adequately task-organized to support the corps plan on a continual basis with minimal follow-on changes, Engineer task-organization changes may be generated from a change to the corps plan or major changes in a subordinate corps engineer unit status. All corps engineer task-organization changes must be closely synchronized between the SES and corps engineer brigade staff and be approved by the corps G3 or corps commander.

ENGINEER COMMAND AND SUPPORT RELATIONSHIPS

As part of the task-organization process, it is critical to identify the proper command-and-support relationships of corps engineer forces. Table 2-3 describes the employment of engineer command and support relationships. Each situation is unique and requires its own solution. Whatever the relationship, engineer commanders are always responsible for the technical correctness of all tasks undertaken by their subordinate elements. The following should be considered when identifying command and support relationships of corps engineer forces:

Command Relationships

Command authority over corps engineer units is given to a maneuver commander when he needs responsive corps engineer forces that are immediately available to him. The command relationship can be attachment, OPCON, or operational command (OPCOM).

Attachment. An attachment is appropriate when a maneuver commander needs task-organization or direct-command authority over corps engineer units and when time, distance, or communications prevent the parent corps engineer headquarters from providing adequate logistical support, Attached corps engineer units may be further task-organized by the maneuver headquarters. Examples of attachments include attaching a mechanized corps engineer battalion to a cavalry regiment during corps covering-force operations or attaching a light corps engineer battalion to a deploying airborne or air assault division during initial force-projection operations. When placing corps engineer forces in an attached command relationship, the following should be considered:

- How long will the attached command relationship last? What decision criteria exist to return the corps engineer unit back to its parent headquarters? Consider an attachment of corps engineer units by phase of the operation, until certain objectives are met, or for specific tasks. Reconstituting formerly attached corps engineer units will normally take time to reform the unit back under the parent engineer control.
- What logistics support will not be provided by the maneuver unit that the parent engineer headquarters may have to support? (For example, engineer equipment repair parts, some Class IV/V supplies, and so forth.) Attached corps engineer units may need accompanying corps logistics elements.
- What engineer reporting requirements still exist to the parent engineer headquarters after affecting the attached command relationship? These reports are normally passed through maneuver channels to the division engineer and then passed to the parent corps engineer headquarters.

OPCON. OPCON is appropriate when a maneuver commander needs task-organization or direct command authority over corps engineer units but logistical support can be provided by the parent corps engineer headquarters. OPCON corps engineer units may be further task organized by the maneuver headquarters. An example is placing OPCON of corps engineer battalions to a division for corps offensive op erations, allowing further engineer task-organization by maneuver forces as required. When placing corps engineer forces in an

Table 2-3. Command and support relationships

	Support Relationships		Command Relationships	
An engineer element with a relationship of --	Direct support	General support	OPCON/OPCOM	Attached/assigned
Is commanded by --	Parent unit (note 2)	Parent unit (note 2)	Supported unit	Supported unit
Maintains liaison and communications with--	Supported and parent units	Supported and parent units	Supported and parent units	Supported unit
May be task-organized by--	Parent unit	Parent unit	Supported unit	Supported unit
Can be--	Dedicated support to a particular unit, May be given task or area assignments	Used only to support the parent force as a whole, May be given task or area assignments	Placed OPCON/OPCOM to other engineer/ maneuver units; made DS to divisions, brigades, or task forces; or retained GS	Further attached OPCON/OPCOM or DS to divisions, brigades, or task forces or retained GS
Responds to support requests from--	Supported unit	Parent unit	Supported unit	Supported unit
Has work priority established by--	Supported unit	Supported unit	Supported unit	Supported unit
Has spare work effort available to--	Parent unit	Parent unit	Supported unit	Supported unit
Forwards requests for additional support through--	Parent unit	Parent unit	Supported unit	Supported unit
Receives logistical support from--	Parent unit	Parent unit	Parent unit (note 1)	Supported unit (note 1)
Sends reports to--	Supported unit; information to parent unit	Parent unit	Supported unit; information to parent unit	Supported unit; information to parent unit

Notes

1. When attached, the engineer element is provided administrative/logistics support, When placed OPCON/OPCOM, the supporting unit provides support in the common classes of supply to the maximum extent possible.

2. It is possible that units will receive additional engineer support without a command relationship (for example, the support relationship of DS to the division).

3. Regardless of the type of relationship, activities of engineer units working in an area are under the staff supervision of the area engineer.

4. The supported unit, regardless of the command/support relationship, is to furnish engineer materials to support engineer operations.

OPCON command relationship, the following should be considered:

- How long will the OPCON relationship last? What decision criteria exist to return the corps engineer unit back to its parent headquarters? OPCON is normally used for short-duration operations. Consider OPCON of corps engineer units by phase of the operation, until certain objectives are met, or for specific tasks. Reconstituting former OPCON corps engineer units will not take as much time as if they had been attached.
- What logistics support will be provided by the maneuver unit that the parent engineer headquarters may not be able to support? (For example, common classes of supply, rations, fuel, water, and so forth.) OPCON corps engineer units will need accompanying corps logistics elements.

Ž What engineer reporting requirements still exist to the parent engineer headquarters after affecting the OPCON command relationship? These reports are normally passed through maneuver channels to the division engineer and then passed to the parent corps engineer headquarters.

OPCOM. OPCOM is appropriate when a corps engineer unit supports another service or coalition force during joint and multinational operations. In this case, OPCOM is synonymous with OPCON concerning command, administrative, and logistics responsibilities. OPCOM is used when the joint or multinational commander needs task-organization or direct-command authority over Army corps engineer units but the parent Army corps engineer headquarters can provide logistical sup port OPCOM corps engineer units maybe further task-organized by the joint or multinational maneuver headquarters. An example is placing an Army combat heavy engineer battalion under OPCOM of a Marine division headquarters for general engineering missions in a joint force-projection theater, allowing further engineer task organization by joint forces as required. When placing corps engineer forces in an OPCOM relationship, the following should be considered:

Ž How long will the OPCOM relationship last? What decision criteria exist to return the corps engineer unit back to its parent headquarters? OPCOM is normally used for short-duration operations. Consider OPCOM of corps engineer units by phase of the operation, until certain objectives are met, or for specific tasks. Reconstituting former OPCOM corps engineer units will not take as much time as if they had been attached.

- What logistics support will be provided by the joint or multinational unit that the parent engineer headquarters may not be able to support? (For example, common classes of supply, rations, fuel, water, and so forth.) O PCOM corps engineer units will need accompanying Army corps logistics elements.
- What engineer reporting requirements still exist to the parent engineer headquarters after affecting the OPCOM relationship? These reports are normally passed through joint or multinational command channels to the parent Army corps engineer headquarters.

Ž What engineer LO requirements exist?

Support Relationships

Support relationships retain corps engineer command, administrative, and logistical responsibilities with the parent corps engineer unit .The corps engineer unit commander organizes his unit and suballocates tasks in a manner he determines will most effectively

meet the needs of the supported commander. Engineer support relationships include DS and GS.

Direct support. ADS relationship is appropriate when the supported unit requires responsive engineer support but does not require task-organization authority. The parent corps engineer headquarters provides logistical support DS corps engineer units may be further task-organized by the parent engineer headquarters. The parent corps engineer headquarters may task the DS engineer unit with additional corps missions if time and resources permit Under the DS relationship, the priority of corps engineer work is with the supported unit. An example of DS is the placement of an engineer group in DS to a division for large-scale breaching or river-crossing operation support, allowing further engineer task organization by engineers as required. Direct engineer support is normally provided on a task basis or on an area basis. The EWL is often used to denote the area covered under the DS mission. The EWL is a coordinated boundary and its location is usually determined by the supported units. DS engineer support and the use of the EWL should be considered when a change of the subordinate rear boundary is expected. This reduces the transfer of missions between the supported unit and the corps engineer. When placing corps engineer forces in a DS relationship, the following should be considered:

- How long will the DS relationship last? What decision criteria exist to return the corps engineer unit back to its parent headquarters? Consider DS of corps engineer units by phase of the operation, until certain objectives are met, or for specific tasks.Reconstituting former DS corps engineer units will not take as much time as if they had been attached or OPCON.
- What logistics support will be provided by the supported unit that the parent engineer headquarters may not be able to support? (For example, common classes of supply, rations, fuel, water, and so forth.) DS corps engineer units will need accompanying corps logistics elements,
- What engineer reporting requirements still exist to the parent engineer headquarters after affecting the DS relationship? These reports are normally passed through maneuver channels to the parent corps engineer headquarters.

General support. A GS relationship is appropriate when the higher headquarters requires central control and flexibility in employing corps engineer resources. The parent corps engineer headquarters provides logistical support. Under the GS relationship, the priority of corps engineer work is with the supported unit. An example of GS is the placement of an engineer group in GS to the corps rear area to control corps general engineering operations.

CORPS ENGINEER ORDERS AND PLANS

All commanders must issue timely clear, and concise orders that give purpose and direction to subordinate planning, preparation and execution. Corps engineer commanders issue orders to subordinate units to execute the scheme of engineer support to corps close, deep, and rear operations, based on developed plans. Orders translate the corps's scheme of engineer operations into clear and concise engineer missions. They combine the concept of corps engineer support with engineer unit-specific plans needed to accomplish engineer missions, sustain the engineer force, and ensure unity of engineer effort. The corps engineer brigade commander uses both corps orders and engineer unit orders to provide the necessary engineer C2 for the corps commander. The engineer-estimate process and tactical decision-making process again drive the insertion of

engineer information in corps orders and the development of engineer unit orders.

The corps engineer brigade commander retains functional control of corps engineer units sup porting divisions, separate brigades, and the cavalry regiment by assigning specific tasks and missions in corps orders and annexes. Regardless of command and support relationships, the brigade commander must still provide the corps commander with functional control over the engineer effort within divisions, separate brigades, and the cavalry regiment to ensure unity of effort. He may issue WARNORDs to task-organized corps engineer forces in order to focus future planning and preparation of upcoming corps missions. He may also require periodic SITREPs from task-organized corps engineer forces to ascertain ongoing combat readiness status. The bottom line is that the corps engineer brigade commander is responsible to the corps commander to ensure unity of engineer effort through functional control of task-organized corps engineer forces.

The corps engineer brigade commander exercises a high level of both unit and functional control over assigned corps engineer unite not task-organized to divisions, separate brigades, and the cavalry regiment. He and his subordinate commanders directly issue the full range of engineer unit orders that are absolutely essential to ensuring that subordinate units understand how their missions support the maneuver plan and mesh with the corps engineer plan. The intent behind engineer orders is to focus subordinate engineer planning and preparation effort. They facilitate subordinate engineer integration and responsiveness to the corps's rapid decision cycle. There are three types of unit orders: the WARNORD, the OPLAN and OPORD, and the FRAGO.

Warning Order

The corps engineer brigade commander issues a WARNORD to his subordinates, including task-organized corps engineer units, when a FRAGO is developed by the corps staff or when he perceives significant changes to the corps plan. The WARNORD is essential to initiatingsubordinateplanningandpreparation. It should be as detailed as possible, based on the corps's mission and information available. It should include any likely changes in task organization with a no-earlier-than move time identified. This facilitates planning any necessary engineer force consolidation and required unit sustainment operations. The WARNORD is also used by the receiving engineer unit to initiate internal planning. Appendix A provides the format for a WARNORD and provides examples.

Operations Plan and Operations Order

The corps engineer brigade commander issues an OPLAN or OPORD at the outset of an operation or when the corps mission changes so much that the initial OPLAN or OPORD is no longer useful as a foundation. Engineer OPLANs and OPORDs focus the corps engineer force on the mission, effect the necessary task organization, assign unit missions (including on-order and be-prepared missions), and establish the necessary service support structure. They also provide subordinate commanders with the corps engineer brigade commander's intent and concept of engineer support operations, giving subordinate engineer commanders the necessary freedom of action while retaining unity of effort. The corps engineer brigade OPLAN or OPORD serves as a base document from which the brigade commander can adjust as the situation develops by the use of FRAGOs. When a corps mission changes drastically and the engineer brigade OPLAN or OPORD is no longer a solid base document the engineer brigade staff produces a new OPLAN or OPORD and issues it to affected subordinate engineer units. Appendix A provides the format for OPORDs and provides some examples.

Fragmentary Order

The FRAGO allows the corps engineer brigade commander to modify the current OPLAN or OPORD quickly based on changes in the situation. The FRAGO only outlines changes; all other instructions in the base OPLAN or OPORD remain in effect A FRAGO has no set format or content; it is modified to meet the needs of the situation. The FRAGO can be used to change any part of the base OPLAN or OPORD. Normally, the corps engineer brigade commander uses the FRAGO when there is an immediate tactical requirement to adjust engineer task organization or the scheme of engineer operations, or to submit missions. With few exceptions, task-organized corps engineer units do not execute the FRAGO until coordination has occurred with the supported commander. Appendix A provides a sample format for a FRAGO.

CORPS ENGINEER INFORMATION REQUIREMENTS

Corps engineer commanders must receive timely and accurate battlefield information in order to affect future engineer support plans. Several means of gathering this necessary information is used by engineer commanders. They include personal reconnaissance, visits with subordinate engineer units, periodic staff briefings and updates, and periodic reports transmitted through the corps signal system or delivered by courier. All of these provide information to the commander so that he can decide whether to continue with the current engineer support plan, change to a branch plan, or drop the current plan completely and make a new one. To allow the corps engineer commanders to be at critical points on the battlefield to gather information, it is imperative that adequate transportation and communications capability be available to them.

Personal Reconnaissance

The best information corps engineer commanders can receive is what they can actually see and hear through personal reconnaissance of ongoing engineer support missions. By observing engineer operations, commanders can immediately assess the cause and effect of corps engineer support plans. A danger lies in relying totally upon personal reconnaissance for decision making, as it is just a snapshot in time and space, not showing the overall dynamics involved in the corps fight.

Visits With Subordinate Units

Through discussions with subordinate units, corps engineer commanders gather fairly timely and accurate engineer operational and logistical information. This is especially critical with corps engineer units that are task-organized to divisions, separate brigades, and the cavalry regiment.

Periodic Staff Briefings and Updates

Corps engineer commanders continually receive briefings from higher headquarters staffs and their own engineer staff concerning threat, maneuver, engineer, and logistical support information. This information is normally not as timely as personal reconnaissance or visits with subordinate engineer units, but it provides a broader perspective of corps engineer support to the battlefield. The briefing forum provides a setting for the corps engineer commander to explain his intent and concept of engineer support to the corps. Any changes to the current plan are explained in detail. Decisions are often made during these briefings by the commander, so it is critical that key engineer staff and subordinate engineer unit commanders be present.

Transmitted Reports

Periodic reports transmitted through the corps signal system or by courier provide critical information to both the brigade commander and his staff. Standard reporting formats of key engineer information requirements help determine trends in engineer support, allowing the brigade commander to make decisions based on

higher quality information (see Appendix C for a template of standard corps engineer report formats). Corps engineer force information that is transmitted to the corps engineer brigade headquarters and SESs can be described in four general types: engineer operations and intelligence information, engineer logistics and personnel information, corps operations and intelligence information, and corps logistics and personnel information.

Engineer operations and intelligence information flow. Figure 2-11 shows engineer operations and intelligence information flow. This information includes such things as DA Form 1355 minefield reports, intelligence spot reports (SPOTRE Ps), engineer situation reports (ENSITREPs), NBC reports, and so on. Two paths are used by corps engineer forces assigned to the corps engineer brigade and task-organized corps engineer forces supporting divisions, separate brigades, and the cavalry regiment. The paths work both ways, with the majority of information flowing from corps engineer units to the brigade CP and corps SES. The managers of this information

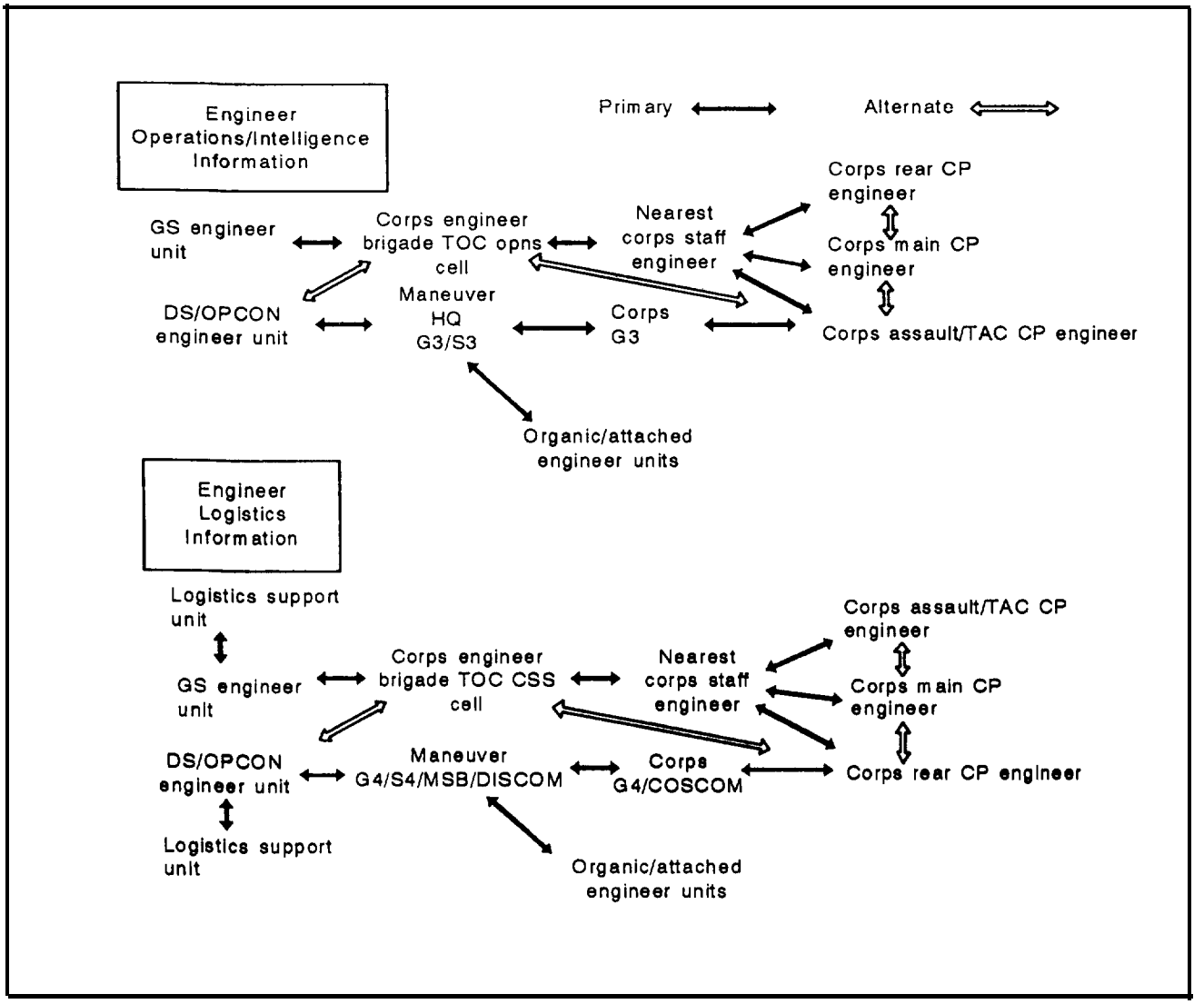


Figure 2-11. Corps engineer information flow

include the engineer brigade operations staff personnel at the brigade CP and the corps assault or TAC CP. In some cases, information coming in from task-organized forces may be timelier than that coming in from assigned engineers, due to easier access to corps signal systems. The corps SES will receive this information faster than the brigade CP. In reverse, the brigade CP will receive information faster from assigned engineers than the SES. For the brigade commander to retain functional control, task-organized corps engineer units should develop a way to transmit operational and intelligence information directly to the brigade CP.

Engineer logistics and personnel information flow. Figure 2-11 also shows engineer logistics and personnel information flow. This information includes such things as daily logistics status reports (LOGSTATs), casualty feeder reports, awards, and so on. Two paths are used by corps engineer forces assigned to the corps engineer brigade and task-organized corps engineer forces supporting divisions, separate brigades, and cavalry regiments. The path works both ways, with the majority of information flowing from corps engineer units to the brigade CP and SES. The managers of this information include the engineer brigade logistics staff sections at the brigade CP and the corps rear CP. Again, engineer information coming in from task-organized forces may be timelier than that coming from assigned engineers, due to easier access to corps signal systems. Task-organized corps engineer units should also develop a way to transmit logistics and personnel information directly to the brigade CP.

Corps operations and intelligence information. Figure 2-12, page 2-40, shows corps operations and intelligence information flow. This information includes such things as intelligence summaries (INTSUMs), maneuver overlays, FRAGOs, chemical downwind messages and so on. Again, two paths are used by corps engineer forces assigned to the corps engineer brigade and task-organized corps engineer forces supporting divisions, separate brigades, and cavalry regiments. The paths work both ways, with the majority of information flowing from the corps G2/G3 through the brigade CP, SES, and maneuver CPs to corps engineer units. The managers of this information include the engineer brigade operations staff personnel at the brigade CP and the corps TAC CP. In some cases, information coming in from maneuver CPs may be timelier for task-organized engineers than assigned engineers, due to direct access to corps information at the maneuver CP. The corps SES will receive this information faster than the brigade CP.

Corps logistics and personnel information flow. Figure 2-12 also shows corps logistics and personnel information flow. This information may include such things as corps ammunition controlled supply rates (CSRs), personnel replacement rates, supply-point locations, and so on. Again, two paths are used by corps engineer forces assigned to the corps engineer brigade and task-organized corps engineer forces supporting divisions, separate brigades, and cavalry regiments. The paths work both ways, with the majority of information flowing from the corps G4/COSCOM through the brigade CP, SES, and maneuver CPs to corps engineer units. The managers of this information include the engineer brigade logistics staff personnel at the brigade CP and the corps rear CP. In some cases, information coming in from maneuver CPs may be timelier for task-organized engineers than for assigned engineers, due to direct access to corps information at the maneuver CP. The corps SES will normally receive this information faster than the brigade CP.

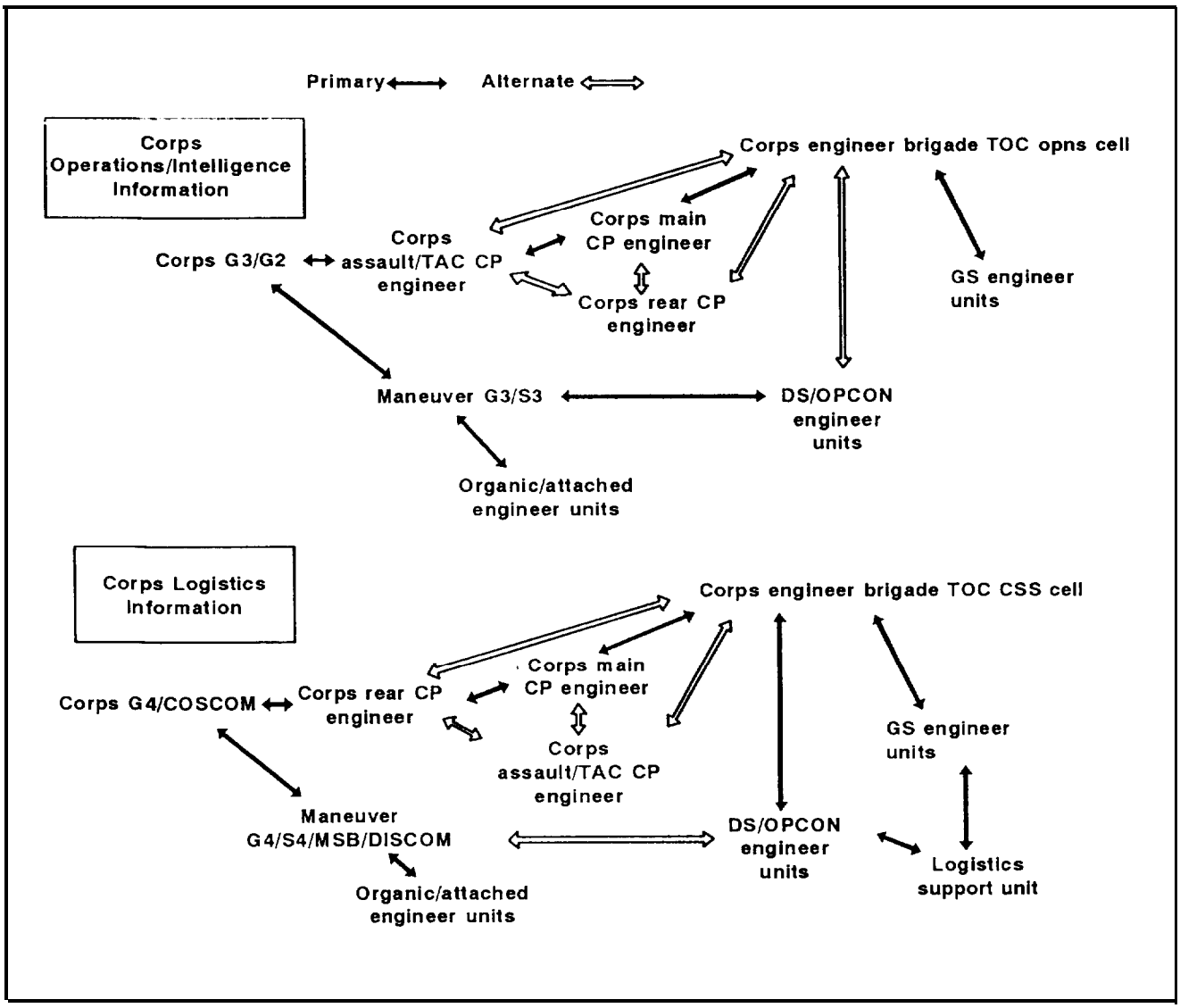


Figure 2-12. Corps information flow

CHAPTER 3
FORCE PROJECTION

The (7th Engineer) Brigade units occupied various locations in tactical assembly area (TAA) JUNO in advance of VII Corps. We immediately began sustainment operations which provided life support and protection for arriving units. These missions included constructing unit-sized protective berms, airfields, helipads, hospitals, roads, ammunition storage areas, and a petroleum storage area and applying dust palliative. The Brigade also executed projects in support of the corps train up for offensive operations. Several tank gunnery ranges were built in division areas and the 176th Engineer Group constructed a replica of the Iraqi barrier system to rehearse combined arms breaching operations. The engineers participated in this breach training as an integral part of the team, which culminated in a live-fire exercise using the mine-clearing line charge (MICLIC).

From the 7th Engineer Brigade Command Report-- Operations Desert Shield and Desert Storm, dated 9 April 1991, Colonel Samuel C. Raines, Commanding.

Force-projection operations usually begin as a contingency operation in response to a crisis involving imminent or actual military involvement during war or OOTW on a regional scale. These crises present a definite threat to US interests, but the situation, military mission, and military threat are often vague and uncertain. The objective area may be defended or it may be benign; the threat may be mobile and armored or it may be a light paramilitary force; the terrain could be steep jungles, wide open deserts, or high mountain valleys.

The corps will conduct force-projection operations as part of a joint and possibly multinational force under the OPCOM of a Commander in Chief (CINC) or joint force commander. The corps's mission could range from a simple show of force to providing a deterrent force against a major and immediate threat. The ability to project continental United States (CONUS)-based, ground combat power is critical as forward-presence US forces have declined over the years. Adherence to Army-operations tenets requires close cooperation with US Naval, Marine, and Air Forces. In addition, operations in foreign territory will require multinational efforts with host-nation and coalition military forces. Engineer support efforts require close coordination and cooperation with joint and coalition military engineer forces along with host-nation support agencies to meet force-projection mission requirements.

FORCE-PROJECTION CONSIDERATIONS

FM 100-5 describes several key considerations that apply to force-projection operations. The following describes corps engineer capabilities that should also be considered:

LETHALITY FOR THE DEPLOYING FORCE

In all contingencies, the early-entry force must possess the required lethality to accomplish the mission and protect the force the moment it arrives in theater. Corps engineers contribute to the lethality of the early-entry combat force through placing minefield and other obstacles, along with protecting the lodgment by constructing secure C2 nodes, logistics bases, and other needed fortifications and survivability positions. Corps engineer mobility, such as bridging, gap crossing, and obstacle breaching, enhances the lethality of combat forces securing operational objectives.

ANTICIPATION AND INTELLIGENCE

Force-projection anticipation is the expectation of being alerted and deployed. The rapid introduction of US forces requires accurate, detailed, continuous, and timely intelligence. Corps engineers anticipate and provide needed topographic terrain products of likely contingency areas in support of the ongoing IPB process. They assess available infrastructure for possible general engineering requirements, including airfields, MSRs, ports, utilities, and logistics facilities. They determine threat engineer capabilities in likely lodgment areas, including requirements for countermine and counterobstacle capabilities needed with the early-entry force. They also consider planning and support which may be available through the logistics civil augmentation program (LOGCAP) and USACE contracting capabilities.

FORCE TAILORING AND TEAMWORK

Force tailoring is the process of determining the right mix and sequence of units. Proper planning should give the operational commander the resources and dispositions to deal with any eventuality that might jeopardize either mission accomplishment or force protection. Commanders consider the factors of METT-T, strategic lift, pre-positioned assets, and host-nation support when they tailor forces. Deploying unite must be extremely flexible and versatile, placing a premium on early and continuous teamwork. Corps construction engineers may be the initial forces deployed during unopposed entry operations where limited host-nation support and infrastructure exist. Other corps combat engineer forces may flow with and closely support early-entry combat forces.

JOINT BATTLE COMMAND

Because of the joint and possibly multinational nature of force-projection operations, commanders must establish a battle-command system that can contend with the simultaneous challenges of deployment, entry, and combat while retaining the capability to adjust to the evolving conditions of each. Corps engineers are involved in each of these challenges--supporting deployments while also deploying themselves, supporting lodgments with construction, and supporting maneuver operations with combat engineering. This requires corps engineers to execute missions at the small-unit level while joint engineer battle-command echelons are separated in time and space.

A key battle-command consideration is the method in which joint and multinational engineer forces, including USACE civilian contractors, are commanded. When the corps is designated as a JTF or multinational headquarters, the engineer staff should be placed under the Operations Directorate (J3) staff or as a separate joint or multinational SES. When the corps serves as an ARFOR headquarters, the use of a standard corps SES (as described in Chapter 2) applies. Engineers should avoid being placed under the auspices of the joint or multinational Logistics Directorate (J4) staff. Lessons learned from force-projection operations show that when staff engineers are placed under the J4, engineers are prioritized to support logistics forces in theater at the expense of maneuver and other deployed units. In addition to ensuring proper engineer staffing at the JTF or ARFOR level, a separate engineer headquarters (such as the corps engineer brigade, an ENCOM, a TA engineer brigade, or an engineer group) should be identified to command and control the varied,

critical, and constrain operational engineer support required in the AO.

LOGISTICS

Successful force projection requires tailorable, flexible logistics. Existing theater infrastructure greatly affects logistics planning, including airfields, ports, roads, and other assets. Corps engineers support force-projection logistics operations by constructing forward-support bases, ISBs, and lodgments. Corps engineers work closely with host-nation and contracted logistics sources.

TRAINING AND MULTINATIONAL OPERATIONS

Demanding and relevant training helps focus missions and conditions expected to be found during force-projection operations. Corps engineers continually conduct peacetime overseas deployment training in support of nation-assistance, disaster-relief, peacekeeping, counterdrug, and humanitarian-assistance missions around the world. Normally, these missions are fully combined with host-nation forces, using local construction materials and equipment. These types of missions continually prepare corps engineers for future force-projection operations during war and OOTW.

MEDIA IMPACT

Force-projection operations are affected by visual media such as television. Corps engineers can have positive media impact during these operations, such as visually describing local civic-action construction projects that enhance goodwill both in the TO and in the US.

POSTCONFLICT

Issues related to the strategic end state, postconflict activities, and transition to peace are considered throughout force-projection operational planning and execution. Corps engineers play a significant role in supporting postconflict activities, including the construction of refugee and redeployment facilities; battlefield cleanup of mines, UXO, and hazardous waste; and the restoration of basic infrastructure utilities and services.

FORCE-PROJECTION OPERATIONS

Force projection will follow a general sequence. Normally force-projection operations fall into stages that begin with planning and preparation and end with redeployment and demobilization of the force-projection force. Activities of one stage may blend with another, be parallel to another, or not occur at all. The following eight stages provide the general structure for a force-projection operation with engineer considerations for each stage. They can be adjusted to fit the needs of a particular crisis response.

MOBILIZATION

Mobilization describes a process by which the armed forces reach a state of enhancd readiness in preparation for war or other national emergencies. It includes activating all or part of the reserve component as well as assembling and organizing personnel, supplies, and material prior to deployment.

Over three-fourths of the total engineer force structure is in the selective reserve components of the US Army Reserves (WAR) and the Army National Guard (ARNG). A large force-projection engineer capability also exists in USACE agencies throughout CONUS and overseas. Because of this, force-projection operations require the mobilization of reserve component corps engineer forces and USACE personnel. Activated engineer forces may include corps engineer brigades, groups, battalions, and companies; USACE agencies; elements of the ENCOM; other theater engineer units; and specialized engineer teams and personnel.

Activated reserve component engineer units and USACE agencies maintain a high state of personnel, equipment, and training readiness. These units and agencies continually demonstrate their mobilization proficiency during day-to-day operations, annual training deployments throughout CONUS and overseas, state emergency duty, and other support to domestic authorities.

PREDEPLOYMENT

Force-projection operations commence with crisis-action planning and predeployment activities. Using the corps crisis-action system, the corps seeks to determine the requisite military conditions for success, sequences activities to achieve these conditions, and applies resources accordingly. The objective in this phase is to select the proper force and to derive the correct operational concepts for subsequent phases of the campaign (see Figure 3-1). Decisions made in this phase determine the corps engineers' capabilities to support the entire force-projection operation. Engineers are integrated fully with corps planners as they identify the conditions for success. Engineer planners organize engineer forces to ensure that success (see Figure 3-2).

Corps engineer force support packages are formed according to the operational concept. This input is provided in a matter of hours, not days or weeks. As a hedge against unforeseen circumstances in the objective area, leading combat engineer elements of the crisis response force are tailored for forcible entry. This provides overwhelming combat power at the first point of decision—securing lodgments—and supports the additional conditions required for subsequent phases of the operation.

Robust initial combat engineer capability to open airfields and provide maneuver survivability and force protection is a critical forced-entry support consideration. Follow-on combat engineers are phased in for port-of-debarkation (POD) development, including the construction and repair of austere logistics bases, staging areas, and roads.

Timely topographic engineer support is critical to the corps commander's terrain assessment in order to determi ne where to conduct operations and to identiy host-nation infrastructure that may be available to sustain operations. Early deployment of USACE water-detection teams may be essential in ensuring the development of adequate resources. Accurate topographic imagery and map products are crucial to support operational IPB and follow-on C2 operations.

Requisite engineer capability may be required in force packaging for acquiring host-nation real estate and for planning the construction of contingency theater support facilities. This engineer support package is normally attached to the corps engineer brigade or JTF engineer staff until a theater engineer battle-command headquarters arrives. Initial engineer support capability may be available with USACE personnel already working in the force-projection theater.

Peacetime engineer overseas deployment training, the acquisition and construction of facilities, and the pre-positioning of engineer materials and equipment in possible force-projection theater locations may reduce initial requirements for engineer support forces. Forward-presence engineers engaged in humanitarian- assistance, nation-assistance, or disaster-relief operations in the force-projection theater also reduce initial engineer force structure requirements. Theater host-nation engineer support must be planned for and may augment initially deployed engineer forces.

DEPLOYMENT

Deployment of corps forces is dependent upon limited sealift and airlift assets. The primary consideration i n determining the composition of initial corps response forces will be METT-T factors, balanced against available airlift and

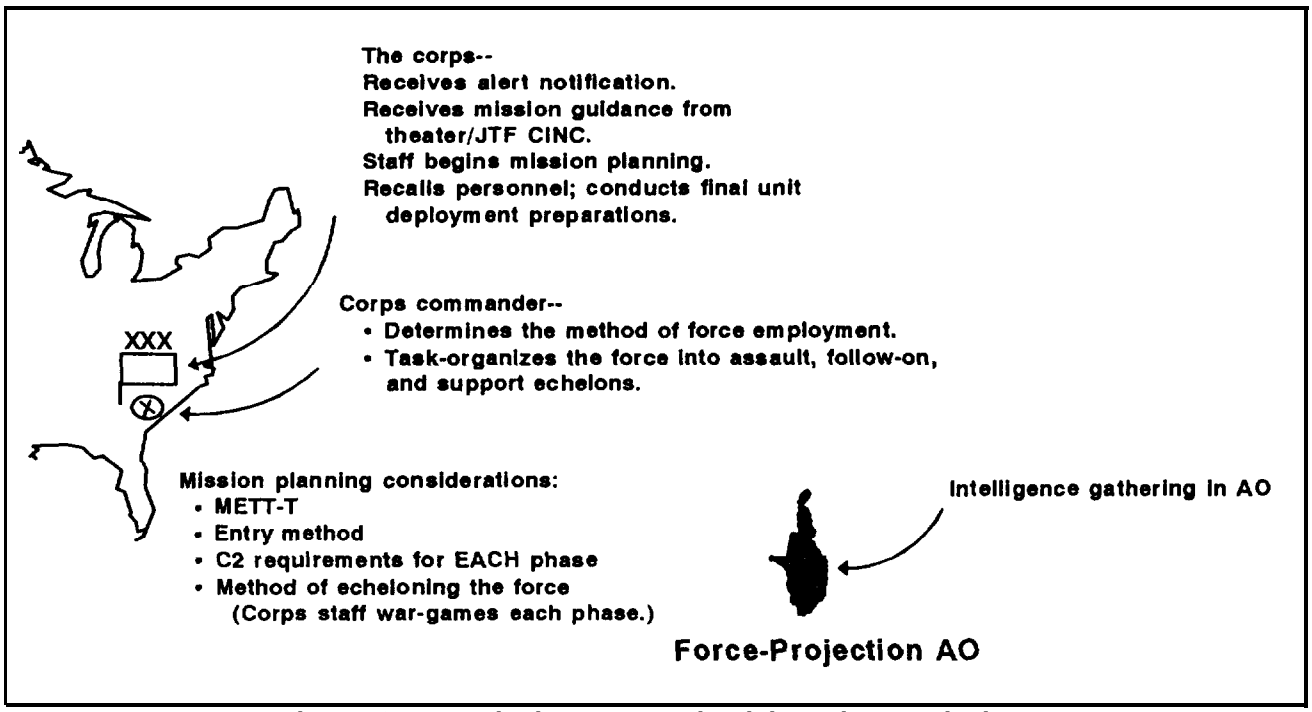


Figure 3-1. Predeployment and crisis-action analysis

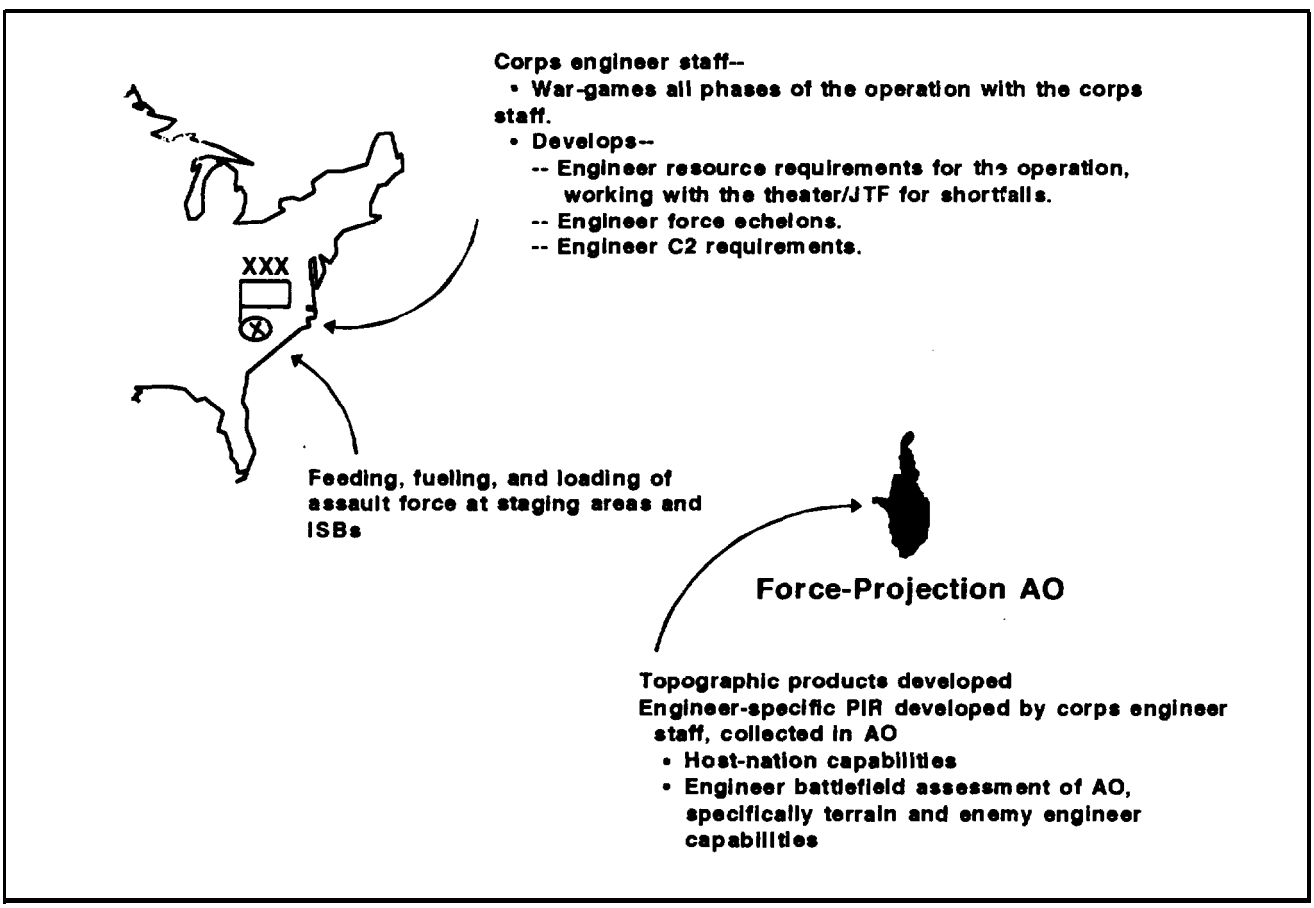


Figure 3-2. Predeployment and crisis-action engineer functions

sealift assets (see Figure 3-3). In a time-critical situation, light corps forces will be deployed initially. Corps armored forces, if required, will simultaneously up load for deployment by sea. Each crisis will have unique demands, causing commanders to balance the speed of deployment with the protection of the deploying force.

Corps engineers are fully integrated into the light and heavy mix of deploying forces (see Figure 3-4). At the same time, other engineers will support installation railheads and staging-area operation requirements. Corps engineers may also be involved with port and airhead deployment operations. Engineer deployment tasks include constructing or upgrading deployment facilities; providing heavy equipment and trucks to assist in moving to and loading railcars, aircraft, and ships; marking and maintaining deployment routes from the installation to the port or airhead; and providing laborers to assist in the deployment process.

ENTRY OPERATIONS

This principal focus of the entry phase is to build up combat power as quickly as possible while concurrently conducting combat opera-

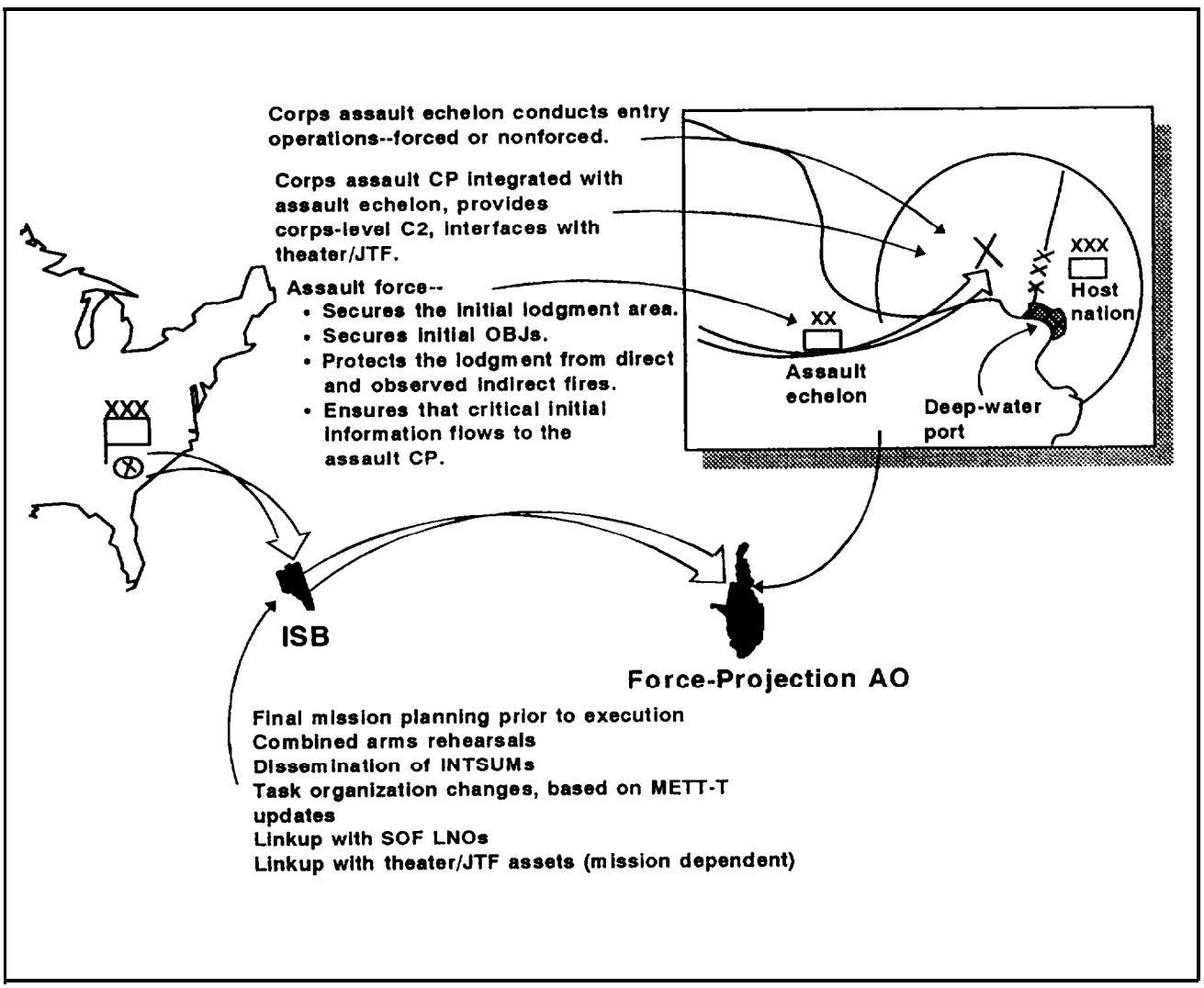


Figure 3-3. Deployment analysis

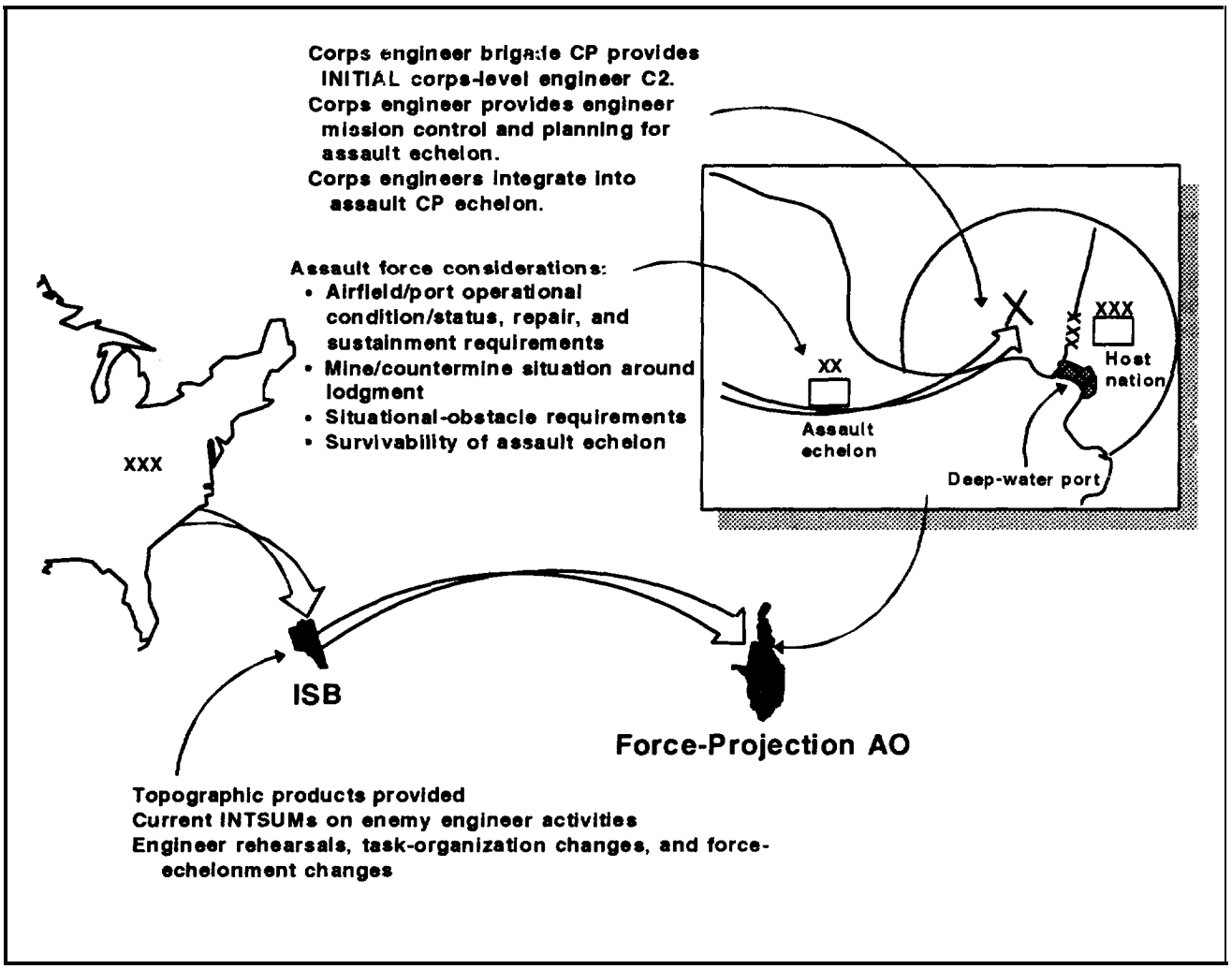


Figure 3-4. Deployment engineer functions

tions (see Figure 3-5, page 3-8). Speed in closing the force and in achieving the desired conditions in the contingency theater is critical. The success of follow-on decisive operations to restore the political and military end state hinges on the corps's ability to build combat power without losing the initiative. The coordinated use of joint, coalition, and host-nation forces continues to be paramount while building combat power. This phase is quite transitive in nature, as the corps commander accepts reasonable risks in using available forces to exploit favorable conditions. This key execution phase encompasses the critical seizure of unopposed or opposed lodgments in the objective area. Tailored assault packages, echeloned battle command, and the careful synchronization of air and sea power are essential. Forced-entry action by airborne, air assault, or amphibious forces initiates this phase by seizing airfields and establishing airheads. Follow-on corps echelons of the crisis-response force must be prepared to close into the objective areas and to reinforce the assault. This normally requires the formation of a JTF to shape future operations even as it focuses on the crucial joint fight to establish a lodgment. Available coalition and foreign/host-nation forces prove critical in this phase to provide the bulk of combat power in theater as US forces arrive.

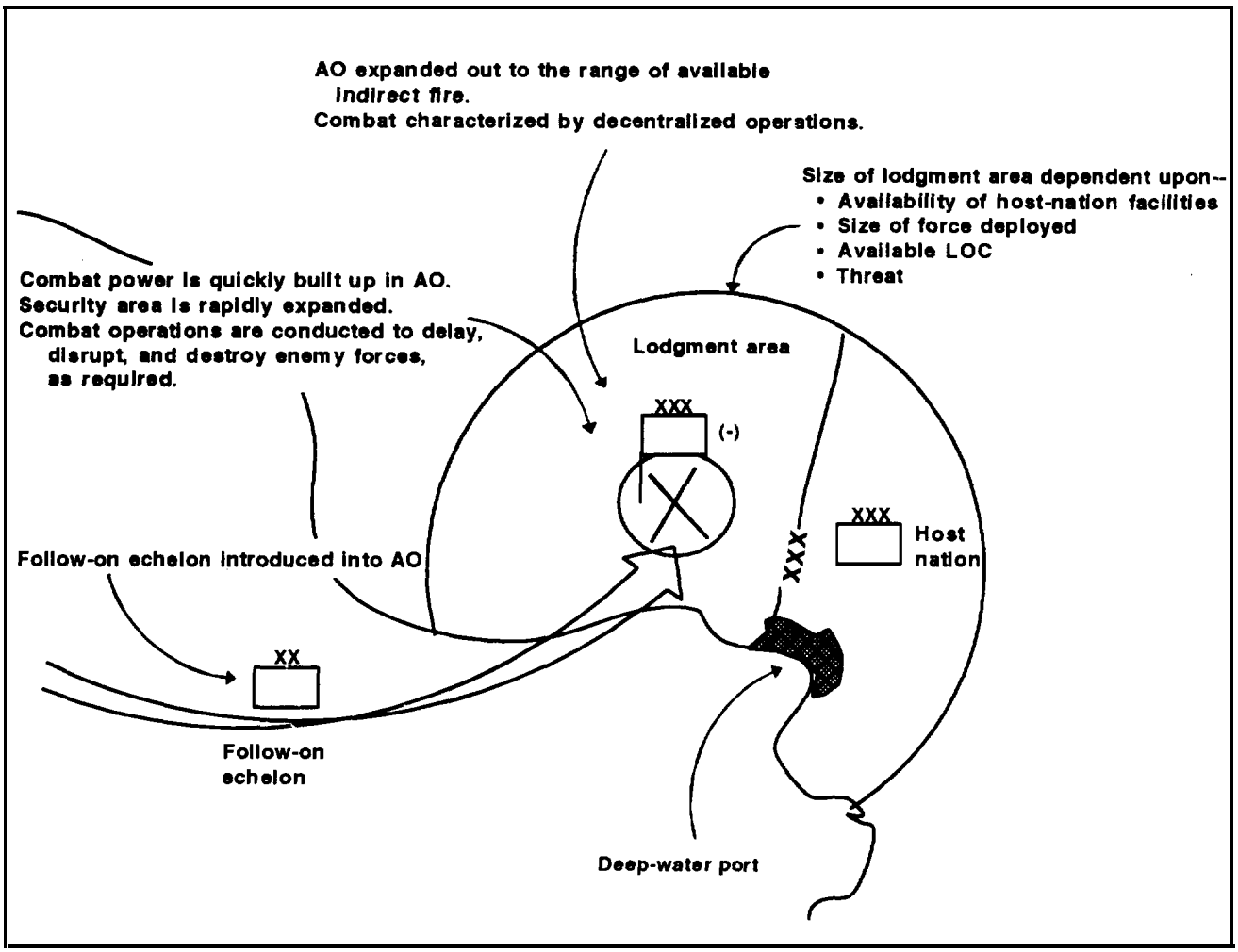


Figure 3-5. Entry operations analysis

Corps engineer forces are organized to support these combat operations simultaneously (see Figure 3-6). This situation could require commitment of both corps and division engineers early in the deployment sequence. Division engineers will focus on close combat requirements, including mobility, survivability, and force-protection support. Corps engineers repair runways, establish or improve existing LAPES and forward landing strips (FLSs), repair airports and seaports, construct and repair roads, support corps defensive operations with countermobility and survivability operations, construct ADA firing points, build corps battle-command facilities, and develop other sustainment infrastructure in the initial lodgment area and ISBs. Early deployment of corps topographic engineer imagery capability is critical to support the shaping of future operations in the force-projection theater. Follow-on corps topographic survey teams will be needed in the lodgment area to establish accurate survey control points for fire-support operations and positive navigation systems. Corps engineer battle-command elements are deployed with the assault and follow-on force packages to maximize engineer work on time-sensitive tasks and to coordinate engineer activities with host-nation and coalition forces. The corps engineer brigade may become the RCEM.

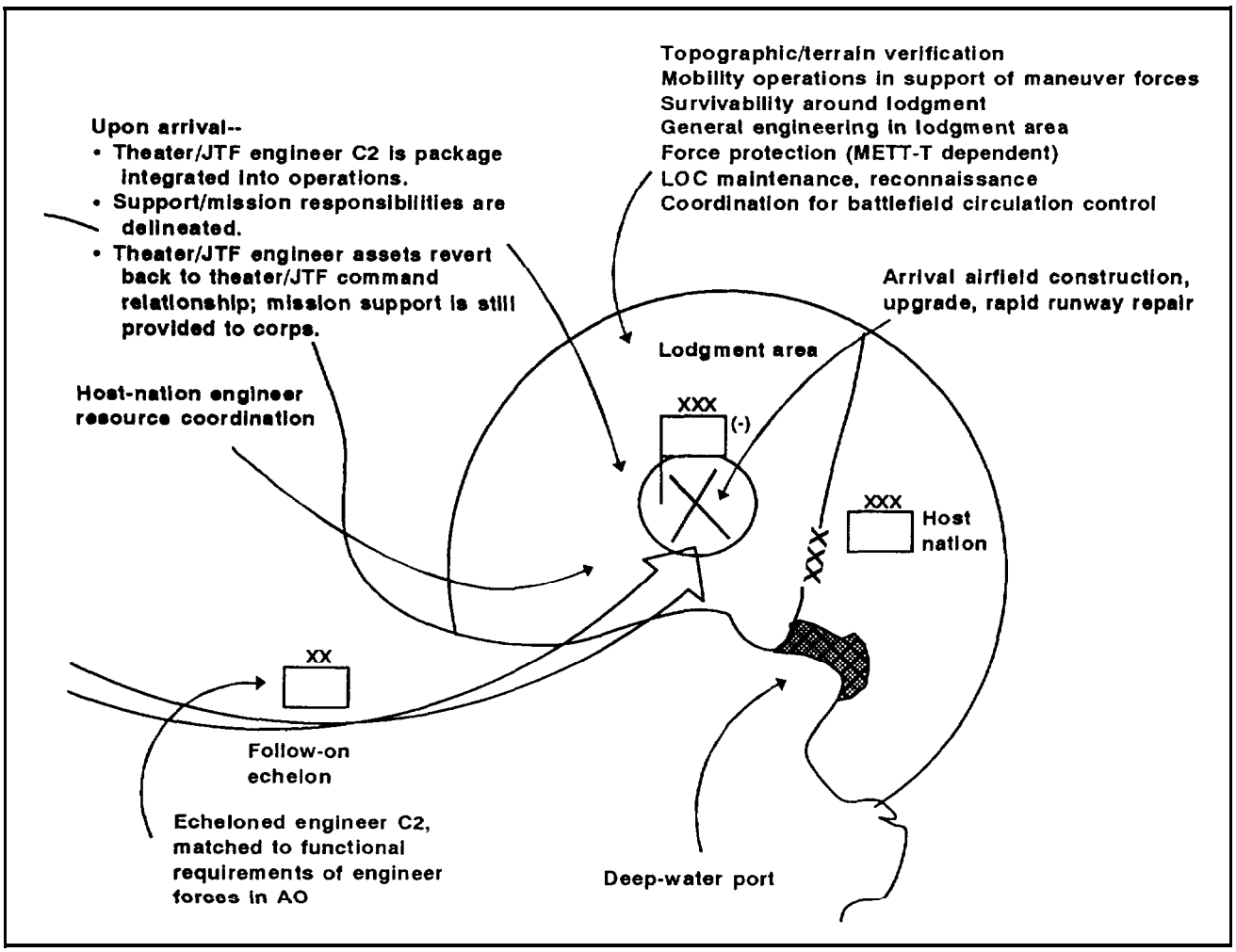


Figure 3-6. Entry operations engineer functions

COMBAT OPERATIONS

It is through decisive combat operations that the corps will achieve those operational objectives that will attain the strategic purpose of the campaign (see Figure 3-7, page 3-10). The corps operational method is characterized by the use of overwhel mi ng force, maneuver warfare, and simple battle-command design that exploit subordinates' initiatives through decentralized execution. The corps seeks to achieve the desired end state as soon as possible by winning the war with quick, aggressive operations. The previously described phases set the conditions for decisive combat operations. Speed and high tempo in planning and execution are essential qualities of the corps's warfighting style. The corps destroys or neutralizes the threat's center of gravity in this phase by maneuvering and orienting combat power against the enemy's flanks and rear.

During this phase, corps engineers are fully engaged in all of the battlefield operating systems (BOSs) as described throughout this manual, supporting the numerous tasks required during decisive combat operations (see Figure 3-8, page 3-11). These include—

- Protecting the arriving force with engineer survivability and countermobility operations.

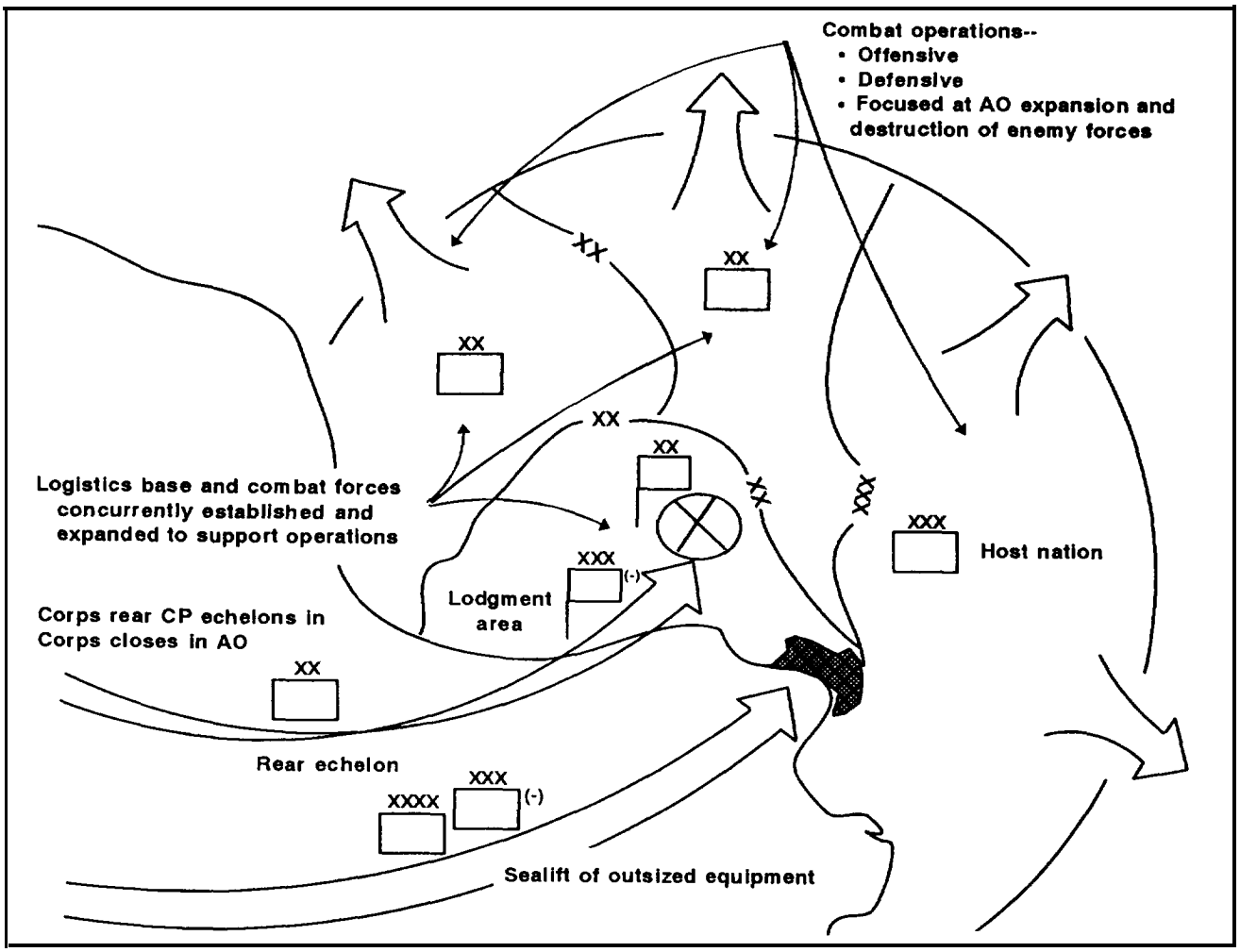


Figure 3-7. Combat operations analysis

- Constructing forward operating bases, FLSs, and supply routes.
- Expanding the lodgment area through combat engineer mobility operations.
- Providing arriving forces with topographic engineering support.
- Assisting reception, staging, and onward-movement operations with general engineering support, including the erection of portable structures and the construction of aircraft bed-down facilities, training facilities, EPW camps, and refugee facilities.
- Locating construction materials and equipment through engineer reconnaissance operations.
- Facilitating linkup operations with other forces, both joint and unconventional.
- Performing other needed force-projection theater engineer missions until the arrival of theater engineers under the control of an ENCOM or TA brigade (such as real estate acquisition, host-nation construction contracting support, well drilling, diving, fire fighting, pipeline construction, hazardous waste cleanup, and prime-power supply).

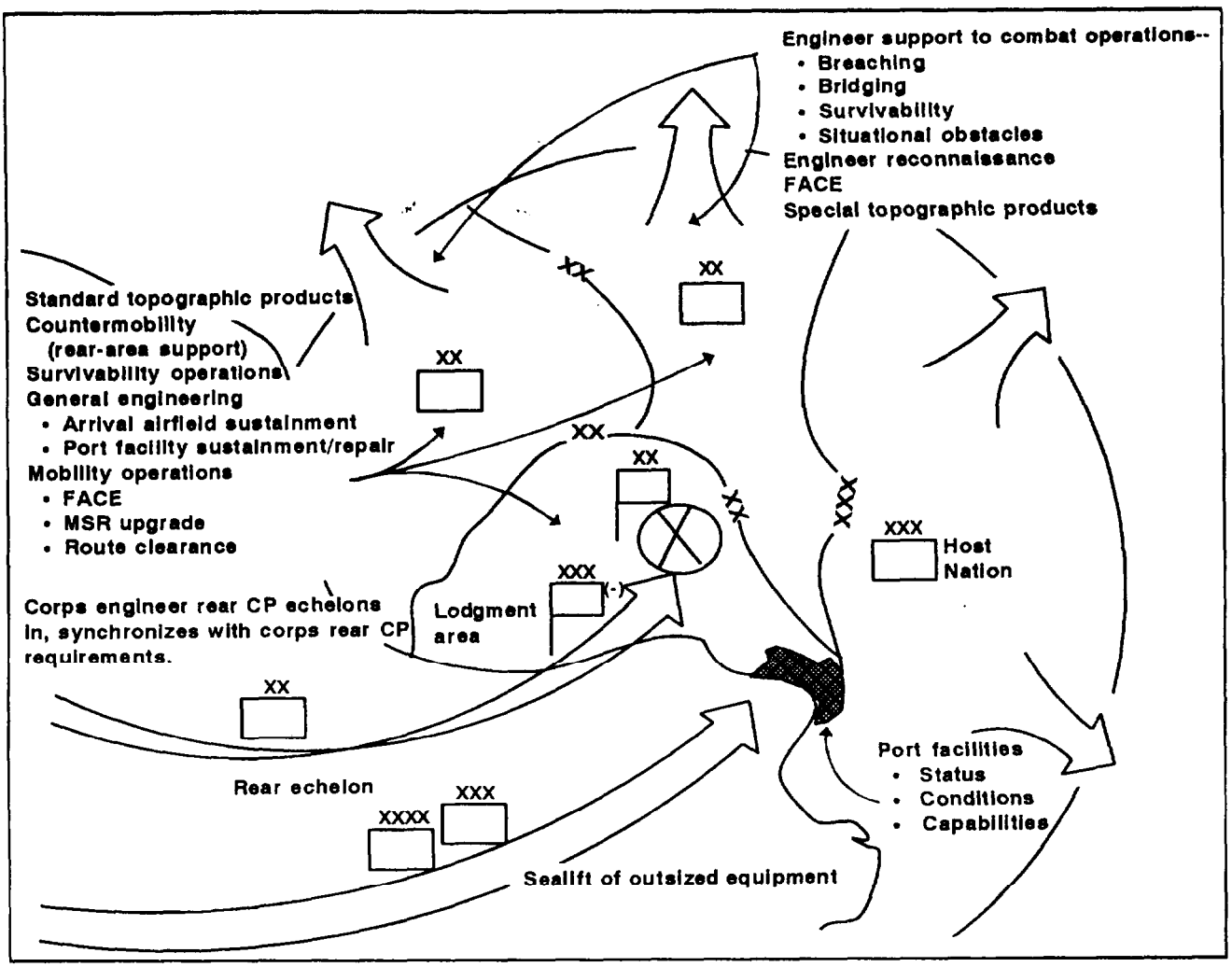


Figure 3-8. Combat operations engineer functions

Several tasks may be conducted exclusively by corps engineers, including—

- Constructing corps defensive positions, EPW camps, refugee facilities, and logistics bases.
- Providing combat engineer support to the corps reserve, cavalry regiments, separate maneuver brigades, corps RAOCs, TCFs, and corps aviation units.
- Performing deliberate river crossings.
- Augmenting corps force-protection and survivability.
- Relieving/reconstituting expended division engineer units.
- Performing corps camouflage and deception operations.
- Breaching bypassed obstacles, widening assault lanes, and limited clearing of minefield and UXO.
- Constructing, improving, and maintaining supply routes.
- Erecting permanent route signs.
- Performing equipment and munition deni al operations.

- Producing and distributing nonstandard topographic imagery products.

CONFLICT TERMINATION AND POSTCONFLICT OPERATIONS

Successful combat operations are designed to bring an end to the conflict.When a cessation of hostilities or a truce is called, deployed corps forces transition to a period of postconflict operations. This transition can occur even if residual combat operations are still underway in other parts of the force-projection theater (see Figure 3-9).

Corps engineers are especially suited to assist in restoring order, reestablishing the foreign/host-nation infrastructure, preparing forces for redeployment, and providing a contínting presence in theater (see Figure 3-10). Corps engineers support various postconflict missions such as constructing tent cities for refugees, constructing EPW camps, developing potable water supplies, restoring utilities, rebuilding roads and bridges, and marking and limited clearing of minefield and UXO.

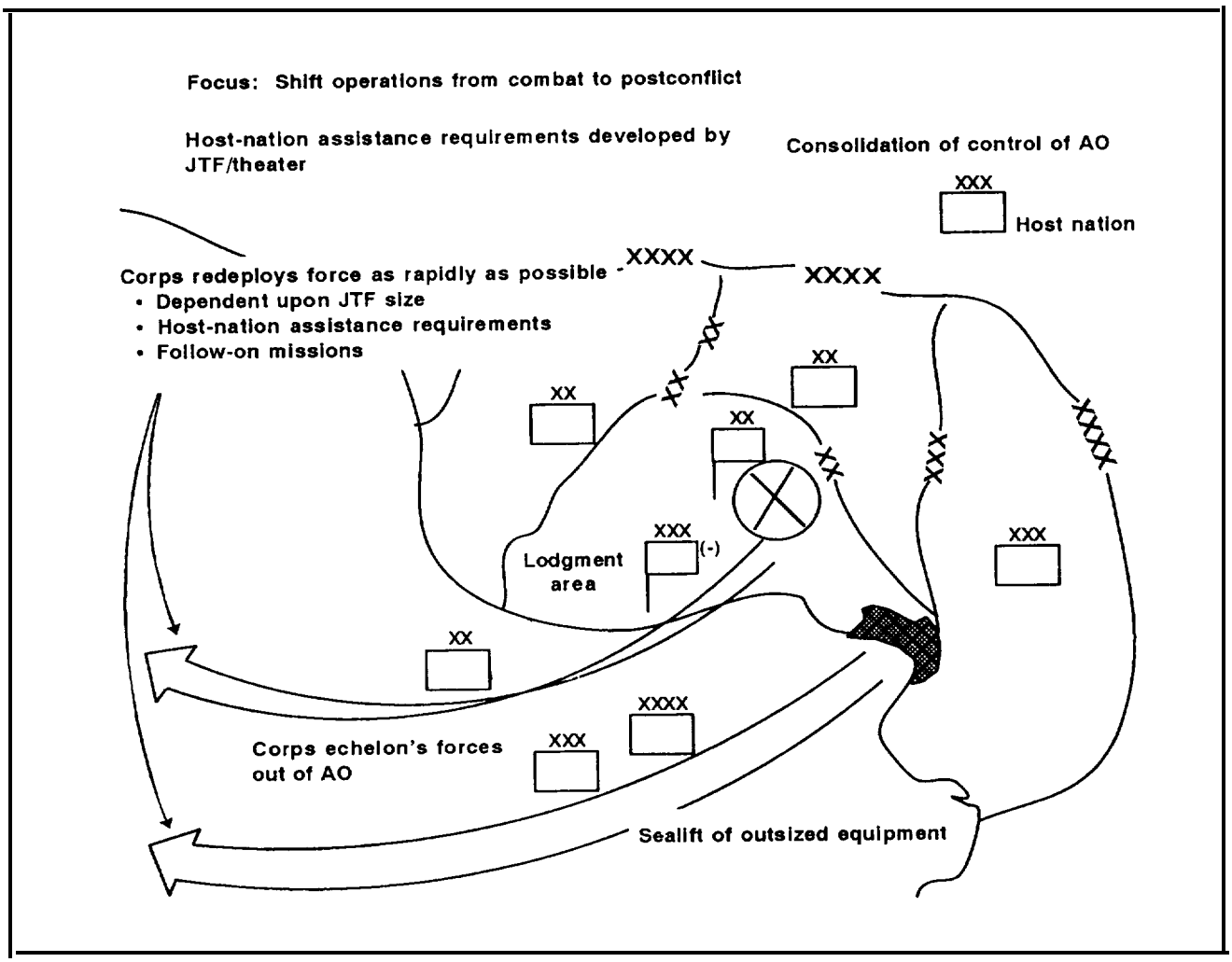


Figure 3-9. Conflict termination postconflict operations redeployment, and reconstitution operations

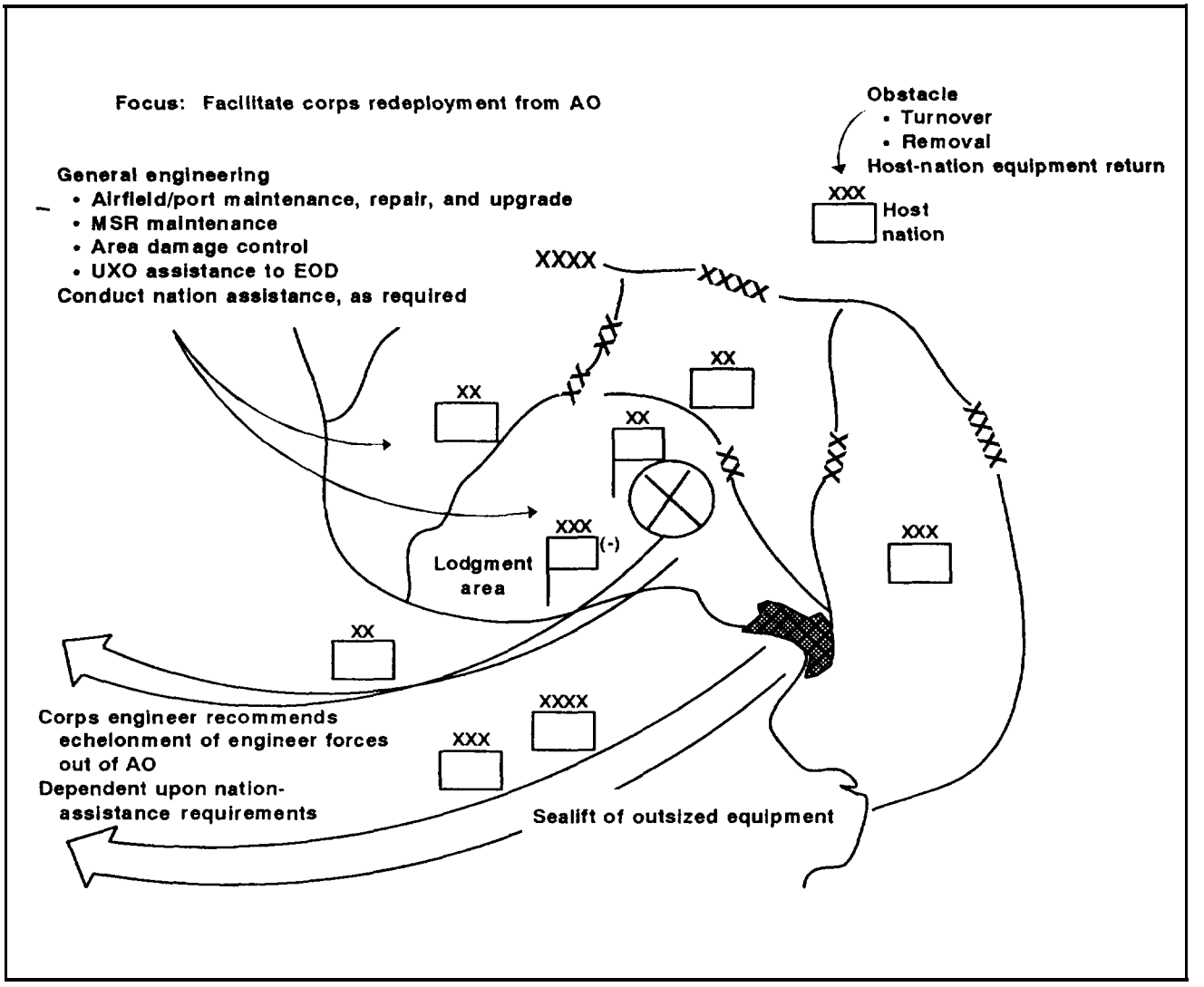


Figure 3-10. Conflict termination, postconflict operations, redeployment, and engineer functions

REDEPLOYMENT AND RECONSTITUTION

The objectives in this final phase are to redeploy assets that are no longer needed as rapidly as possible to CONUS, to an ISB, or to another TO. Postconflict activities have a di - rect impact on the redeployment flow. In conjunction with this effort, the corps must be reconstituted for other force- projection missions. At the same time, CS and CSS elements often remain in theater to support forward-presence peacekeeping or nation-assistance efforts. Echeloning the corps battle command while retaining flexibility and security continue to be essential.

During this phase, corps engineers are focused on the construction or repair of redeployment facilities and staging areas, including wash racks, equipment holding, and sterile customs inspection facilities. In addition, corps engineers will support—

- Force protection of deployi ng forces.
- Port operations and maintenance.

- Battlefield and hazardous-waste cleanup.

Ž Supply-route and facility maintenance.

Ž Other needed general engineering and life-support engineering tasks.

DEMOBILIZATION

Demobilization is the process by which units, individuals, and material transfer from active duty back to a reserve status. Demobilization of logistics requires significant resources such as supplies, material, and support activities.

Corps engineers may demobilize themselves or be involved with the handling, storage, and accountability of demobilized equipment and supplies. Typical engineer demobilization missions include the construction, upgrade, or removal of logistics facilities; the cleanup and removal of hazardous waste, the repair of in-

JOINT OPERATIONS

Operation RESTORE HOPE demonstrated how well joint engineer capabilities can be used to meet theater requirements. Early planning identified a large military engineer requirement for both combat and construction support missions. Planners decided to use a mixture of engineering capability from the US Army, Navy, Air Force, and Marine Corps. Time phasing of this support was well orchestrated, based on available lift and mission requinements.

US Air Force RED HORSE airfield repair teams had been maintaining airfields throughout Somalia in support of Operation PROVIDE RELIEF since 16 August 1993.

A small portion of the JTF engineer staff arrived on D-Day to assess theater requirements. Of immediate concern was power generation and potable water for the impending force.

On D+1, a vertical construction detachment from the 40th Naval Mobile Construction Battalion (NMCB 40) (Seabee) opened up the Mogadishu airfield, and constructed troop beddown and logistics support facilities throughout Mogadishu.

On D+5, a company of combat engineers from the 1st Marine Combat Engineer Battalion (1 CEB), 1st Marine Division, supported the expansion of Marine operations in Mogadishu by clearing obstacles and sweeping for mines. The battalion then supported Marine lodgment efforts in Baidoa, Balidogie, and Kismayo. They also began upgrading the road from Baidoa to Bardera.

Elements of the Marine 7th Engineer Support Battalion (7 ESB) arrived offshore on D+5. The battalion augmented Seabee horizontal construction capability and constructed and operated redeployment facilities. Horizontal construction equipment from the 1st Naval Mobile Construction Battalion (NMCB 1) arrived on D+7 along with command and control elements from the 30th Naval Construction Regiment (30 NCR). NMCB 1 repaired airfields and constructed base camp facilities at outlying humanitarian relief centers and opened up MSRs out of Mogadishu.

On D+7, a company of the Army's 41st Engineer Battalion, 10th Mountain Division, arrived and supported the lodgment of Army infantry forces at Balidogle and Marka with minesweeping operations, engineer reconnaissance, force protection, and limited base-camp construction

support. The remainder of the battalion (-) flowed into theater and constructed two Bailey bridges, repaired one Bailey bridge, and cleared mines along the Kismayo-to-Bardera MSR.

On D+10, a DMA map depot was *established at the Mogadishu airfield.*

On D+22, the JTF dropped the requirement for one additional Army combat heavy battalion, a port construction company, a prime-power detachment, and several fire-fighting units. The decision not to bring forward additional engineer forces was based on capabilities available in theater with deployed or deploying US and coalition engineer forces.

On D+24, elements of the Army's 36th Engineer Group, along with the 43rd Combat Heavy Engineer Battalion and the 63rd and 642nd Engineer Combat Support Equipment Companies, arrived to open MSRs and build base camps in the western sector Remaining elements of NMCB 40 and NMCB 1 also arrived on D+24 and continued working on MSR and base camps in the eastern sector All engineer personnel and equipment were in theater by D+50.

From the Center for Army Lessons Learned (CALL) "After-Action Report on Operation Restore Hope in Somalia", March 1993.

The Army will not operate alone. Force-projection operations involving Army forces will always be joint under the responsibility of a unified combat commander. Joint forces include unified and specified commands and JTFs. Armies normally design the major ground operations of a campaign, while corps and divisions usually fight battles and engagements. A corps commander may be a JTF commander in certain circumstances, planning and executing a campaign that achieves strategic objectives. A JTF will normally draw units from various components: TA, naval fleet, fleet marine force, or theater air force, Joint forces operate with two distinct chains of command--one for operations and another for administrative and logistical matters. A JTF may be formed to perform OOTW missions such as support to insurgency and counteri nsurgency, peace operations, Department of Defense (DOD) support to counterdrug operations, antiterrorism operations, and contingency OOTW.

Corps engineer support to a JTF, unified, or specified command uses both chains of command to accomplish required tasks. The operational chain of command delineates missions, task organ izations, and geographic areas of responsibilities for corps engineer forces. The corps engineer brigade SES may form the nucleus of the JTF engineer staff section, with additional staffing provided from each service component in the JTF. An understanding of other component engineer capabilities is essential for understanding the joint commander's intent. Appendix E lists some of these joint capabilities that corps engineer forces should be familiar with.

When corps engineer forces are identified to support a JTF, a thorough joint engineer METT-T analysis is made to identify all engineer requirements. This critical front-end analysis drives the entire engineer support operation, ensuring success. The corps engineer force uses the Army administrative and logistical chain of command for support. Engineer requirements are extensively planned with the corps logistics staff, ensuring that adequate support exists over extended joint operations distances. Limited common-type engineer logistical support (such as fuel, demolitions, construction materials, and construction equipment repair parts) may be available from other

components. However, most corps engineer administrative and logistical support must come exclusively from Army sources. Corps engineer LO requirements during joint operations will also be extensive.

AIR FORCE SUPPORT

Army corps engineer support to the Air Force falls into three broad categories: input to Air Force interdiction missions, requests for terrain imagery products from Air Force air- and space-based surveillance and reconnaissance assets, and airfield construction support in the corps area.

Interdiction Missions

Army corps engineers will nominate situational obstacle locations in support of deep operations through the corps G2/G3 targeting element to the corps air support operations center (ASOC) located in the CDOCC of the corps main CP. Deep situational obstacles may include strategic bridge demolitions and Air Force-delivered scatterable minefield. Approved deep-operations situational obstacle locations with specific obstacle effects on HVTs will be described in the engineer annex to the corps order and supported by the DST. Obstacles that are emplaced during deep operations will be reported by the ASOC to the G3 and tracked by the engineer staff in the corps main CP current-operations cell.

Surveillance and Reconnaissance Missions

Army corps engineer requests for specific terrain imagery products from Air Force surveillance and reconnaissance assets will be made through the corps G2 to the ASOC.

Construction Support

Army corps engineers directly interface with Air Force agencies, as required, in support of major airfield construction operations in the corps's force-projection area. These missions are normally beyond the scope of organic Air Force engineer capability (such as the Prime Base Engineer Emergency Force (Prime BEEF) and the Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineer (RED HORSE)) and require extensive liaison between the corps engineer brigade and the Air Force customer. Host-nation airfield facility leasing and contracting support may be required from the USACE or an ENCOM. The corps engineer brigade may be required to provide fire-fighting and crash-rescue support to Air Force airfields. The engineer annex to the corps OPORD/OPLAN describes specific procedures to be used.

NAVY AND MARINE CORPS SUPPORT

Army corps engineer support to the Navy and Marine Corps primarily deals with the support of amphibious operations on a mission basis. Corps engineer input into the CDOCC targeting cell may eventually lead to naval or marine corps forces emplacing approved corps deep obstacle groups. In addition, naval and marine corps imagery support may be available through the corps G2. Corps engineer construction interface with NMCBs (Seabees) may occur in special circumstances, with extensive liaison support required from the corps engineer brigade, the USACE, and the ENCOM. This support may include Army diving and well-drilling support for joint port facilities.

Army corps engineers may assist Navy amphibious operations by clearing deep-water mines using Army divers. They may also assist Marine Corps amphibious operations with shallow-water, beach obstacle breaching and clearing.

MULTINATIONAL OPERATIONS

Force-projection operations inherently imply that they will be multinational, varying in duration, formality and purpose. These include the temporary alignment of countries for narrowly focused objectives, informal coalitions to provide for common action in accomplishing limited objectives, and long-standing alliances. The longer the coalition is sustained, the more opportunities exist to standardize and integrate tactics, techniques, and procedures between nations.

Some considerations that corps engineer forces should address while supporting multinational operations include—

- What are the capabilities and any limitations of coalition engineer forces?
- What topographic capabilities and products can be shared between coalition partners?
- Can construction services and materials be provided by the host nation? What common engineer items can be shared between coalition partners such as construction equipment repair parts and obstacle materials?
- What engineer liaison requirements exist? Are LOs provided with adequate transportation and communications equipment? What language skills are needed?

OPERATIONS OTHER THAN WAR

Corps engineers are key players during unopposed force-projection operations into theaters with little or no infrastructure support. Corps engineers can effectively support complex and sensitive situations in a variety of OOTW, to include support to insurgency and counterinsurgency, humanitarian assistance and disaster relief, peace operations, DOD support to counterdrug operations, nation assistance, antiterrorism operations, and contingency OOTW. All of these situations relate directly to wartime engineer missions and tasks. Corps engineer LO requirements during OOTW can be extensive, Chapter 8 and FM 5-114 describe in detail how corps engineers support OOTW.

CHAPTER 4
LOGISTICS

Another substantial undertaking was the construction and maintenance of several MSRs to support the movement of soldiers, equipment, fuel, food, water and ammunition. These MSRs were color coded Green, Blue, Black, and Gold. Over 68 miles of new MSRs were constructed, with maintenance required on over 204 miles. Operations were conducted around the clock with all of the company's assets. Continuous sustainment operations reduced the average life span of grader cutting edges to three days. Heavy dust one day and heavy rains the next provided added challenges every day.

From the 131st Engineer CSE Company Unit History in Support of Operation Desert Shield/Storm, dated 10 March 1991, Christopher D. Bishop, Commanding.

Logistics is the process of planning and executing force sustainment in support of military operations. A force-projection Army depends on the right logistical decisions prior to the onset of operations. There is normally little time for last-minute logistics fires when the decision to employ combat forces has been made.

Corps engineer force sustainment is critical for maintaining and multiplying combat power. Logistical operations sustaining corps engineer activities accurately anticipate engineer needs. Many corps engineer logistical needs are unique, one-of-a-kind requirements that demand improvisation by the logistician and oftentimes strain the logistical system Special engineer equipment is of low density requiring intensive management to ensure availability for mission use. Engineer mission materials are normally bulky heavy and hard to transport. They must be requisitioned, transported, stockpiled, and issued in a streamlined manner. Engineers play a key role in supporting corps logistics operations, including the construction, upgrade, and maintenance of logistics bases, troop bed-down facilities, airfields, ports, and MSRs.

This chapter focuses on the sustainment of corps engineer units and corps engineer support to corps logistical operations. It supplements doctrine found in FMs 100-10 and 63-3.

THE UNDERPINNINGS OF LOGISTICS

The objective of logistics is to ensure operations succeed and facilitate the commander's ability to generate and mass combat power at the decisive time and place. Logistics is a major operating system. Strategic and operational logistics support wars, campaigns, and major operations; tactical logistics support battles and engagements. Corps logistics focuses on

operational and tactical support. Corps engineers closely support operational logistics in areas such as renovating existing facilities or, if required, constructing new troop bed-down facilities for force-reception operations; opening ports and airfields to develop the theater infrastructure; and assisting in the distribution and management of material, movements, and personnel and health services by constructing and maintaining MSRs and other logistics support facilities. Operational logistics support encompasses those activities required to sustain campaigns and major operations and to enable success at the tactical level of war.

Tactical logistics encompasses all CSS and engineer activities required to sustain the tactical commander's ability to fight battles and engagements. Successful tactical logistics provides the right support at the right time and place to units in the combat zone. Corps engineers receive tactical logistics support from COSCOM units in the areas of manning, arming, fueling, fixing, moving, and sustaining. Corps engineers support tactical logistics operations in areas such as constructing FARPs, digging in ASPS and corps logistics C2 nodes, and erecting fixed bridging along forward sup ply routes.

Regardless of the war level, the corps engineer logistical support structure and resource requirements are dependent upon METT-T. The corps engineer logistical support structure fully supports the corps commander's intent and is integrated into his concept of operation. Trade-offs between combat and general engineering capabilities in the corps area directly affect this logistical support capability.

LOGISTICS CHARACTERISTICS

Scarce resources require logistics operations to be efficient, not wasteful. Logistics operations must be effective to provide the intended or expected support therefore, successful logistics support must be balanced between effectiveness and efficiency. Logistics operations are characterized by being able to anticipate requirements, integrate joint and multinational logistics support and improvise solutions and by being responsive and continuous. These characteristics facilitate effective, efficient logistics support and enable operational success. They apply in both war and OOTW. These imperatives act as a guide for planners and operators to synchronize logistics on the battlefield. The corps engineer unit commander and his staff understand and use these imperatives while planning engineer operations. The following paragraphs describe these characteristics along with corps engineer considerations for each:

ANTICIPATION

To anticipate means that the corps logistics planner is proactive rather than reactive before, during, and after combat operations. Corps logistic planners look at least 72 hours into the future. Corps logisticians consider joint, multinational, and host-nation assets when planning support for engineer operations. They maximize the use of all available resources, especially host-nation assets. They prioritize critical logistical activities based on the concept of operations. They anticipate logistical requirements based on experience and historical knowledge. They concentrate on critical war-stoppers first, then move to the item next in priority. They participate in and evaluate the logistical significance of each phase of the operation during the entire command-estimate process, to include: mission analysis; course-of-action (COA) development, analysis, war gaming, and recommendation, and execution of the plan. Various phases of force-projection operations can help describe anticipation requirements for corps engineers.

Predeployment and Deployment

If possible, before hostilities begin, the logistics organization first envisions and then becomes

capable of supporting engineer operations involved in theater sustaining base development. Since all corps logistics and combat operations depend on a robust infrastructure system, base development should be placed high on the force-projection theater commander's priority list. A foreign country's infrastructure cannot be developed overnight to support force-projection operations. Normally its infrastructure is built only to sustain the indigenous population and industry with minimal additional capacity being available to support US and coalition forces. The theater needs to have the capacity to move large numbers of units through its airport and seaport facilities. The theater also needs the necessary facilities to manage such functions as battle command, storage and transfer of ammunition, equipment maintenance, storage and movement of bulk petroleum, power generation and distribution, and rear-area troop staging and billeting. These functions are necessary for a synchronized flow of support to occur. The onward movement of follow-on forces and supplies is critical for success on the battlefield. Logistics planners work closely with the corps engineer to develop a suitable transportation infrastructure (ports, roads, bridges, railroads, and airfields). Anticipation of engineer requirements is crucial to ensure that adequate time is available to complete a robust infrastructure. Much of this work can be done by foreign/host-nation or US contractor personnel. These facilities can also be improved with the foresight of using engineer assets prior to the conflict during nation-assistance operations and other OOTW. Base development does not end once the conflict begins. On the contrary, base development needs will increase depending on the size of the force involved in the conflict. Each time the force expands or contracts, planners review facilities and LOC requirements to ensure that they are adequate to accomplish the mission.

Entry and Combat Operations

During the decisive entry and combat phases of force-projection operations, the nature of engineer operations places an extraordinary burden on the logistics structure. Rates of consumption for fuel, repair parts, construction and obstacle materials, mines, and explosives dictate the commitment of a large amount of maintenance and transportation assets in support of corps engineer forces. Engineer combat operations are dangerous by their very nature, which means that logistics planners anticipate and provide for the replacement of corps engineer personnel and equipment losses.

Conflict Termination, Postconflict Operations, and Redeployment

When combat operations have ended, corps engineer forces may be asked to restore the war-torn area and to construct redeployment facilities. This phase of force-projection operations is critical to ensuring victory in war, and also victory in peace. Depending on the political and social factors of a conflict, devastation resulting from hostilities may require some restoration by our forces. This will require the same attention to detail in logistics anticipation planning and most likely the rotation of follow-on units working in concert with host-nation and US construction contractors.

INTEGRATION

Operational and tactical plans integrate all logistical support such that it creates a synergism with the combat concept of operation. Logistical planners participate in and evaluate the logistical significance of each phase of the operation during the entire command-estimate process.

Engineer logistical plans will most likely be in support of joint and multinational operations. The theater commander integrates operations in his area of responsibility which often include engineer forces from other services or countries and possibly civilian engineering contractors. Army corps engineers are integrated fully with logistics support agencies to ensure mutual support.

CONTINUITY

The corps commander needs continuous logistical capability in order to gain and maintain the initiative in combat. Continuity of operations is critical to success on the battlefield.

Corps engineer forces are always either committed to the current fight or in preparation of the next battle. The battlefield tempo requires a constant vigilance by both the logistician and engineer commander in ensuring a constant flow of support. Supplies are pushed (unit-distribution method) forward whenever logistically feasible. This is especially crucial to corps engineer units because they do not usually have lulls in their operations that would allow them to use the supply-point method of supply.

RESPONSIVENESS

Versatility in logistics-support systems will enhance the supporting unit's responsiveness. Corps logistics planners structure the logistics force to be versatile enough to complement combat plans and operations, yet robust enough to ensure that there is no interruption of services. The structure is responsive enough to allow the commander to seize and maintain the initiative.

Corps engineer logisticians plan to meet the changing requirements of the battlefield on short notice. The engineer sustainment system should be versatile enough to keep pace with rapid decision cycles and mission execution and also react rapidly to crises or opportunities. Sustainment planners pay particular attention to engineer task-organization changes. Engineer units can normally respond to a change in task organization much quicker than the corps logistical-support packages can. Because of this, interim contingency engineer sustainment plans are normally developed such as the overstocking of critical engineer supplies and repair parts for use until corps logistical support packages are available.

IMPROVISATION

Extraordinary methods may be necessary to ensure success on the battlefield. Corps logistical planners attempt to push support to engineer units forward to ensure smooth combat operations. Sometimes this is not feasible or supportable. They improvise by making, inventing, devising, or fabricating what is needed out of what is on hand. An example includes creating a demolition cratering charge using common fertilizer and diesel fuel. During Operation Desert Storm, crude oil and diesel fuel were also used as a substitute for unavailable dust palliative. Specific battle damage assessment and repair (BDAR) procedures have been developed based on the need to improvise on the battlefield. **Improvisation is not a substitute for good planning . . . . anticipate requirements.** Improvisation is one of the American soldier's greatest strengths; recognize it as an advantage in meeting emergencies.

LOGISTICS PLANNING CONSIDERATIONS

Planning for corps logistics support involves several critical decisions concerning the interface of combat CS, and CSS activities in the corps. A corps logistics-support concept is developed, including support to corps engineer forces along with how corps engineers support the corps logistics system. Critical to this concept development are several corps logistics planning considerations.

LOGISTICS PREPARATION OF THE THEATER

Logistics preparation of the theater are those actions taken prior to a crisis that enhance future corps logistical support during future force-projection operations. Corps engineers can assist in this process by identifying and preparing bases of operation and forward logistics bases. They can select and improve LOC.

They can identify theater construction equip ment and materials. Corps engineers participating in OOTW can improve the theater's infrastructure through various operations such as nation-assistance and disaster-relief activities.

LOGISTICS FORCE COMPOSITION

The speed of deployment and the expected level of threat to be encountered will dictate how the corps CSS force is structured in theater. The majority of initial logistics forces an objective area may be a primarily active component working with joint, host-nation, and coalition logistics-support agencies, especially in the early stages of force-projection operations. As the duration of the operation becomes longer, reserve component logistics forces will be phased in. Government civilians and contractors can provide many specialized logistics functions for the military possibly requiring their integration into combat operations and requiring detailed advanced planning. Some corps engineer construction units, such as combat heavy engineer battalions and CSE companies, may be task-organized and phased into the theater as logistics forces deploy and arrive.

LOGISTICS PRIORITIES

The fact that the corps commander's resources are limited will always be a planning consideration in establishing priorities.The establishment of engineer logistical priorities considers a wide array of factors, such as—

- Commander's intent.
- Commander's concept of the operation.
- Host-nation assets.
- Joint-service capabilities.
- Multinational/coalition-nation capabilities.
- Systems interoperability.
- Availability of sealift and airlift into the theater.
- Suitability of air, ground, and sea LOC.

Corps engineer logistics priorities can shift between units or maybe focused on a particular area. Shifting priorities between units or areas requires close scrutiny and coordination by the logistics planner to ensure that there are no lapses in support. The shifting of priorities from one location to another on the battlefield is an extremely complicated process with a high potential for failure. Some examples of potential reasons for shifting priorities are—

- Reconstituting the force.
- Exploiting enemy weaknesses on the battlefield.
- Preparing for future operations such as counterattacks.
- Continuing with success of a current operation.

Corps engineers may receive priority for certain corps logistics supplies such as Class IV construction materials or Class V mines and demolitions. Corps bridge companies may be directed to support corps line-haul operations after downloading bridges. Priorities for corps engineer work may be required for the construction of logistics bases and MSRs.

JOINT LOGISTICS

The nature of joint logistics at the strategic level ensures its integration with national systems. Integration of joint logistics at the op erational level requires detailed planning and synchronization between all service organizations. The logistical force structure for a joint operation usually requires multiple task-organization changes as the theater matures.

The CINC or JTF staff will ensure that logistics are integrated by delegating responsibility for various classes of supply. For instance, the Air Force may be responsible for all aviation fuel and Class VIII (medical) supplies, the Army would provide Class I (food and water) and Class III (packaged and bulk) supplies, while each service would handle its own Class V (ammunition) supplies. Army corps engineers could receive Class IV materials from joint-service supply points such as those established by Naval seabees.

MULTINATIONAL LOGISTICS

Logistics in a multinational operation is much the same as in a joint environment but much more complicated. Logistics support is normally a national responsibility; however, arrangements may be made for US corps logistics agencies to supply coalition partners with such things as food and water, some ammunition, POL, medical supplies, construction and obstacle materials, mines, some vehicles, and maps. Although some logistical functions may be suitable for purely national operations, many are not. Movement control; the operation and use of ports, airfields, or LOC; and logistical communications systems are perfect examples of supply functions better suited for multinational operational control. Weapon, equipment, and battle-command systems compatibility is the biggest obstacle to overcome in synchronizing logistics in a multinational operation. The method of integration and synchronization of multinational assets depends on many factors. Technological capabilities, tactical training, national economic well-being, host-nation contracting capability political issues, or even cultural differences are all considerations in determining an appropriate logistics system. If members of an alliance use similar equipment or systems, plans should include consolidation of maintenance, resupply, and other support operations. Although many of our possible coalition partners have bought like engineer equipment systems, such as the bulldozer or grader, none of our allies' engineer forces are completely compatible with US engineer forces. Incompatibility with coalition communications systems can be an even bigger problem for synchronizing adequate multinational logistics support on the battlefield. LOs are essential to ensure successful multinational logistics operations.

FOREIGN/HOST-NATION SUPPORT

The use of foreign/host-nation assets allows greater flexibility to assign US logistical units other missions that are more critical to success on the battlefield. It also reduces the initial requirements for strategic sealift and airlift which allows critical transportation assets to be dedicated to deploying more combat power. However, foreign/host-nation support should not be relied on as a sole source of logistics support. Preestablished foreign/hosb-nation support agreements, such as Status of Forces Agreements (SOFAs), can significantly improve logistical support systems. These agreements must be made prior to the outbreak of hostilities and cannot be relied on for critical logistical requirements. Regardless of the presence of a preestablished agreement, the corps commander ensures the force has contracting and real estate capability deployed early enough to acquire the necessary foreign/host-nation assets. Some of the typical logistical support that can be provided by foreign/host-nation assets is—

- Government agency support. The foreign/host nation may operate systems such as transportation, utilities, and telephone networks in support of US forces. It can also provide police, fire, and local security forces in support of rear-area operations.

- Contractor support. Foreign/host-nation, third-country nationals, or US contractors can provide supplies and services such as construction, labor, laundry, bath, bakery, and transportation. Pre-

arranged LOGCAP contracts can also provide these services.

- Foreign/host-nation civilians or third-country nationals. These civilians can perform a wide array of services for the commander. Some of the civilian skills that may be required include construction laborers, linguists, stevedores, truck drivers, rail operators, air-traffic controllers, utility specialists, and technicians.

- Foreign/host-nation military units. Foreign/host-nation military or paramilitary units support wartime functions such as traffic control, convoy escort, installation security, cargo and troop transport, fuel storage and distribution, and rear operations.

- Foreign/host-nation facilities. The use of existing foreign/host-nation facilities can relieve the commander of the need for a great deal of new construction. Such facilities as billets, maintenance shops, medical and dental clinics or hospitals, logistical activities, and recreational areas can be provided by a contractual agreement.

- Supplies and equipment. The availability of critical supplies is highly dependent on the TO. Such things as construction materials (lumber, bricks, concrete, asphalt, and so forth), construction equipment and tools, and obstacle materials will drastically reduce engineer lift requirements into the TO.

METT-T analysis determines the ultimate decision to use foreign/host-nation assets and ap propriate foreign/host-nation support battle command. Consider the following factors in determining the suitability of using foreign/host-nation resources to accomplish logistics-support missions and functions in the area of responsibility (AOR):

- The effect of the failure of compliance with a foreign/host-nation asset on US security.

- The reliability of the foreign/host-nation support provided.

- The capability, dependability, and willingness of the foreign/host nation to provide and sustain identified resource needs.

Ž The political, social, and economic considerations associated with the use of foreign/host-nation assets.

- The risk associated with foreign/host-nation support being unavailable in wartime in the type and quantity agreed upon.

CONSTRUCTION CONTRACTING ACTIVITIES

The majority of logistical contracting actions will be accomplished by the corps G4. Corps combat engineer forces will not normally get involved with normal contracting actions in the TO. The corps engineer assists the corps G4 in coordinating construction contracting actions being accomplished by the foreign/host nation and the USACE by identifying requirements in terms of US engineer force equivalents. The forward-deployed USACE command (USACE (FWD)) maybe part of the Army component of a JTF and yet respond directly to the JTF commander through the JTF engineer on contract construction issues. The USACE (FWD) may also be engaged in real estate leasing operations as well as other Army support missions (for example, maintenance of the Theater Construction Management System (TCMS), water detection, and so forth). To the extent that the corps requires USACE support USACE (FWD) may place a liaison cell with the corps SES and/or, if required, a contract execution section with the corps engineer brigade headquarters. Regardless of the ultimate arrangements for support, the ACE and the USACE (FWD) com-

mander will work closely together to ensure that the corps's engineering contracting needs are met.

LOGISTICS CIVIL AUGMENTATION PROGRAM

The LOGCAP is a DA program that provides responsive contract capability to augment US forces with facility and logistics services during contingencies/wartime. As the program's executive agent, the USACE provides program management, coordinates LOGCAP requirements with supported major Army commands (MACOMs), and administers the LOGCAP contract. The G3, the G4, the corps engineer, and the comptroller are key players in developing LOGCAP requirements and ensuring the appropriate mix of contractor and troop support. Three major types of activities are supported by the worldwide LOGCAP contract facilities operations, maintenance, repair, and construction; all other nonfacility logistics services (for example, POL, transportation, food/water, and maintenance); and contractor planning expertise to assist MACOM/contingency planners. LOGCAP is especially suited to support reception, staging, and onward movement (RS&O) operations. Additionally LOGCAP can augment engineer units (operate Class IV supply yards and provide construction equipment), provide facility engineer support and support COMMZ-oriented construction.

CAPTURED ENEMY RESOURCES

Captured enemy resources are another asset that may become available during combat operations. Corps engineer use of captured obstacle and construction materials, mines and demolitions, and engineer equipment can significantly reduce logistical requirements in the AOR with appropriate safety awareness and operational training. Food, POL, water, and medical supplies can be used to support EPW camps or holding facilities. Captured facilities can be used in a variety of ways to support logistics operations.

SUPPORTING OPERATIONS OTHER THAN WAR

OOTW may require the same or a greater level of logistical support as wartime operations. Combatant commanders tailor logistics sup port of these operations based on theater needs. In some cases, logistics-support units and corps engineers may be the only forces involved in the theater. The logistical operation may be the main effort in certain situations, such as humanitarian-assistance operations. Corps logistics efforts are integrated with host-nation or local resources and activities. The wide variety of potential support requirements demands a flexible logistics structure tailored to theater missions. Corps engineers invariably get involved with a wide variety of missions that may need flexible logistics support. Critical engineer logistical considerations during OOTW include the availability of construction equipment DS maintenance capability repair parts supply, Class IV construction materials, and the need for engineer LOs.

CORPS LOGISTICS OPERATIONS

Corps logistics elements are organized to provide military forces with supply, maintenance, transportation, and field services. Corps units are supported by the COSCOM whether they are operating in division, separate brigade, cavalry regiment, or the corps rear areas (see Figure 4-1). The COSCOM provides corps-level logistics support and health-services sup port to corps units and theater units attached to the corps. Corps units attached to divisions are supported by the DISCOM. All other corps units operating in division areas receive logistics support from COSCOM units operating in nearby areas. Health-services support for

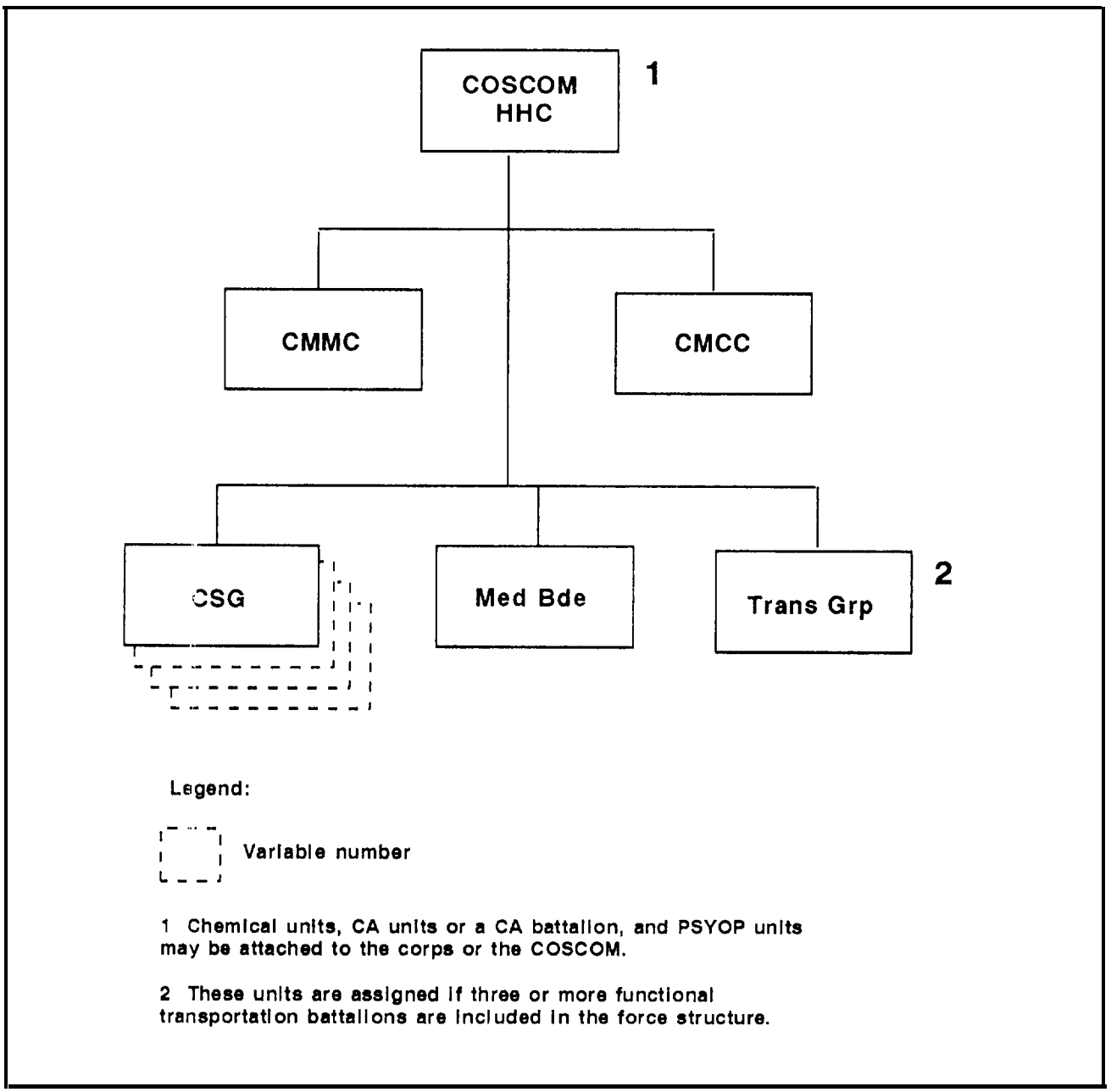
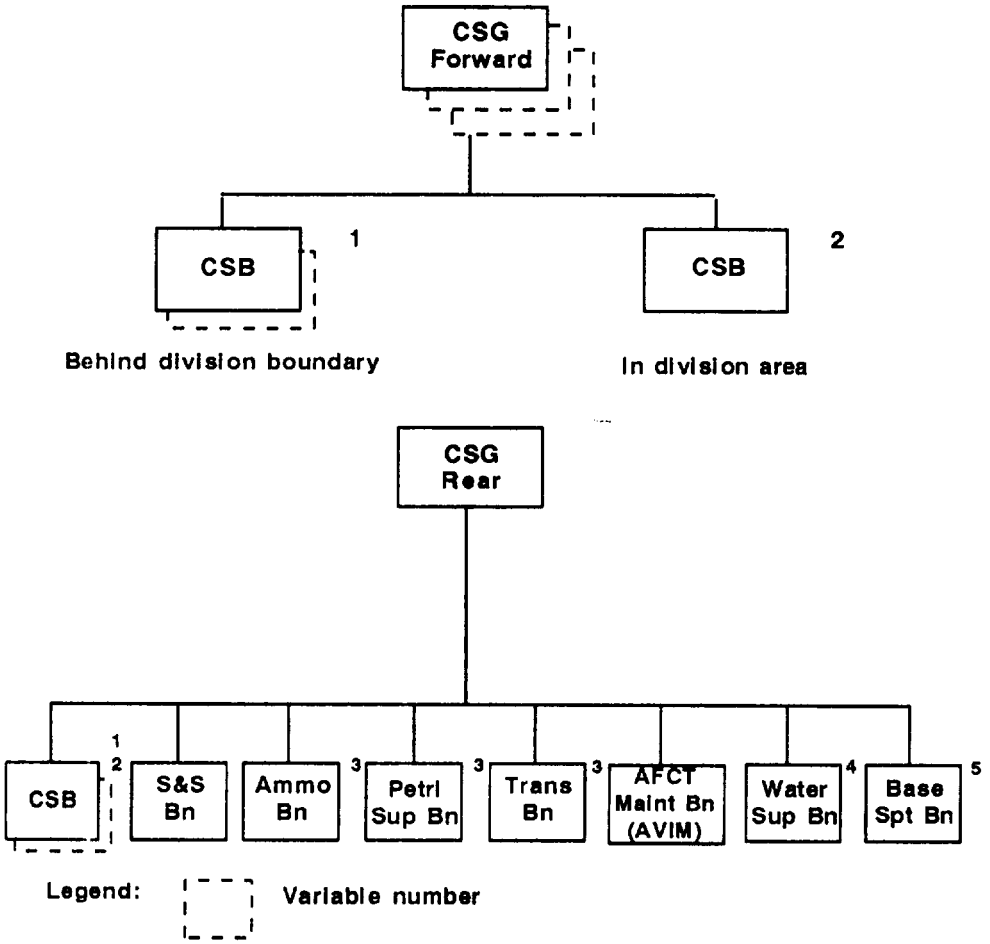


Figure *4-1. COSCOM organization*

corps units operating in division areas are provided on an area basis by the division medical-support structure.

CORPS SUPPORT COMMAND

The COSCOM is the principal logistics organization in the corps. It provides supply field services, transportation (node operations and movement control), maintenance, and medical support to divisions and nondivision units of the corps. The COSCOM is not a fixed organization; it contains a mix of subordinate units as required by the corps's size and configuration. Within the COSCOM, corps support groups (CSGs) provide supply (except Class VIII), maintenance, and field services to division and nondivision units (see Figure 4-2, page 4-10). A



1 Number of battalions dependent upon force structure, geography, and span of control

2 DS units only

3 May be host-nation support

4 Attached to support corps requirements in an arid environment

5 Theater dependent

Figure 4-2. Forward and rear corps support group organizations

corps medical brigade provides medical support, and a transportation group may be assigned to the COSCOM. Personnel and finance support are provided by functional commands.

A task-organized DS battalion from the CSG normally sustains corps engineer units deployed in division areas. To support forward corps units, including engineers, these COSCOM units habitually locate in the vicinity of division rear boundaries to render timely effective support. However, some corps engineer units may operate too far forward for the COSCOM to provide support such as corps engineer battalions supporting cavalry regiments. In these cases, the maneuver unit will normally be logistically augmented by the COSCOM to provide needed support to the forward corps engineer units. Corps engineer units operating in the corps rear area will normally be sustained by CSG support units and systems, usually on a supply- point basis. All corps engineer units directly establish individual logistics accounts with various COSCOM support agencies in theater.

COMMAND AND SUPPORT RELATIONSHIPS

Command and support relationships determine how corps engineer units will be sustained. Normally maneuver units do not have the capability to logistically sustain corps engineer units. For this reason, most corps engineers are placed in DS or OPCON roles to maneuver forces. Parent corps engineer organizations track subordinate unit missions and their status in order to properly allocate and provide sustainment resources from the corps. Corps engineer units are rarely attached to maneuver or other units because it requires the sup ported unit to provide logistical support except for personnel and administration activities. Command and support relationships can be altered to fit various situations. For example, theater engineers on a task in the corps area will be supported by the COSCOM. Corps engineers operating in a division area may receive support of common classes of supply and limited vehicle maintenance support from the DISCOM and its FSBs. Regardless of the command or support relationship, all corps engineer units must exchange logistics coordination and status information through engineer channels to the corps engineer brigade CP See Figures 2-9 and 2-10, pages 2-30 and 2-31, concerning corps engineer logistics information flow.

PERSONNEL-SERVICES SUPPORT

Personnel-services support is the management and execution of personnel services, resource management, finance services, chaplaincy activities, command information services, and legal-service support

The S1/G1 has staff responsibility for coordinating personnel-services support. Religious, legal, and public-affairs support is provided by elements organic to engineer units. Morale, welfare, and recreation (MWR) support is procommand and a variety of external agencies.

Personnel support is provided through the personnel groups who exercise C2 over subordinate elements, including personnel-services battalions, postal companies, replacement companies, and bands. These elements operate on both area and DS bases and support both division and nondivision units. Personnel and administration services include strength and personnel accounting, casualty reporting, replacement operations, awards, military personnel management, Red Cross services, and civilian personnel mangagement. For doctrine on personnel and administrative support, see FM 12-6.

Finance support is provided through the finance group and its subordinate finance battalions, which have the capability of fielding finance detachments. These units provide military pay, disbursing, travel, and commercial vendor service on an area-support basis. For doctrine on finance support, see FM 14-7.

Figure 4-3 shows the corps personnel strength accounting channels used by engineers on the battlefield. Figure 4-4 shows how engineer replacements are managed in the corps's AO. Figure 4-5, page 4-14, shows area and corps finance support.

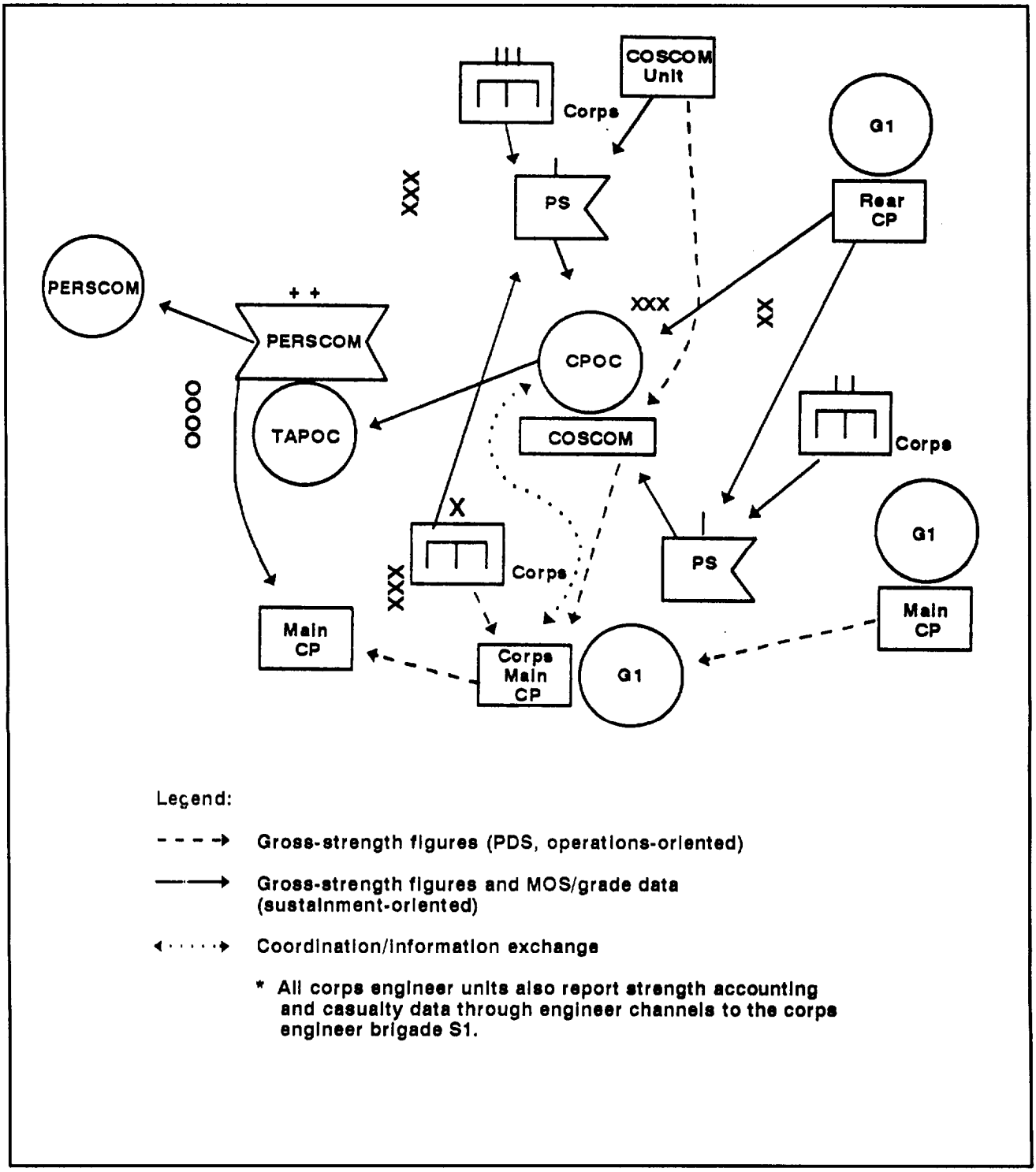


Figure 4-3. Strength accounting data and casualty reporting flow

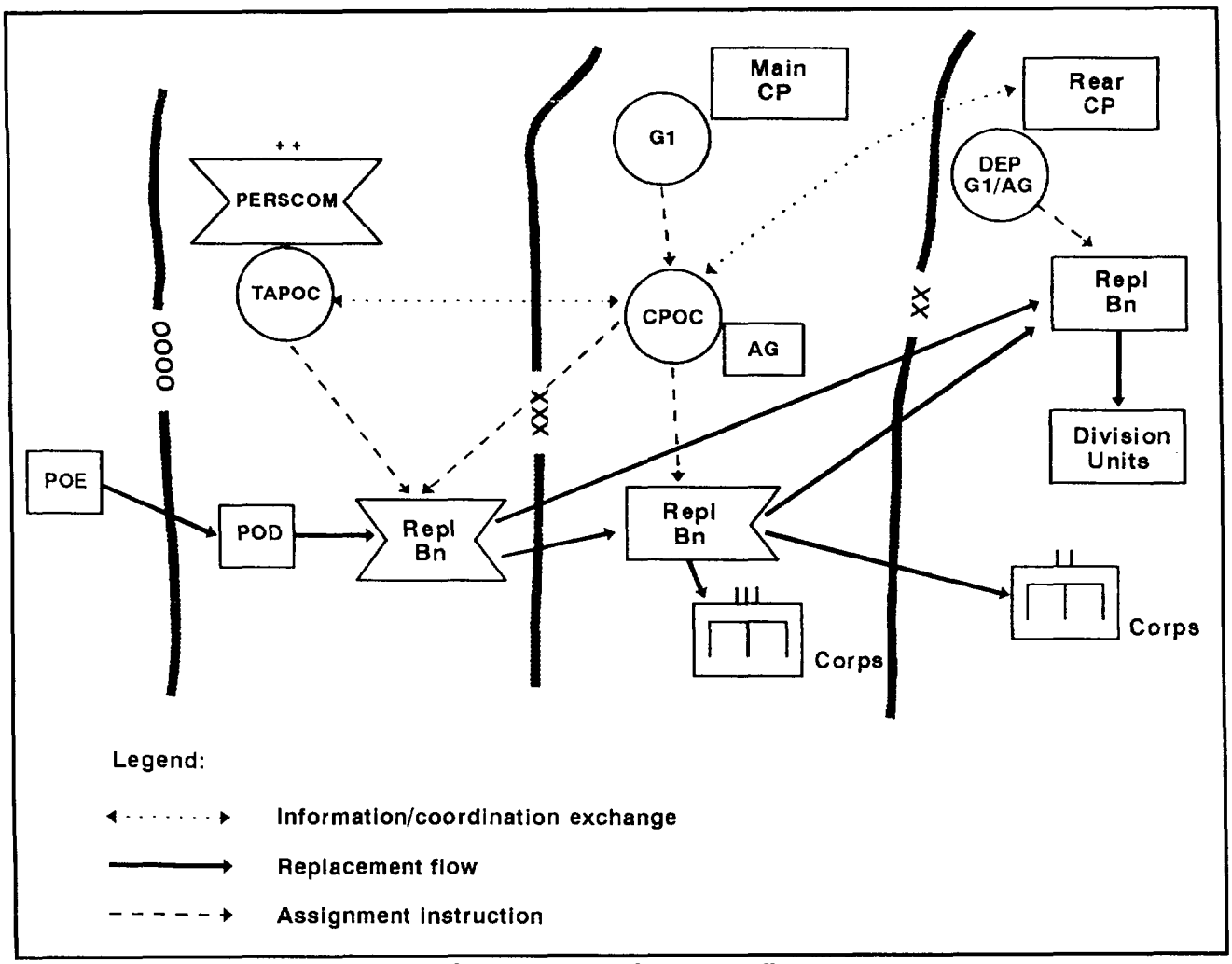


Figure 4-4. Replacement flow

HEALTH-SERVICES SUPPORT

Health-services support relates to all elements of medical care for the soldier. There are four levels of health-services support in the theater: unit division, corps, and EAC. Each higher level of support contains equal treatment capability as the lower level plus a new increment of treatment capability which sets it apart from the lower level of support The corps medical brigade provides health-services sup port to corps engineer forces in the areas of—

- Emergency medical treatment and evacuation of casualties.
- Preventive-medicine services.
- Medical logistics (Class VIII supply and resupply).
- Hospitalization support.
- Medical regulation of patients.
- Whole-blood management
- Dental services.
- Veterinary services.

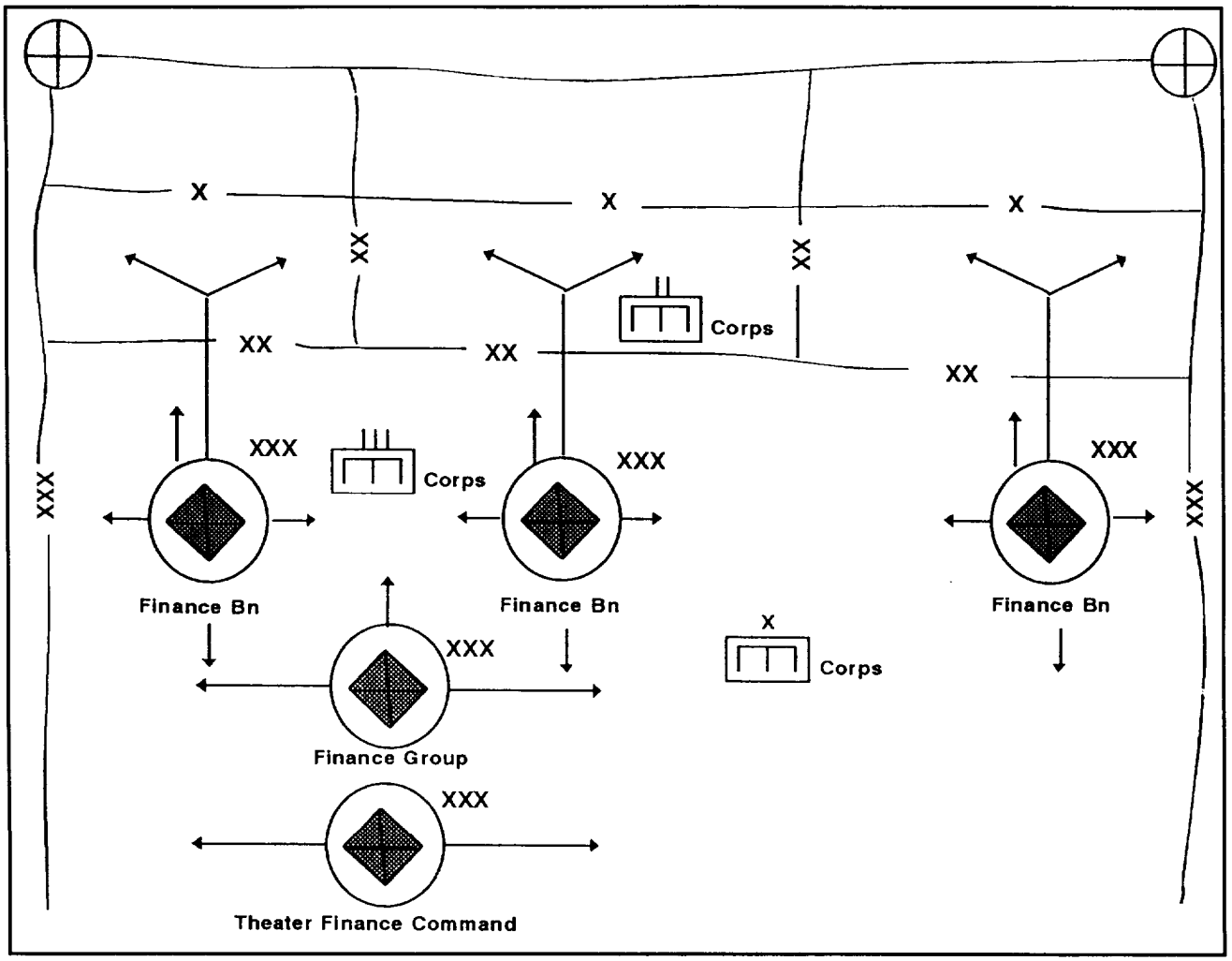


Figure 4-5. Area and corps finance-support centers

Figure 4-6 shows how health-services support is normally provided to engineers in the corps's AO.

SUPPLY SUPPORT

All supply classes are vital to the overall success of operations. The COSCOM provides direct and general supply support to corps engineer units. Supply-support functions include—

- DS and GS ammunition supply.
- DS and GS water supply.
- DS and GS Class I, II, III, and IV supply.
- DS and GS repair-parts supply.
- Major end-item replacement.
- Air-drop supply.
- Local procurement.
- Material management performed by the Corps Materiel Management Center (CMMC).

The principal supply classes for corps engineers supporting combat operations are Class III POL, Class IV construction (lumber, nails, and so forth) and obstacle (concertina wire, sandbags, and so forth) materials, and Class V

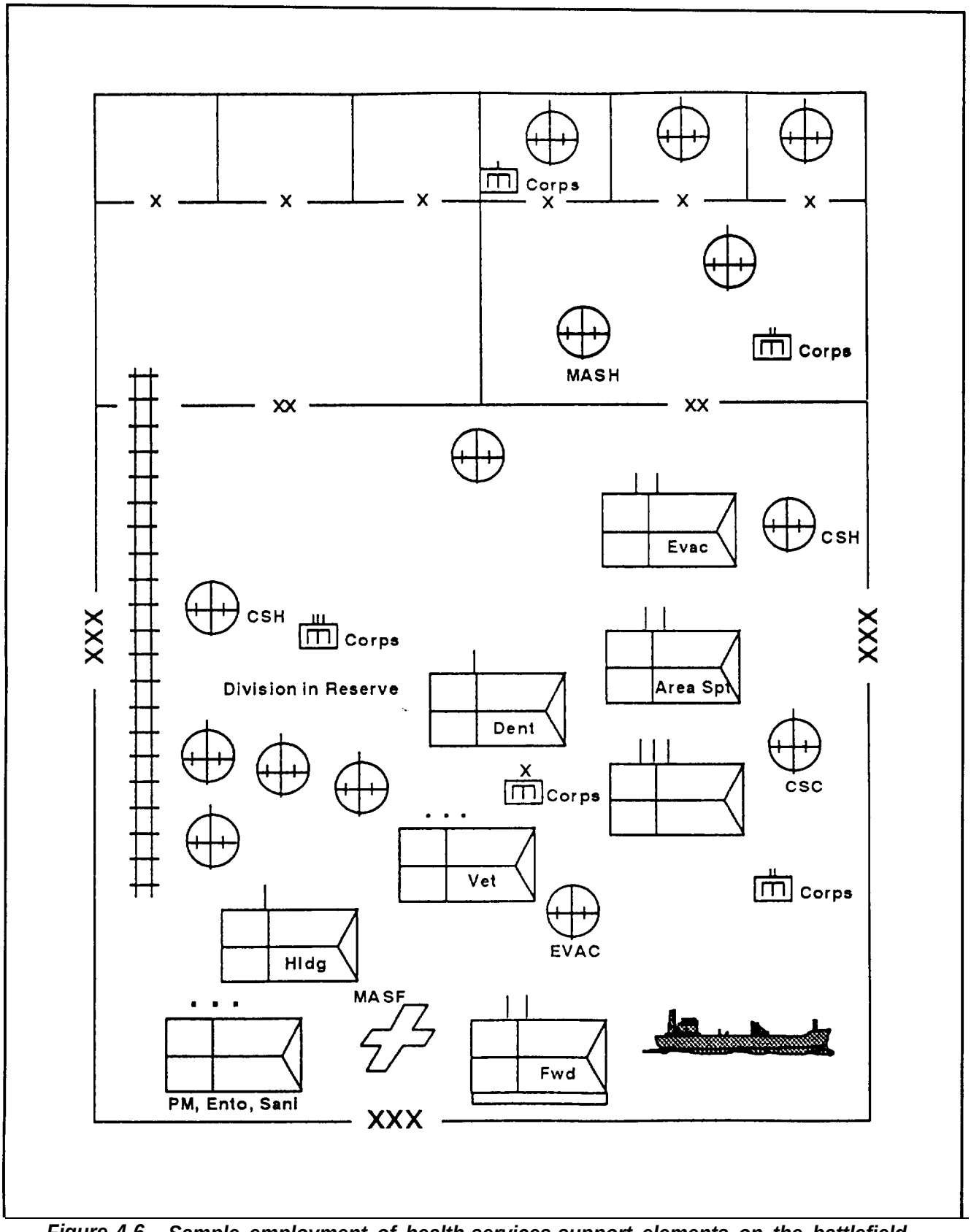


Figure 4-6. Sample employment of health-services-support elements on the battlefield

mines and demolitions. In general, the engineer supply request and material flow for Classes I, H, III, IV, and VII can be depicted as shown in Figure 4-7. Figure 4-8 shows the flow of Class IX repair parts and maintenance-related Class II supplies.

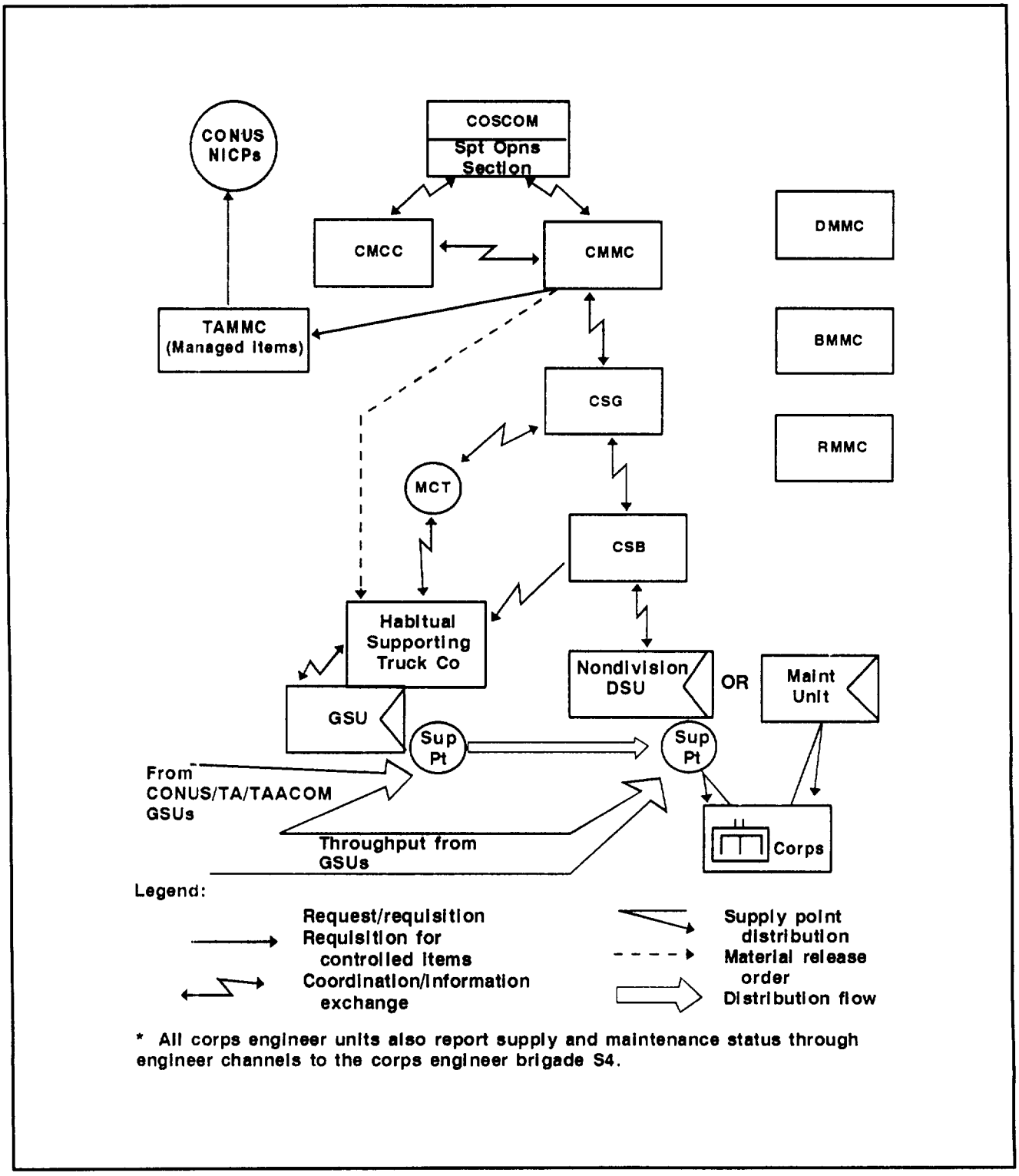


Figure 4-7. Generic requisition and distribution flow

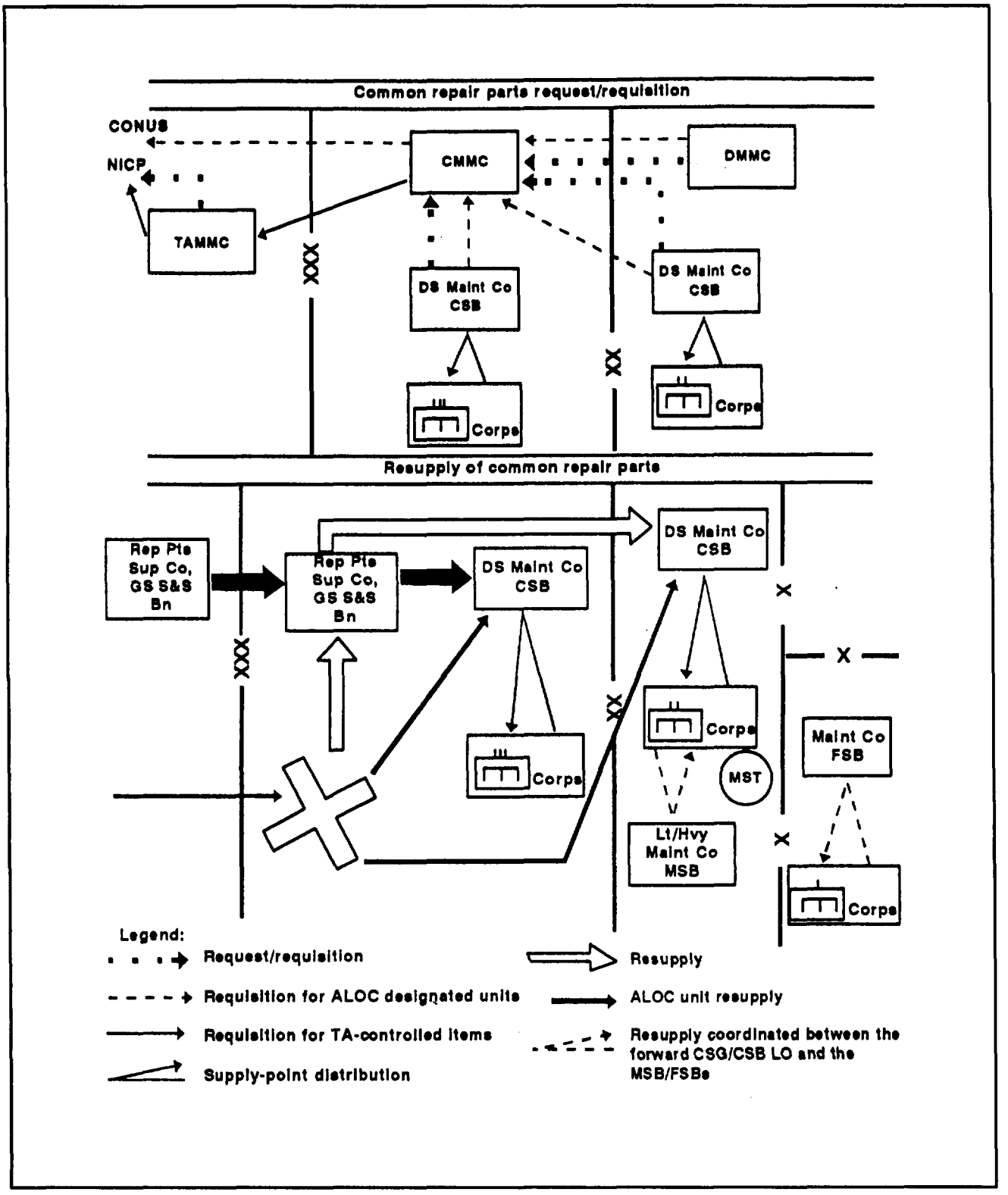


Figure 4-8. Requisition and supply flow of common repair parts and maintenance-related Class II supplies

Class III POL Supply

Engineer forces require an enormous amount of Class III POL to operate. The following should be considered to ensure an adequate flow of POL to the corps engineer units:

- Commanders develop forecasts to support the concept of operation.
- Forecasts are submitted through the CMMC.
- Supply units submit usage reports to the CMMC.
- A distribution plan is developed by the CMMC based on available POL and the commander's priorities.
- The petroleum battalion (GS) distributes POL to nondivision DS supply units using unit supply distribution.
- The engineer user normally picks POL up from the DS supply unit via supply-point distribution.
- Figure 4-9 depicts the normal flow of engineer POL supply in a corps's AO.

Class IV Supply

Class IV supplies are handled by COSCOM heavy material supply and general supply companies. These items are usually heavy tonnage and are critical to the war effort The corps G3 keeps the COSCOM informed of breaching, bridging, obstacle, or construction supply requirements which significantly change Class IV supply estimates. Class IV supplies are normally a low priority for the G3 and G4, requiring the corps engineer to continually keep attention focused on needed Class IV supplies. The COSCOM's Class IV supply support organization consists of—

- DS supply companies that receive, store, and issue 29.65 short tons (STONs) of Class IV items per day to nondivision units in their AOR.
- A general supply company that can receive, store, and issue 212 STONs of bridging equipment, obstacle, and construction supplies daily.

Class V Supply

Class V supply requirements for corps engineer units are satisfied by the COSCOM GS ammunition companies. A minimum of one corps storage area (CSA) for ammunition is located behind each division to support the ASPS and ammunition transfer points (ATPs) for operations. Conventional ammunition may be the dominant factor in determining the outcome of conventional combat. The mission of the conventional ammunition support structure is to provide the ammunition to meet the mission requirements of operational and tactical commanders. The Maneuver-Oriented Ammunition Distribution System (MOADS) is designed to provide 100 percent of the combat units' requirements through the ATP network. Normally corps transportation is allocated and operates in a DS role to support ammunition shipments from the CSA to ASPS and ATPs. This system provides engineer unite with the normal Class V ammunition as well as mines and demolitions required to accomplish their missions.

Engineer commanders control the flow of ammunition by using two ammunition supply rates: the required supply rate (RSR) and the CSR. The RSR is the amount of ammunition needed to sustain tactical operations, without restrictions, over a specified period of time. The RSR is developed by the G3/S3 and submitted through operational channels. The CSR is the amount of ammunition that can be allocated based on the availability of ammunition assets, Class V storage facilities, and transportation assets over a specified period of time. The CSR is announced through logistical channels.

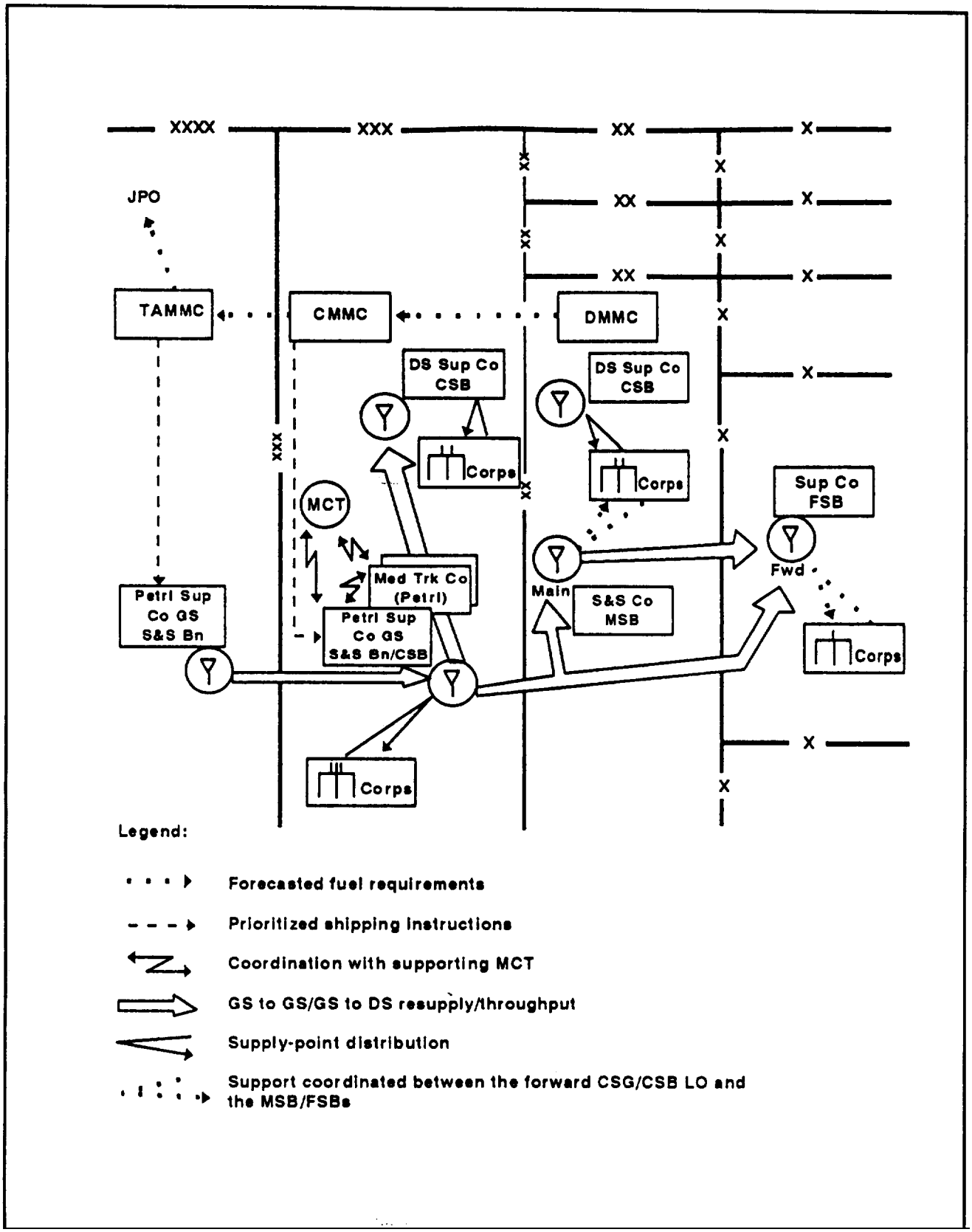


Figure 4-9. Bulk fuel requirements

Requirements for engineer weapon systems are estimated in the same manner as other combat arms systems. In many instances, sound judgment and METT-T considerations will be the only tools available to make these estimates (for example, the identification of how many MICLICs are required to perform all breaching operations in the main battle area (MBA)). A detailed understanding of the commander's intent and concept of the operation are crucial to accurately estimate the RSR. Figure 4-10 shows a typical engineer ammunition distribution system in a corps's AO.

Class IV/V Distribution

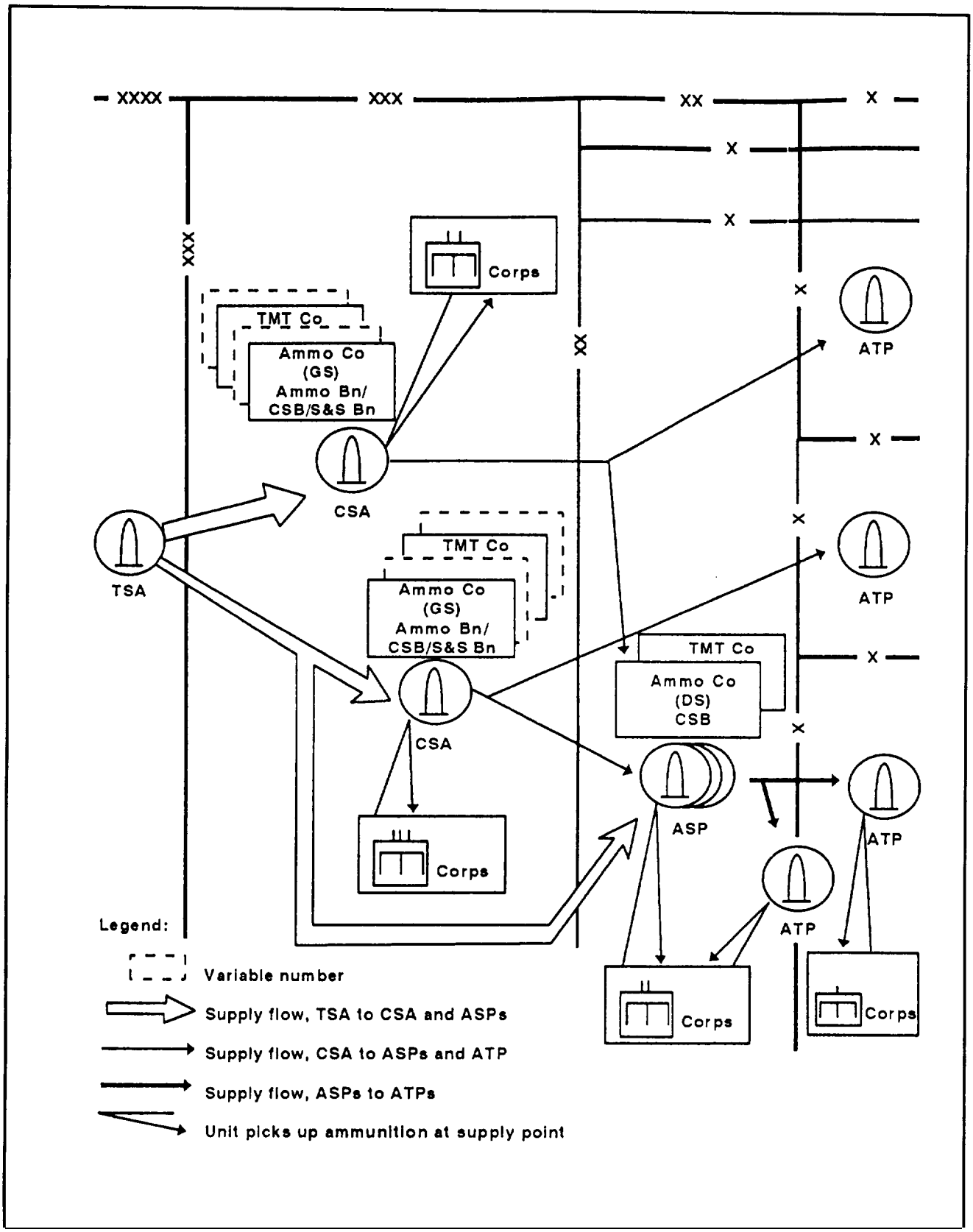
It is essential that COSCOM logistics-support elements provide unit distribution to deliver Class IV and V supplies as far forward as possible to corps engineer forces. Corps engineer unit on-hand basic loads of Class IV and V materials allow quick initiation of engineer missions; however, a unit's basic load will normally not sustain the unit throughout the operation. Unit distribution requires the use of the corps transportation assets to allow engineer transportation and personnel assets maximum time to concentrate on preparing the battlefield for operations. This is particularly important for corps engineer units supporting maneuver units and is commonly called the *push* method for supplying forward units. Engineer mission resource requirements are normally large, bulky, heavy, and not readily available in theater. These requirements are anticipated by all command levels to make maximum use of preparation time. For this reason, logistics and engineer planners push Class IV and V supplies forward as soon as possible, even if the exact quantities are still not known. Standard logistics packages (LOGPACs) provide the best method in pushing forward engineer logistics for missions. These LOGPACs are normally configured based on METT-T in the COSCOM by the DS supply company for Class IV supplies and the GS ammunition company for Class V supplies. Once quantities are known, the G4, the CMMC, the corps movement control center (CMCC), and COSCOM staffs will procure and ensure the transport of required engineer materials to point distribution areas.

TRANSPORTATION AND MOVEMENT

Movement is inherent in all combat operations. It is the one element that ties together sustainment and all the other BOSS. Moving the force includes not only transporting equipment and personnel, but also controlling the entire transportation system. Transportation organizations provide support to corps engineer forces in three basic functional areas: node operations, movement control, and terminal operations.

Transportation management ensures that planning maximizes the use of available transportation resources to meet the command's movement requirements. The CMCC coordinates and monitors the movement of corps engineer forces within the corps area. Movement control teams (MCTs), movement regulating teams (MRTs), and air terminal movement control teams (ATMCTs) are established to reduce the CMCC'S span of control and to provide more responsive support to the transportation system users. MCTs, MRTs, and ATMCTs generally report directly to the CMCC and are located at points that allow close and constant coordination with the installations and units to be served. During joint operations, the joint movement control cell (JMCC) manages transportation requirements at the JTF level. Figure 4-11, page 4-22, depicts engineer movement support in the corps's AO.

Engineers provide valuable assistance to another movement control system, battlefield circulation control (BCC). The traffic flow on MSRs and alternate supply routes (ASRs) is crucial to ensuring success on the battlefield, The main players in this system are the CMCC, transporters (COSCOM and the G4),



4-10. Flow of ammunition within the corps

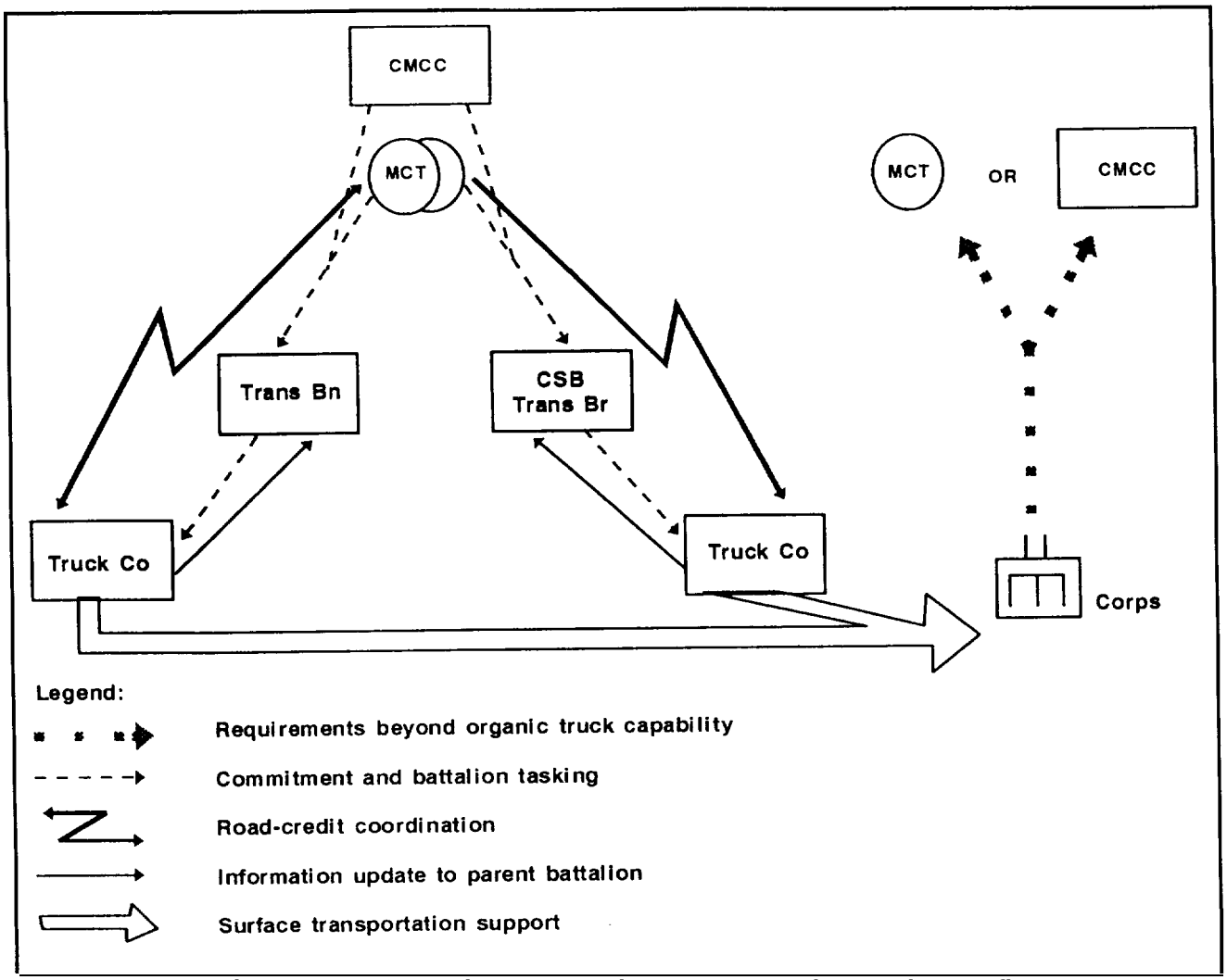


Figure 4-11. Ground transportation request and commitment flow

MP, engineers, and the units moving along the supply routes. Daily coordination between all of these elements is essential to ensure smooth traffic flow. This coordination reviews such things as battle damage assessment (BDA) reports, corps movement priorities, future division- and corps-level movements, the threat situation, and the availability of transportation assets. Corps engineer forces are responsible for constructing, upgrading, and maintaining MSRs in the corps sector. METT-T may dictate the need to use corps engineer assets in the division sectors to improve MSRs critical to future corps operations.

MAINTENANCE SUPPORT

The corps maintenance system is developed around the idea of "fix forward." Maintaining corps engineer equipment is critical to ensure operational success. Low-density/high-usage engineer equipment requires intensive management by the corps engineer and corps logisticians. Management of certain repair parts and supplies needed for maintenance of this equipment is critical, especially filters, tires, and cutting edges.

Fixing engineer equipment and systems encompasses much more than maintaining on-hand equipment. It includes recovering,

evacuating, supplying repair parts, and replacing major items. The nature of the battlefield, combined with the complexity of engineer operations, demands that repairs be made quickly and as near as possible to the point of failure or damage. This means that repair parts and maintenance teams must be pushed as far forward as possible. The attachment of DS maintenance support teams to corps engineer units helps facilitate this forward maintenance support. BDAR kits should be maximized whenever feasible. Figures 4-12 and 4-13, pages 4-24 and 4-25, depict typical corps engineer equipment maintenance flow on the battlefield.

FIELD-SERVICES SUPPORT

Field services available to corps engineer forces include food service, airdrop, laundry clothing exchange and bath, renovation, bakery, classification, mortuary services, RPMA, post exchange sales, camouflage, and explosive ordnance disposal (EOD). Corps field services directly impact on the safety morale, and welfare of soldiers. Corps engineers support field services as required primarily with general engineering tasks. RPMA and camouflage are normally considered engineer areas of expertise. Corps engineers also augment EOD operations by conducting mobility operations through concentrations of UXO.

CORPS ENGINEER SUPPORT TO LOGISTICS OPERATIONS

LINES-OF-COMMUNICATION CONSTRUCTION

LOC are often equated to MSRs, but they are much more. According to FM 100-5, LOC are all the routes (land, water, and air) that connect an operating military force with a base of operations and along which supplies and military forces move. Lines of support are intratheater extensions of LOC. If the theater's infrastructure is underdeveloped, corps and theater engineer forces will need to arrive early in the force flow to establish the minimum required infrastructure to support the force. The establishment of priorities of corps engineer effort will be crucial in the initial stages of force flow. Potential LOC engineering missions include: port construction or upgrade; airfield construction, upgrade, or repair; MSR/ASR construction, upgrade, or repair; and bridge construction, upgrade, or repair.

Logistics-Facility Construction

Corps logistics operations may require the use of facilities such as Force Provider, ASPS, POL bladder farms, supply points, and maintenance bays. Corps engineers may be required to provide limited construction and prime-power electrical support to logistics facilities.

Water Supply Support

Corps engineers may be required to support water detection, development of water sources, and water storage and distribution systems in the corps area. Topographic engineer support and water-detection teams from the USACE assist with finding water sources. Well-drilling teams or contracted well-drilling support with organic logistics support develop water sources. Engineer tasks associated with water storage and distribution include site preparation for storage tanks and bladders, and construction of storage tanks and water distribution lines, possibly by contract.

MEDICAL-FACILITY CONSTRUCTION

The construction of corps medical facilities may place one of the largest demands on engineer forces. The corps engineers provide construction-related support to all COSCOM units in the corps's AO, but none are more demanding than the health services. The use of existing host-nation facilities is preferred, but construction of adequate medical facilities may be needed to support the force.

Site preparation requirements vary with the type of hospital and the nature of the terrain.

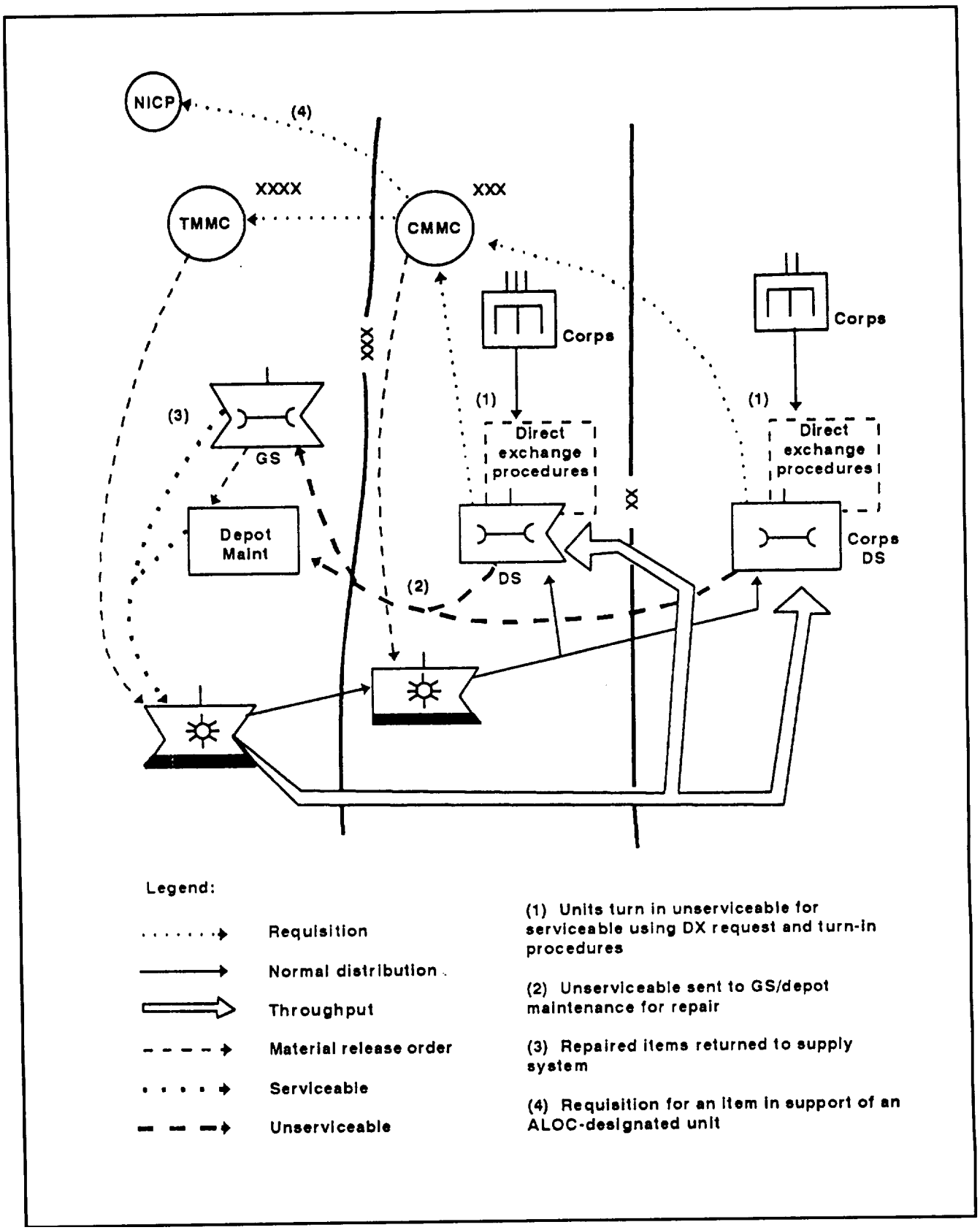


Figure 4-12. Reparable flow

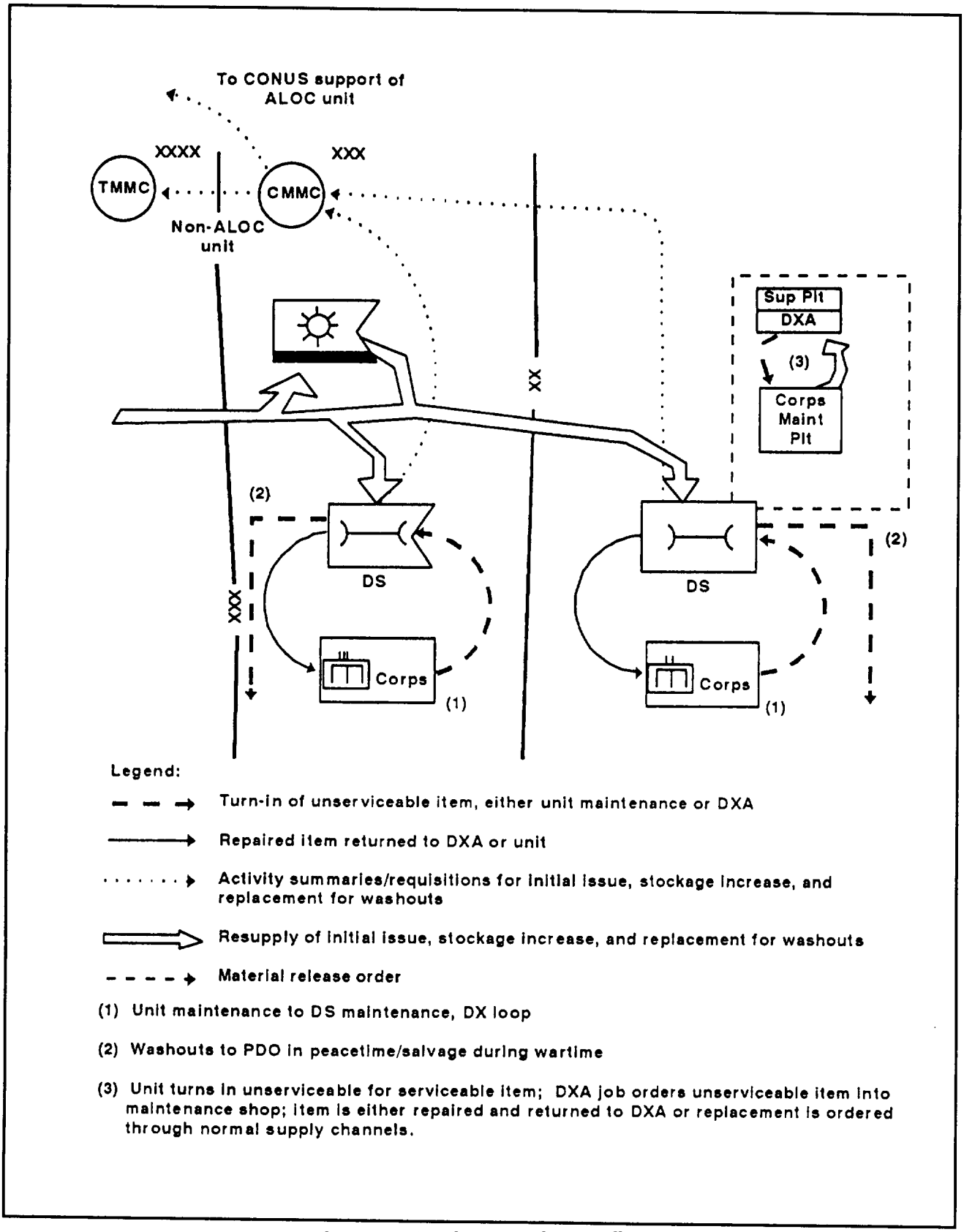


Figure 4-13. Direct-exchange flow

Site selection may be restricted based on METT-T or political and social considerations. Whenever possible, select the site to minimize engineering construction effort. Theater real estate management teams may be needed to lease the large amount of land required to support a health-services site.

Follow-on medical facility construction requirements include such things as power generation and distribution, waste disposal (hazardous and ordinary), field sanitation, water supply and distribution, heating and cooling, refrigeration, and patient and staff living facilities.

RECONSTITUTION SUPPORT

Reconstitution is an extraordinary action that commanders plan and implement to restore units to a desired level of combat effectiveness commensurate with mission requirements and available resources. An operational pause may be necessary to implement reconstitution procedures. Corps engineers oftentimes do not have the opportunity to take full advantage of reconstitution because many engineer missions continue to support the reconstitution effort, including MSR maintenance and arifield upgrades. Therefore, the corps engineer commander emphasizes the need for continuous internal unit reconstitution activities throughout the battle. Chapter 7 provides more detail on corps engineer support to reconstitution operations, along with internal unit reconstitution operations.

LOGISTICS FORCE-PROTECTION SUPPORT

Corps logistics forces are primarily located in rear areas and are vulnerable to rear-area threats. The purposes of corps rear operations are to secure the force; neutralize or defeat threat operations in the rear area; and ensure freedom of action in close and deep operations. Three levels of response to threat activities are used in planning corps rear operations. Rather than focusing on the size or type of threat, these levels focus on the nature of friendly actions needed to defeat the threat.

- Ž Level I threats can be defeated by base or base cluster self-defense measures.
- Ž Level II threats are beyond base or base cluster self-defense capabilities but can be defeated by response forces, normally with supporting fires.
- Ž Level III threats necessitate the command decision to commit a combined arms tactical combat force to defeat them.

Corps engineer construction forces build and fortify corps logistics bases, battle-command facilities, and decontamination sites. They also perform other engineer tasks needed against rear-area threats such as camouflage and countermobility operations. Corps combat engineer forces can be used to defeat level H threats if the corps commander has deemed it necessary to divert valuable engineer assets to this mission. They are generally not suitable for defeating level III threats unless they are augmented with additional training, transportation, forces, antiarmor weapon systems, and forward-observer support adequate enough to defeat the expected threat forces.

CORPS ENGINEER LOGISTICS CONCEPT

Corps engineer sustainment planners and executors focus on several essential tasks to accomplish the logistics support mission. First, engineer logistics planners keep pace with the corps decision cycle through early, complete, and continuous integration into the corps C2 and logistics structure. They plan and adjust engineer sustainment in concert with the rapid

corps planning process. Second, they track both subordinate and supporting engineer units' sustainment postures to allow the sustainment planner to account for available resources, shift them as necessary and integrate them into planning future operations. Third, detailed coordination with the corps logistics units allows engineer sustainment planners to influence current and future operations by ensuring that continuous and responsive logistics support is maintained.

CORPS ENGINEER LOGISTICS LAYDOWN

Corps logistics support for engineer units depends on their location on the battlefield and their command or support relationship to the supported unit. In terms of logistics planning and integration, corps engineer units fall into four types:

- Corps engineer brigade and group HHC and separate engineer companies (such as bridge and CSE companies).
- Corps engineer units operating in division areas.
- Corps engineer units supporting cavalry regiments and separate maneuver brigades.
- Corps engineer units supporting corps rear operations.

Corps engineer brigade and group HHCs and separate companies have limited organic capability to sustain themselves. Therefore, these units rely upon tailored corps logistics assets from the COSCOM for sustainment throughout the battlefield. These engineer units locate and establish accounts with designated COSCOM logistics-support agencies and units. Corps engineer separate companies that are attached to corps engineer battalions receive logistics support through those battalions for the duration of the attachment.

Corps engineer units supporting forward maneuver brigades receive logistics support from an element of the COSCOM collocated with the brigade FSBs. These special supply and health-service-support packages from the CSG are tailored and sent to the BSAs through direct coordination with the CSG LO collocated with the DISCOM CP. The DISCOM may provide common classes of supplies to forward corps engineer units. Personnel-services sup port remains with corps personnel units that locate in the division support area (DSA), Corps engineer units operating in division rear areas receive supply and health-services sup port from the DS corps support battalion. Personnel-services support is obtained through direct coordination with corps personnel units in the DSA.

Corps engineer units supporting cavalry regiments and separate maneuver brigades receive support through the designated corps support package attached to the corps maneuver unit. Corps engineer units operating in the corps rear area receive logistics support through a designated CSG on an area basis. They locate and establish accounts with designated COSCOM logistics-support agencies and units. Theater engineer units operating in the corps rear area are also supported by a designated CSG.

Regardless of the command or support relationship and location on the battlefield, all corps engineer units provide routine logistics status reports through the appropriate headquarter to ensure that the logistics support of corps engineer units is fully integrated into the corps's planning and coordination of sustainment support.

FLOW OF SUPPORT

Logistics support for corps engineer units is divided into two basic categories: unit sustainment and mission sustainment. Unit sustainment encompasses all of a unit's logistics-

support requirements needed to remain a viable fighting force. Mission sustainment consists of the supplies and services needed to accomplish specific engineer missions for the corps. The flow of supplies and services in these categories differs, requiring corps engineer logistics planners and executors to understand the differences. Figure 4-14 and Figure 4-15, page 4-30, show the flow of supplies and services for unit and mission sustainment. The requisition and delivery processes vary, based on the supply class or type of service. Engineer unit sustainment is generally accomplished through the COSCOM infrastructure of corps support battalions, personnel, and medical units. Forward corps engineer forces may also receive some common logistics support from DISCOM units. Mission sustainment requires supplies such as Class V demolitions and mines for combat operations and Class IV construction materials for general engineering missions. These supplies are requested through the COSCOM direct-support supply unit (DSSU), which in turns passes the requisition to the CMMC. These mission supplies are normally moved from corps general-support supply units (GSSUs) by corps transportation units as close to the combat or general engineering mission location as possible. This minimizes multiple material handling requirements, reduces the transportation requirements on corps transportation assets, and facilitates faster mission accomplishment. If mission-related supplies cannot be delivered directly to the combat or general engineering location or engineer unit by corps transportation assets, a plan using corps engineer or other corps assets is required. Most corps engineer units are equipped to augment this operation with limited organic transportation capability but are not responsible for planning, controlling, and executing the delivery of mission-required supplies.

Corps engineers can influence both unit and mission sustainment requirements through early integration into the corps sustainment planning process at the main and rear CPs. Sound sustainment estimates, accurate tracking of corps engineer unit sustainment posture, and continuous coordination with the COSCOM and corps G4 ensure that engineer unit requirements are properly forecasted, prioritized, and delivered.

KEY CORPS ENGINEER LOGISTICS LEADERS

The responsibilities of the corps engineer unit's key logistics leaders and their functions within the corp and engineer CP systems are crucial to accomplishing these tasks. All corps engineer commanders and staffs must be familiar with and support these roles and functions to ensure appropriate corps engineer unit and mission sustainment.

Assistant Corps Engineer

The ACE is responsible for writing and integrating engineer-specific information for inclusion in corps orders and plans, including logistics support. The ACE ensures that essential engineer logistics-support requirements are identified, coordinated, and published. He is assisted in this task by the corps rear CP engineer section, the corps engineer brigade S4, the corps main CP engineer plans and operations sections, and the corps engineer brigade CP CSS cell.

Corps Rear CP Engineer

The corps rear CP engineer is responsible for identifying requirements and ensuring that logistics are coordinated for engineer units operating in the corps area. The corps rear CP engineer is assisted in this task as necessary by the corps main CP engineer plans and operations sections and the corps engineer brigade CP CSS cell.

Executive Officer

The XO, at all levels from the corps engineer brigade through the corps engineer battalion, is responsible for synchronizing all logistics sup-

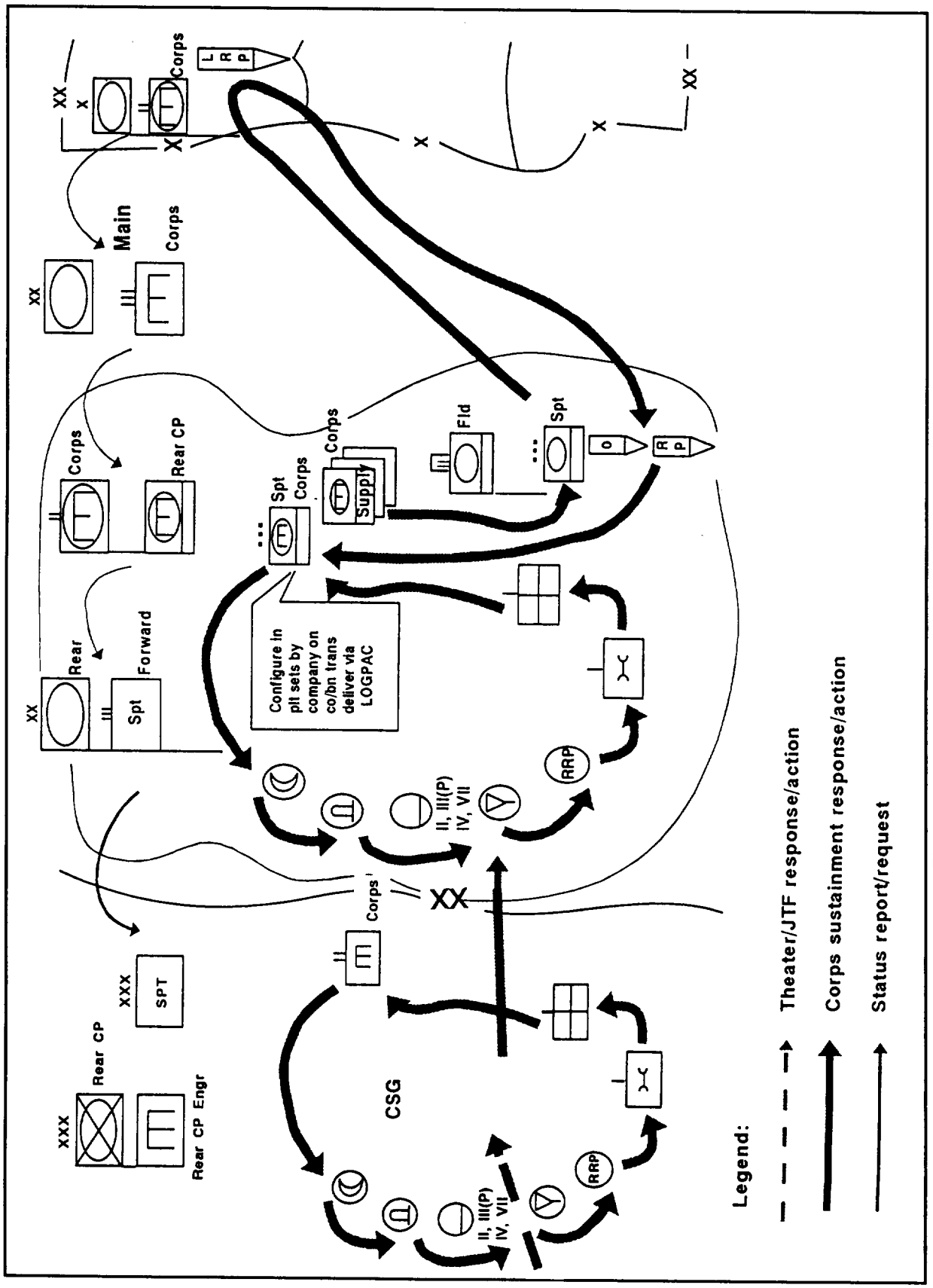


Figure 4-14. Unit sustainment for corps engineers

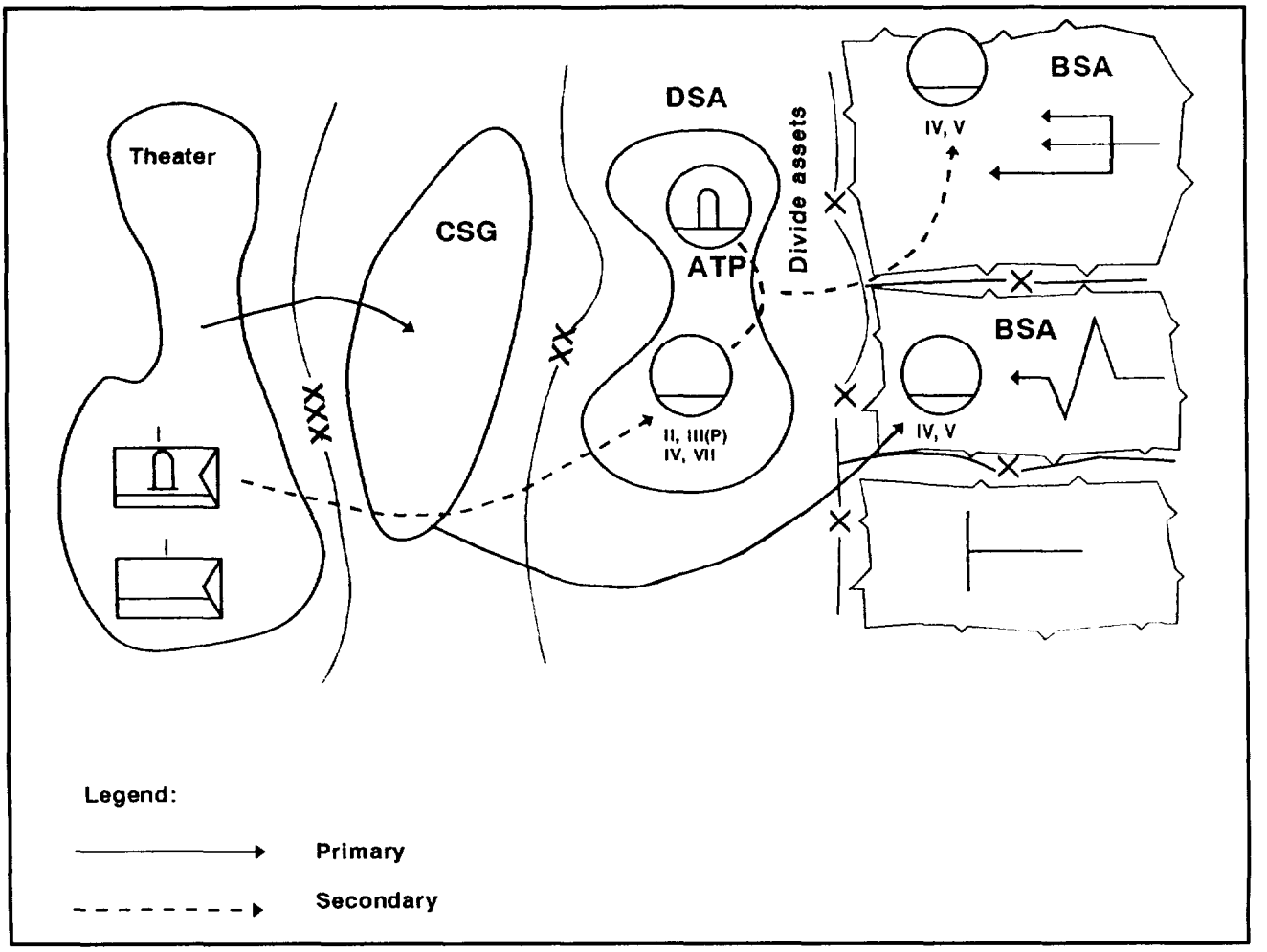


Figure 4-15. Engineer mission sustainment Class IV/V supplies for corps engineers

port in his unit. He directs the execution of engineer staff logistics-support tasks, coordinates the effort of staff members, and supervises the efficient and prompt response of staff logistics-support functions. He relies on the logistics staff section (for example, the corps engineer brigade, group CSS cells, the battalion rear CP, and unit trains elements) to plan, integrate, request, and monitor corps engineer logistics fuctions that support both unit and mission sustainment.

S1

The S1 at the corps engineer brigade, group, and battalion levels is responsible for integrating personnel and medical-services support and general administrative functions with the appropriate corps personnel, finance, and medical-support units. The S1 should be cross-trained with the S4 in all areas of engineer sustainment.

The corps engineer brigade S1 specifically coordinates corps engineer personnel and medical support with the corps G1/AG staffs at the corps rear CP and with the corps personnel, finance, and medical groups.

S4

The S4 at the corps engineer brigade, group, and battalion levels is responsible for integrating supply, maintenance, transportation, and

field-services support with the appropriate corps logistics-support units. The S4 should be fully cross trained with the S1.

The corps engineer brigade S4 specifically plans, coordinates, and monitors corps engineer operations with the corps rear CP engineer, the corps rear CP G4, and the COSCOM CP staffs. He provides detailed sustainment input to the corps engineer brigade TOC for developing orders for each mission The brigade S4 closely monitors and accurately tracks the sustainment status of corps engineer groups, battalions, and separate companies, He is assisted by a chief supply sergeant, a supply technician warrant officer, and supply specialists for supply-related functions. He is also assisted by the maintenance technician warrant officer and senior maintenance supervisor for troubleshooting maintenance operations and support

HHC Commander

Corps engineer brigade, group, and battalion HHC commanders command the HHC CP and are assisted by the HHC 1SG. The commander is responsible for coordinating sustainment of the corps engineer brigade, group, or battalion CP and command groups. He ensures logistics coordination and integration with designated COSCOM support units. He may also be responsible for base defense operations.

Company First Sergeant

The corps engineer company 1SG is the principal logistics sustainment leader at the company level. The company 1SG remains focused on sustainment of current engineer operations and is normally located with the company CP. However, he may be located at the unit trains element, if established, or a corps CSS location. He maintains close coordination with platoon sergeants and maintenance/supply section sergeants; engineer battalion, group, or brigade S4/S1s; and any supported maneuver S4/S1s. The 1SG monitors the status of engineer company soldiers, including their health, welfare, and morale.

CORPS ENGINEER LOGISTICS COMMAND AND CONTROL

Corps engineer logistics C2 centers around the corps rear and main CPs, but pervades all corps engineer C2 nodes. Each corps engineer CP has specific responsibilities in identifying unit and mission logistics requirements, estimating resources, integrating into the corps's planning cycle, and monitoring the execution of engineer sustainment missions supporting corps logistics operations.

Corps Rear CP Engineer Section

The corps rear CP engineer section is the corps engineer's primary integrator into the corps for executing logistics support for subordinate corps engineer units. The rear CP engineer section coordinates sustainment for current corps engineer operations and plans and prepares for implementation of future operations. It maintains updated logistics status of corps engineer units, providing the corps main CP engineer section with detailed logistics estimates to assist in formulating corps plans and orders and ensuring that corps engineer sustainment plans are synchronized with the corps G4 and the COSCOM. The rear CP engineer works closely with the brigade S4 to develop future logistics estimates.

Corps Main CP Engineer Section

The corps main CP engineer section supports the ACE in developing corps engineer sustainment plans and writing the engineer logistics portions of the basic corps OPLAN or OPORD and paragraph four of the engineer annex. The ACE integrates engineer sustainment into corps operations through coordination with the corps main CP CSS cell. The corps main CP engineer section ensures that immediate engineer sustainment requests received from the corps TAC CP are forwarded

to the corps rear CP and the corps engineer brigade CSS cell.

Corps Tactical CP Engineer Section

The corps TAC CP engineer section has limited capability to impact engineer logistics support Its primary logistics duties are receiving and forwarding reports and influencing the redirection of sustainment priorities for corps engineer units operating forward in the corps area.

Corps Engineer Brigade and Group TOC CSS cells

The CSS cells operating in the corps engineer brigade and group TOC fully support the brigade and group S1/S4 officers in developing corps engineer sustainment plans and writing paragraph four for brigade and group OPORDs and OPLANs. They monitor current corps engineer logistics status through periodic personnel and logistics status reports (for example, the personnel report (PERREP) and the LOGSTAT) from subordinate units. They recommend logistics priorities to the brigade or group commander; identify critical personnel and supply shortages, along with maintenance or transportation problems, that affect engineer unit and mission sustainment; and redirect logistics support as required. The corps engineer brigade CSS cell maintains constant communication with subordinate engineer units logistics sections, the corps rear CP engineer section, COSCOM CP, and the corps G4. The corp engineer group CSS cell maintains constant communication with the brigade CSS cell, subordinate corps engineer units, and supporting maneuver unit logistics-support units, if required.

Corps Engineer Brigade and Group HHC CPs

The corps engineer brigade and group HHC establish CPs at or in close proximity to the brigade or group TOC. The HHC CP is responsible for the sustainment of the brigade and group CP. This includes establishing accounts with designated COSCOM support units, setting up life-support areas for CP personnel, and locating vehicle maintenance areas. The HHC CP may also be designated as a BDOC or BCOC.

Corps Engineer Battalion Rear CP

The corps engineer battalion rear CP fully sup ports the battalion S1/S4 officers in developing corps engineer battalion sustainment plans and writing paragraph four for battalion OPORDs and OPLANs. They monitor current corps engineer battalion logistics status through periodic personnel and logistics status reports (for example, the PERREP and the LOGSTAT) from subordinate units. They recommend logistics priorities to the battalion commander; identify critical personnel and supply shortages, along with maintenance or transportation problems, that affect engineer unit and mission sustainment; and redirect logistics support as required. The corps engineer battalion rear CP maintains constant communication with the battalion main CP, subordinate engineer units logistics sections, higher headquarters logistics sections, designated COSCOM support units, and supporting maneuver unit logistics-support units, if required.

Corps Engineer Unit Trains Element

Corps engineer companies may form a unit trains element to control engineer logistics sup port from the corps or to establish an engineer equipment park or construction supply point. The unit trains element is normally collocated with the company CP. However, depending on METT-T, the unit trains element may be formed in the vicinity of a COSCOM supply or maintenance point or with a corps engineer battalion rear CP. The unit trains element is normally under the control of the company 1SG and consists of the company supply and maintenance sections. It tracks, reports, and provides critical engineer unit and mission-sustainment support. The corps engineer unit trains element maintains constant communication with subordinate platoon and section ser-

geants, higher headquarters logistics sections, designated COSCOM support units, and supporting maneuver unit logistics-support units, if required.

THE CORPS ENGINEER'S ROLE IN PLANNING AND COORDINATING LOGISTICS

The corps engineer's attempt to plan and coordinate engineer logistics efforts is essential to full integration of corps engineer units into the corps's sustainment structure. The ACE, the corps rear CP engineer, the COSCOM, and the G4 work closely to synchronize the logistics planning and coordination process. They facilitate sound and timely plans or orders and necessary sustainment for corps engineer units.

Upon receipt of a WARNORD for a mission, the corps rear CP engineer immediately initiates an engineer logistics estimate as outlined in FM 101-10-1/2. This estimate is specifically focused on the sustainment of all subordinate corps engineer units, Classes I, III, IV, V, and VII supplies and personnel losses are the essential elements in the logistics estimate process. Close integration with the COSCOM can simplify and speed the estimate process through the use of their automated data processing (ADP) systems. During continuous operations, the estimate process may need to be abbreviated due to time constraints. While working closely with the corps engineer brigade TOC CSS cell, the corps rear CP engineer aggressively maintains an accurate logistics and combat status of all engineer units. This information is critical to shortening the engineer logistics estimate process.

Having conducted the estimate process in determine unit sustainment and mission supply requirements, the corps rear CP engineer 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 COSCOM to ensure that necessary supplies are identified and resourced through corps or theater stocks.

Simultaneously the ACE, the corps main CP engineer section, and the brigade TOC CSS cell develop a RSR to support corps engineer mission requirements and forwards it to the corps rear CP engineer. Based on the corps's current stockage of required items and the identification of additional supplies needed, the corps rear CP engineer, in coordination with the G4, assesses the availability of these supplies in corps' stocks. The corps rear CP engineer and the G4 also analyze the corps's capability to transport mission supplies to corps engineer units. This information is provided to the corps G3 for his development of the CSR for engineer supplies.

Having identified the requirements for both unit sustainment and mission supplies and their availability, the requirements are forwarded to the ACE at the corps main CP, along with a projected combat-power status based on the current engineer sustainment status. The ACE then analyzes the requirements to sup port the plan and translates them into specific plans that are used to determine the supportability of the corps's courses of action. Upon determination of a course of action, the specific engineer logistics input into the corps's basic order and paragraph four of the engineer annex are developed and incorporated into each. Current engineer sustainment operations may require redirection based on the new plan and are sent to the corps rear CP engineer and the corps engineer brigade TOC CSS cell for coordination and execution.

Corps engineer units operating in division areas provide the unit and mission logistics status to the division engineer staff so that they can do a similar logistics staff planning process. Accurate and timely status reporting assists the division engineer in providing an accurate corps engineer unit status to the division commander and energizes the division engineer staff support to intercede in critical sustain-

ment problems when necessary. The division engineer staff also ensures that mission-required supplies needed by corps engineer units to execute division missions are integrated into the division's logistics plans.

Theater engineer units operating in the corps area provide the unit and mission logistics status to the corps engineer staff, normally the corps rear CP engineer. This allows a similar logistics staff planning process. Again, accurate and timely status reporting assists the corps engineer in providing an accurate theater engineer unit status to the corps commander and energizes the corps engineer staff support to intercede in critical sustainment problems when necessary. The corps engineer staff also ensures that mission-required supplies needed by theater engineer units to execute corps missions are integrated into the corps's logistics plans.

CHAPTER 5
OFFENSIVE OPERATIONS

Great tanks fitted with special mine plows and rakes jump forward clearing initial paths through obstacles. Combat engineers position mine-clearing charges immediately behind the tanks. When minefield are discovered, engineers fire a rocket over the tanks that pulls out a long line of explosives. The line charge is then detonated, creating an unbelievable blast. This marks a lane, clears some mines, and renders any enemy troops in the area completely ineffective. Bulldozers have been fitted with special steel protection. They push into the breach, clearing and widening each lane. The M9 armored combat engineer vehicle is used to attack bunkers and trenches with its sturdy blade. There is resistance, but Iraqi soldiers begin to surrender in large quantities. Those that stay and fight are quickly overrun. The tanks are busy destroying Iraqi tanks and fighting vehicles. Engineers are clearing bunkers and blowing up enemy equipment. The M9 armored combat earthmover (ACE) crushes bunkers and destroys trenches. Those who do not surrender are covered and crushed. Within minutes, eight lanes are opened through the first obstacle belt. In short order, sixteen lanes are opened, marked, and divided for one-way, two-way, wheeled, or tracked traffic. Everywhere there are engineers blowing up enemy fortifications. Giant engineer equipment pushes aside debris and roads appear in the desert. Everywhere there is noise, dust, smoke, and the deafening roar of gunfire. It is synchronized perfectly.

From "A Commanders Perspective" by Colonel Samuel C. Raines, Commander, 7th Engineer Brigade (Corps), during Operation Desert Storm, 9 April 1991.

PURPOSE OF THE OFFENSE

The corps conducts offensive operations to defeat, destroy, or neutralize the enemy force. The offense is the decisive form of war. Offensive operations are designed to defeat the integrity of the enemy's defense system by driving into his rear and destroying artillery, reserves, C2 systems, CPs, and logistics support. These operations may also be conducted to secure key or decisive terrain, to deceive or misdirect uncommitted enemy forces, to fix or isolate units, to gain information, or to spoil an enemy's offensive preparation. Seizure and retention of the initiative come with offensive action. Corps are expected to conduct offensive operations to defeat or destroy a designated portion or formation of an enemy's defense. A corps may conduct an offensive operation as part of a TA operation, independently as the Army component of a JTF, or internally as part of its own operation.

This chapter provides a doctrinal foundation for corps engineer support to offensive operations. It serves as an extension of FM 100-15. It examines how corps engineers fit into the offensive framework and assist the corps in achieving success. The engineer estimate focuses on the process used to meet the needs of corps offensive planning.

OFFENSIVE CHARACTERISTICS

The offensive operation is the corps's primary means of taking and maintaining the initiative. Successful engineer support of corps offensive operations depends on the corps engineer's understanding and application of the four offensive characteristics: surprise, concentration, tempo, and audacity.

SURPRISE

Surprise is achieved by striking the enemy at a time or place or in a reamer for which it is not physically or mentally ready. To give the corps the element of surprise, corps engineers overcome operational and tactical obstacles rapidly and provide the corps with mobility over restricted terrain. Corps engineers also prepare forward logistics bases, assisting in the rapid forward movement of corps forces.

CONCENTRATION

Concentration is achieved by massing the effects of combat power at the point of attack. The corps engineer task-organizes and develops a scheme of engineer operations that supports this concentration of maneuver forces by massing the right type of engineer support at the right place and time. Allocating the proper mix and amount of corps engineers to divisions that are making the main corps attack permits them to adjust to changing circumstances without time-consuming and confusing reorganizations. The massing of corps engineer general engineering support to corps logistics operations may also be appropriate to ensure adequate corps logistics support during the attack such as MSR construction immediately following combat formations.

TEMPO

Tempo is the rate of speed of military action that maintains relentless pressure on the enemy to prevent him from recovering from the shock and effects of the attack. Corps engineers help achieve this tempo by maintaining a responsive engineer C2 system and decision cycle. Establishing corps engineer task organizations and command or support relationships that do not change during the course of the battle allows the maneuver forces to retain relentless pressure against the enemy.

AUDACITY

Audacity is required to boldly execute simple plans that negate the disadvantages of numerical inferiority. Commanders understand when and where they are taking risks but don't become tentative in the execution of plans. The corps engineer facilitates audacious offensive action by seeing the battlefield and anticipating future engineer requirements. He constantly postures the engineer force so that the corps can rapidly take advantage of narrow windows of opportunity such as in the case of forward river crossings.

FORMS OF THE CORPS TACTICAL OFFENSE

Successful engineer support of corps offensive operations also depends on the corps engineer's understanding and ability to support the four forms of the tactical offense: movement to contact (MTC), attack, exploitation, and pursuit.

MOVEMENT TO CONTACT

The corps conducts an MTC to gain or regain contact with the enemy and to develop the situation. The MTC is characterized by rapid movement along multiple axes, centralized planning and decentralized control, and the rapid transition of combined arms formations from the march to the attack. The corps focuses on intelligence collection and security to the main body. During the MTC, the corps is normally organized with a covering force, an advance guard, a main body and flank and rear security elements. A variant of the MTC is the approach march, used when commanders are relatively certain of the enemy's location and are a considerable distance from the enemy. Limited-purpose applications of the MTC include the *search and attack,* conducted by light maneuver units or air cavalry and *reconnaissance in force,* conducted by heavier units. Both operations seek enemy information and probe for enemy weaknesses; or they may deny terrain to the enemy, and possibly destroy the enemy. The desired result of the MTC is to find the enemy.

An MTC has several possible outcomes. First, a corps may not make contact with the enemy and reach its objective unopposed. This could result in continuing the MTC to a subsequent objective or establishing a hasty defense oriented on key terrain. Second, a *meeting engagement* may occur where the corps meets an unexpected moving or stationary force and where friendly action takes place without hesitation. If the covering force or the unit in contact is unable to defeat or contain the enemy force, the corps will rapidly decide to conduct a hasty attack, hasty defense, or a combination of both, normally with units from the main body. Another possibility is to bypass the enemy force altogether. When the corps has a clear picture of a moving enemy's disposition, it may try to gain the advantage by moving to advantageous terrain and preparing for a hasty defense, hasty attack, or a combination that destroys the enemy force.

The corps engineer supports the MTC by configuring corps engineer forces forward to accomplish needed mobility, countermobility, general engineering, and limited survivability operations. The corps engineer understands the MTC's objective, contingencies, branches, and sequels. He then identifies engineer tasks and allocates forces. Figure 5-1, page 5-4, shows the basic engineer tasks germane to a corps MTC. The corps engineer considers each component of the MTC and the inherent engineer missions that are performed in support of the covering force; advance, flank, or rear guards; and the main body. He then task-organizes units based on his available forces and C2 requirements. He ensures that deep operations scatterable mining is fully synchronized during the MTC so that emplacement times, lanes, and durations facilitate future corps operations. Figure 5-2, page 5-5, shows a possible engineer force laydown to support the engineer missions needed during an MTC.

Covering Force

The corps normally uses the cavalry regiment as the covering force but may use a division or separate brigade. In addition, the corps commander may direct that leading divisions establish division-controlled covering forces in support of the MTC. The corps covering force develops the situation and prevents the unnecessary delay of the main body Covering-force missions include destroying enemy resistance, securing key terrain, or containing enemy forces. When attacking a defending enemy army, the corps covering force is usually expected to penetrate the enemy's security zone, identify the location and deployment of forces in the main defensive belt, and limit the enemy's intelligence-gathering activities.

Engineer support for the corps covering force includes reconnaissance (to gain terrain and enemy engineer intelligence) and mobility operations (to sustain the covering force's freedom of maneuver). Engineers help identify the best routes for forward movement along with lateral

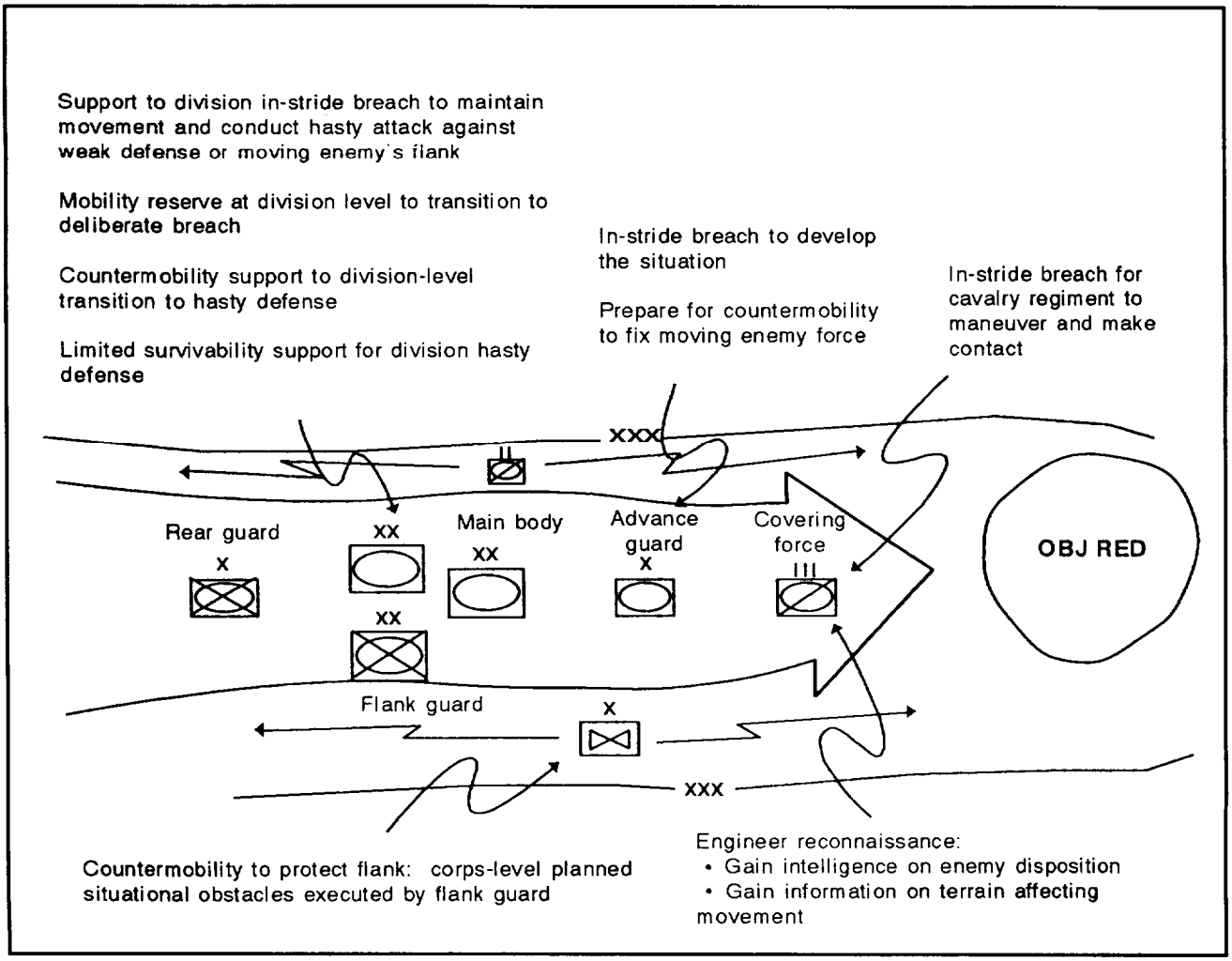


Figure 5-1. Engineer support to a corps MTC

routes for additional flexibility. Engineers with the covering force allow it to move independently through undefended obstacles and restrictions. The cavalry regiment or separate brigade will normally have a corps engineer battalion attached, augmenting organic engineer company capabilities to allow for rapid earth moving, minefield breaching, and assault bridging. If the corps covering force is a division, the organic division engineer brigade or battalion normally provides support for engineer missions. Engineer support to covering-force operations is characterized by early linkup, detailed combined arms planning and rehearsals, and thorough integration into the combined arms team.

Advance Guard

The corps advance guard is normally furnished and controlled by the leading divisions in the main body. The advance guard maintains contact with and provides liaison to the covering force. It is task-organized to support the uninterrupted movement of the main body. Engineer support for this operation normally comes from the leading division engineer brigade or battalion. The corps engineer may augment with bridging and breaching assets. The primary mission of the engineer force supporting the corps advance guard is to maintain the advance guard's freedom to maneuver with mobility support, allowing it to fight through defended obstacles without reinforcement.

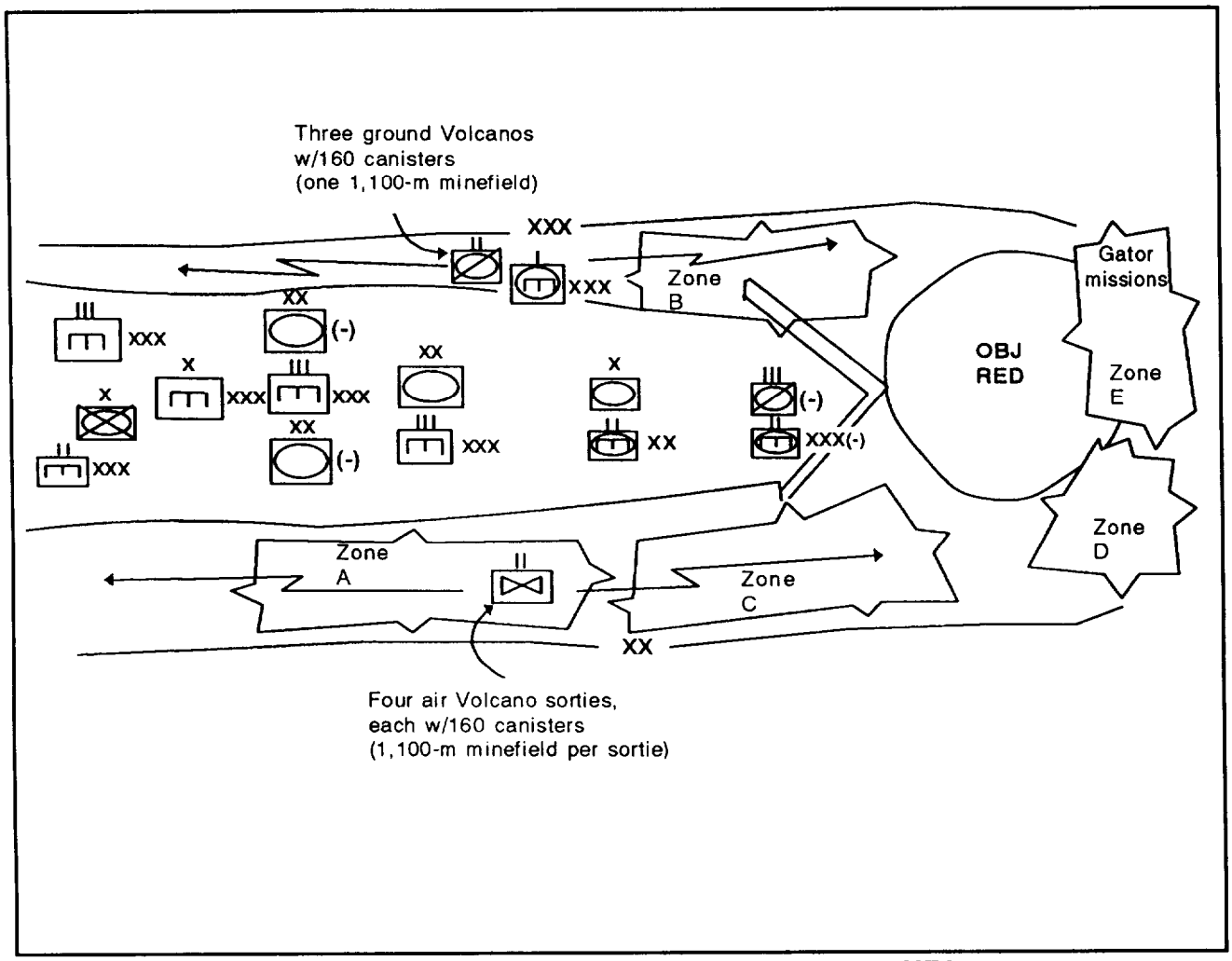


Figure 5-2. Engineer force laydown for a corps MTC

Engineers with the advance guard assist in rapid movement, develop the situation, and maintain the momentum of the main body. Instride breaches are conducted along routes where the main body is moving. The advance guard may require countermobility support, especially if the intent is to fix the enemy and allow the main body to attack a flank. Situational obstacles are planned and executed as required.

Flank and Rear Security

Corps flank security is normally furnished and controlled by main body forces. If flank security forces are required to be under corps control, specific security missions (normally screen or guard) are assigned to these units. While there is not necessarily a dedicated engineer force with the flank security force, countermobility support is an inherent task. Situational obstacle emplacement will normally be the responsibility of main body division engineers or corps engineers supporting screening or guarding cavalry regiments and separate brigades.

The corps normally controls rear security forces due to the extensive distances created by supporting logistics forces. Countermobility support, including situational obstacle planning and emplacement is also inherent to support rear security operations. The corps engi-

neer plans corps reserve demolition targets and ORAs to ensure freedom of maneuver in the corps rear area.

Main Body

The main body contains the bulk of the corps's combat power. Units are task-organized into march columns to facilitate a hasty attack or a hasty defense from the march. Elements of the main body may be committed to reduce pockets of resistance contained or bypassed by the covering force. Engineers supporting the main body focus primarily on forward mobility and countermobility operations. Corps engineer battalions augmenting divisions widen breached lanes, breach bypassed obstacles, and emplace situational obstacles on the flanks. Corps bridging units are located in march columns for responsive support to the main body CSE companies and combat heavy engineer battalions construct follow-on MSRs and logistics bases.

ATTACK

The attack's purpose is to defeat, destroy or neutralize the enemy. The same fundamentals apply to each type of attack. Attacks with enemy-force objectives are preferable to terrain-oriented objectives. The corps will normally transition into an attack following an MTC, but the attack may also occur after defensive operations, exploitations, and pursuits. Successful attacks depend on the skillful massing of fires, maneuver, EW, and other effects against the enemy force. To defeat the enemy force, the corps attacks to destroy the continuity of the enemy defense by making the enemy positions untenable so that he either abandons his defense or eventually faces piecemeal destruction. To destroy the enemy force, the corps achieves overwhelming combat power through the use of fire and maneuver. When attacking a comparable-size force, the corps accept-a risks in a part or parts of its zone of action to achieve concentration at decisive points while using deception and economy of forces in other areas. Several forms of the attack maybe used by the corps commander, including the hasty attack deliberate attack, spoiling attack, counterattack raid, feint, demonstration, or any combination thereof.

The corps engineer supports attacks by configuring corps engineer forces to accomplish needed forward mobility countermobility general engineering, and limited survivability operations. The corps engineer understands the attack's objective, contingencies, branches, and sequels. He then identifies engineer tasks and allocates forces. He considers each type of attack and the inherent engineer missions that are performed. He then task-organizes units based on his available forces and C2 requirements. He ensures that deep operations scatterable mining is fully synchronized during the attack so that emplacement times, lanes, and durations facilitate future corps operations.

Hasty Attack

The hasty attack is an offensive operation with minimum preparation by the unit in contact with the main body. The attack destroys the enemy before he can concentrate forces or establish an effective defense. It is the most likely result of a meeting engagement. A corps uses hasty attacks from the march with main body units and covering forces that are immediately available. The hasty attack may be conducted as part of a planned contingency during an MTC or as an unforseen contingency during hasty or deliberate defenses and deliberate attacks. Sound IPB and prior war gaming of situations, battle drills, and rehearsals are critical to success. The hasty attack is normally initiated by the use of FRAGOs. It is followed by the use of reserve forces or immediate reinforcement.

Prior to the attack, the corps engineer anticipates and task-organizes needed engineer forces to provide responsive support to divisions, separate brigades, cavalry regiments, and reserve forces without delays. Figure 5-3 shows the basic engineer tasks germane to a

corps hasty attack. Special topographic products that assist in terrain analysis and effective engineer and terrain reconnaissance allows some planning to make these attacks less improvised. During the MTC, the corps engineer closely monitors the battlefield to discern the disposition of enemy and friendly forces when transitioning to a hasty attack. Critical information is forwarded directly to subordinate engineer units. The corps engineer also focuses on coordinating engineer operations between adjacent units during the hasty attack. He initially focuses on forward mobility support, such as breaching and bridging, that maintains the attacking force's freedom of maneuver. Countermobility support is planned to isolate the battlefield and protect the corps flanks. Countermobility and survivability sup port become the priorities when objectives are secured and in order to repel enemy counterattacks. General engineering support to build and upgrade MSRs and logistics bases is required to exploit the hasty attack's success, especially when attacks turn into pursuits. The ability to maintain the momentum of the attack is directly affected by the corps's ability to sustain the force, including the pre-positioning of engineer forces and material. The corps engineer has little impact during the hasty attack's actual execution. His responsibility revolves around planning and providing a trained, tailored, flexible, and well-rehearsed engineer task organization before the battle. Figure 5-4, page 5-8, shows a corps conducting

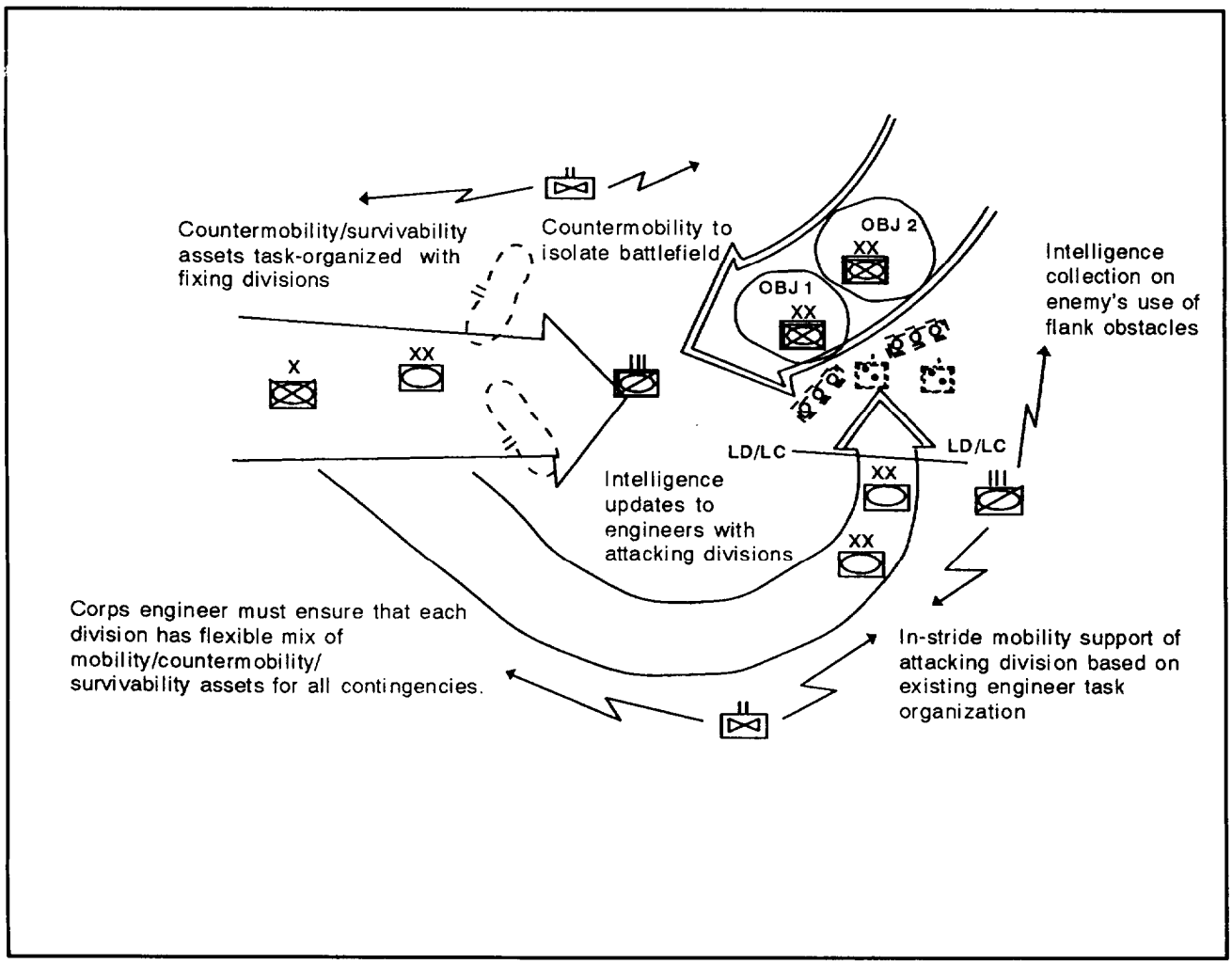


Figure 5-3. Engineer support to a corps hasty attack

a hasty attack on a moving force from an MTC and the engineer task organization that sup ports the inherent corps engineer's tasks.

Deliberate Attack

The corps conducts a deliberate attack against a well-organized defense or when—

- A hasty attack has failed or cannot succeed.
- The enemy situation is known.
- The combined arms team can be employed with sufficient combat power to defeat the enemy.

The deliberate attack is a fully synchronized operation that employs the effects of every available asset against the enemy defense. It is often conducted from the defense. This type of attack requires massed combat power on a narrow front in an area where there is a high probability of surprise. The corps develops intelligence and a flexible scheme of maneuver that uses indirect approaches, deception, and surprise as a basis for the deliberate attack.

The corps engineer develops a scheme of engineer operations that focuses on providing forward mobility support throughout the depth of the corps's deliberate attack. This allocation of engineer forces is based on the IPB, the EBA, and the mission analysis conducted during the

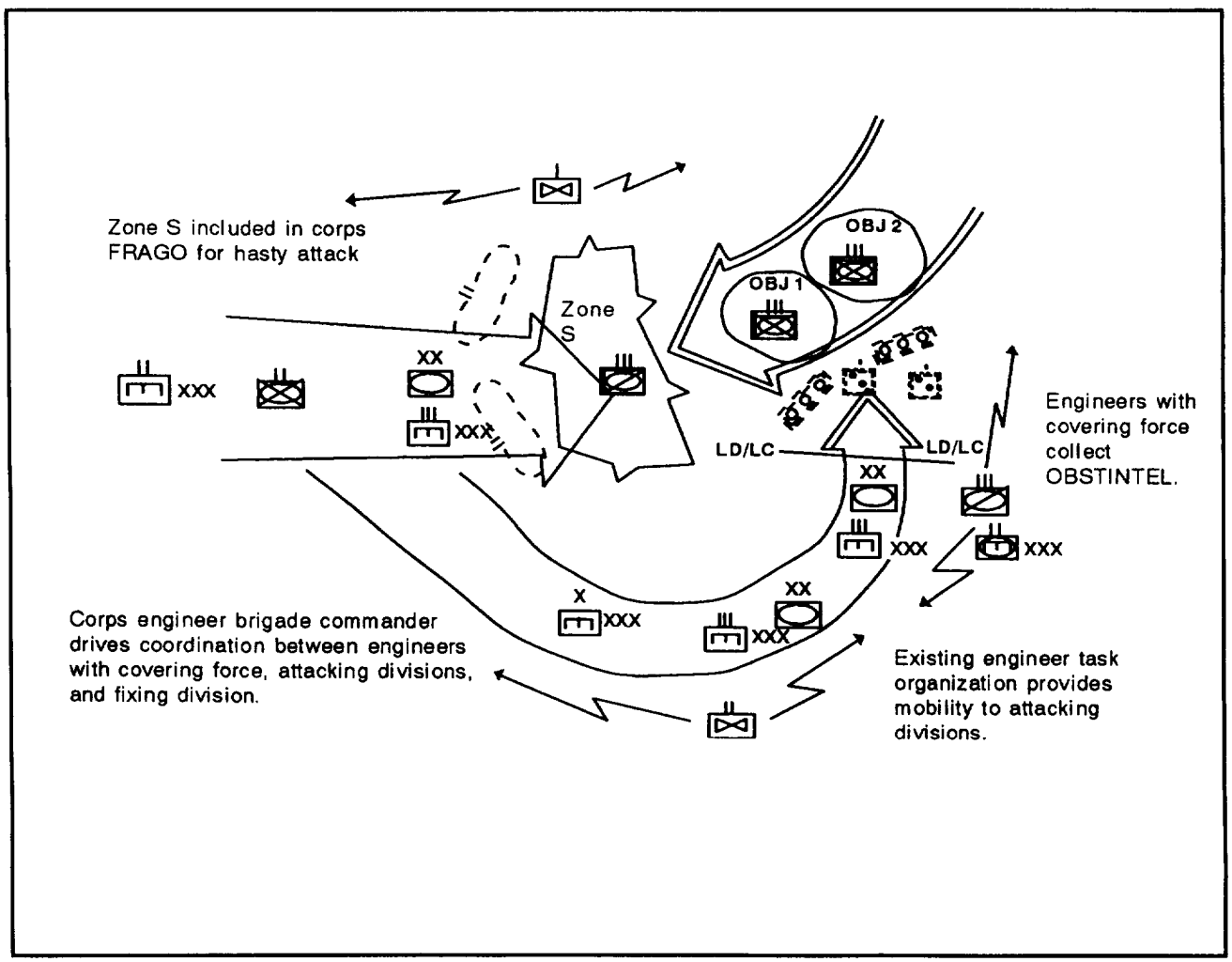


Figure 5-4. Engineer force laydown for a corps hasty attack

command estimate (see Figure 5-5). The corps engineer thoroughly understands the corps commander's intent and scheme of maneuver; anticipates how divisions, separate brigades, the cavalry regiment, and reserve forces will fight and comprehends the threat situational template in order to properly conduct the engineer mission analysis. The corps engineer then looks at the maneuver-brigade level and identifies the number of lanes or crossing sites required for each brigade, regiment, or reserve force. He then compares the capabilities of division, separate brigade, cavalry regiment, and reserve force engineer units to the numbers of required lanes or crossing sites. If a shortfall exists, he allocates available corps engineer battalions and/or bridge companies to the appropriate division, separate brigade, cavalry regiment, or reserve force. If required, he allocates engineer group headquarters to divisions in order to bolster engineer C2. Countermobility and survivability operations are also significant in supporting a deliberate attack. Countermobility operations assist in isolating the battlefield and protecting the corps from enemy flank attack and counterattack. The corps engineer understands the corps commander's intent, follow-on missions, and contingency plans to allocate engineer forces to support them. Using the corps's DST and the synchronization matrix, the corps engineer estimates the time available to conduct needed corps countermobility operations, including the transportation of ob-

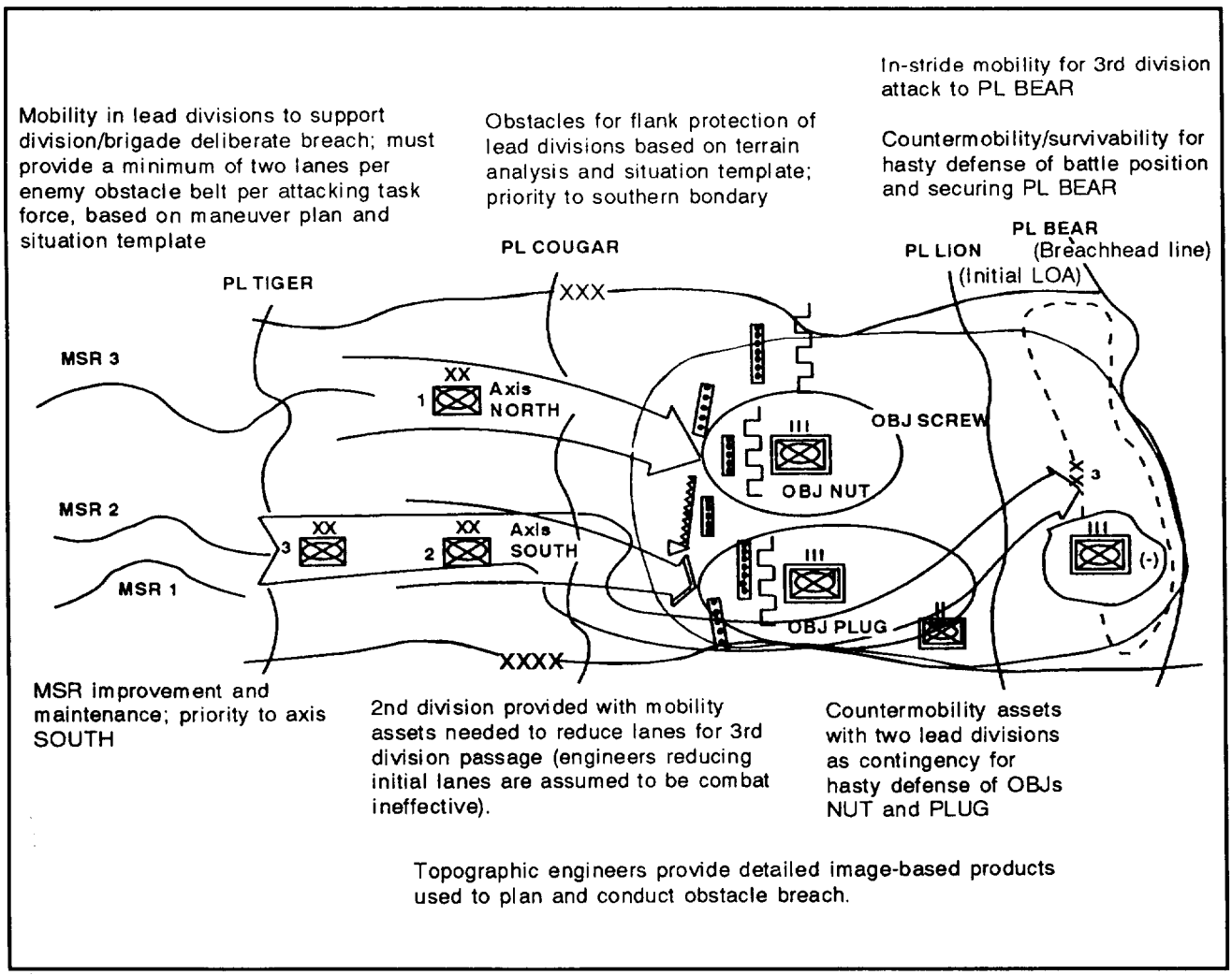


Figure 5-5. Engineer support to a corps deliberate attack

stacle material to corps-directed obstacle locations. He coordinates with the COSCOM to ensure that mission-required Class IV obstacle materials and Class V mines and demolitions are pushed forward to support a hasty defense on the objective and to corps-directed obstacle locations. He influences countermobility operations during the deliberate attack's execution by tracking the battle and advising the corps commander on the use of deep scatterable mines. The corps engineer supports survivability operations by ensuring that divisions, separate brigades, the cavalry regiment, and reserve forces have sufficient earth-moving assets in their task organization. General engineering support to build and upgrade MSRs and logistics bases is required to exploit the success of deliberate attacks, especially when attacks turn into pursuits. The ability to maintain the momentum of the attack is directly affected by the corps's ability to sustain the force, including the pre-positioning of engineer forces and material. Figure 5-6 shows a corps conducting a deliberate attack and the engineer task organization that supports the inherent corps engineer's tasks.

Spoiling Attack

Corps commanders mount spoiling attacks from a defensive position to disrupt an expected enemy attack. A spoiling attack attempts to strike the enemy while he is most vulnerable. Spoiling attacks are conducted like other attacks; they may be hasty deliberate, or exploitive. Corps engineers support spoiling attacks the same way they support hasty or deliberate attacks, primarily in the mobility area.

Counterattack

The corps commander conducts a counterattack with either reserve forces or lightly committed forward forces. The corps counterattacks after the enemy launches his attack reveals his main effort or creates an assailable flank. Counterattacks are conducted much like other attacks, but synchronizing them within the overall defensive framework requires careful timing. Counterattacks can be rehearsed and timing-controlled, and the ground may be traversed and prepared.

Corps engineer support begins with a detailed terrain analysis to determine how to shape the battlefield. The corps engineer plans for counterattacks by ensuring that a proper engineer support force is task-organized with reserve forces. Corps engineers operating in rear areas can have on-order support-type missions to counterattacking forces. They can also prepare counterattack routes in the corps defensive area. The corps engineer recommends corps ORAs and corps-directed obstacles that ensure clear and protected routes for counterattacking forces. Corps engineers support counterattacking forces in the same reamer as those conducting hasty and deliberate attacks, primarily with mobility assets.

Raid

A raid is a limited-objective attack into enemy territory for a specific purpose other than gaining and holding terrain. The corps commander conducts raids to destroy key enemy facilities and installations, to capture or free prisoners, or to disrupt enemy C2. Corps engineers support raids based on specific mission requirements, including demolition or breaching support.

Feint and Demonstration

A feint is a supporting attack designed to divert the enemy's attention from the main effort It is usually a shallow, limited-objective attack conducted before or during the main attack by divisions, brigades, or smaller units. A demonstration is a show of force in an area where a decision is not sought. A demonstration threatens attack but does not make contact. Feints and demonstrations deceive the enemy as to the true intentions of the attacker, pinning him in place, diverting his attention, and allowing decisive action elsewhere. If they unveil an enemy weakness, they may be followed by a hasty or deliberate attack.

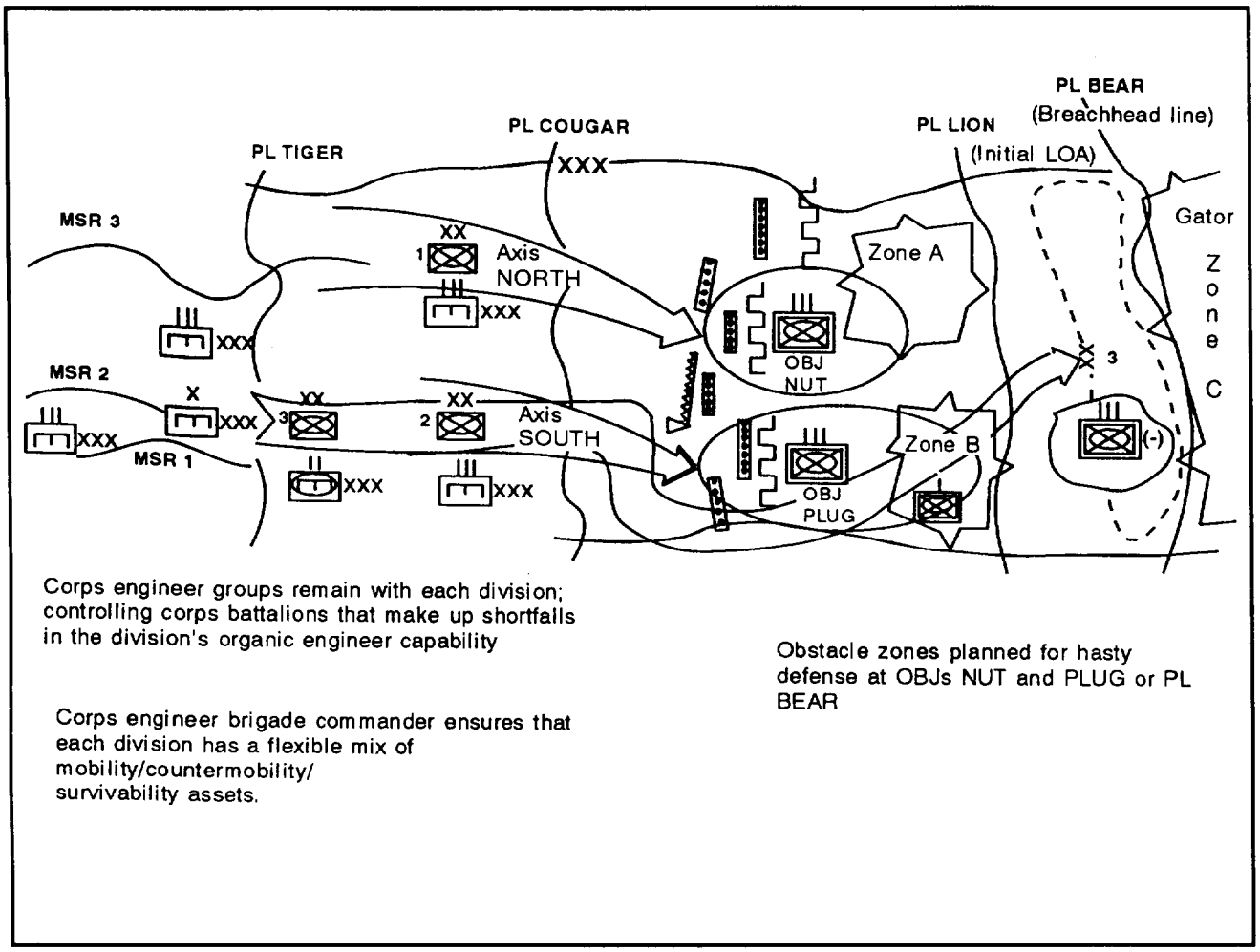


Figure 5-6. Engineer force laydown for a corps deliberate attack

Corps engineers support feints and demonstrations by providing needed mobility and countermobility support. Engineer support to limited (but visible) breaching, obstacle-emplacement, and survivability operations contribute to these deceptive operations.

EXPLOITATION

An exploitation of the disruptive effects caused by a successful attack will either support the securing of deep friendly objectives, or it will prevent the enemy from reconstituting an organized defense, counterattacking, conducting an orderly withdrawal, or continuing to support operations. The attacker extends the defending force's destruction by maintaining offensive pressure through exploitation. It is the chief means of translating tactical success into operational advantage and can be directed by the theater or corps commander. An exploitation is normally initiated by already-committed units using available forces to form both an *exploiting force* and a *follow-and-support force* (see Figure 5-7, page 5-12). An exploitation is characterized by decentralized execution. The employment of exploitation and follow-and-support forces is similar to an MTC. The corps can either exploit its own success or act as the exploiting or follow-and-support force for a higher theater command. Potential missions for the exploiting force are securing objectives deep in the enemy rear, securing LOC, surrounding and destroying

enemy forces, denying escape routes to an encircled force, and destroying enemy reserves. The follow-and-support force initially prevents the enemy from closing the gap in a penetration and secures key terrain gained during the penetration or envelopment. As the exploiting force advances, the follow-and-support force secures LOC, mops up or destroys bypassed forces, expands the area of exploitation from the exploiting force's axis of advancement, and blocks the advance of reinforcements into the area. As the exploitation continues, the corps commander will establish and communicate a limit of advance, a series of objectives for the attacking divisions, and a general plan for the next battle. He will organize the corps to facilitate his next scheme of maneuver.

The corps engineer force supports the exploitation in similar fashion to an MTC. The major difference is the very limited time available to plan and prepare for the exploitation. Because of this, the corps engineer configures the supporting engineer force from the engineer assets already task-organized with the exploiting force. Forward mobility assets, including breaching and bridging equipment, are required to maintain the force's momentum so that it can rapidly execute its mission. Countermobility operations are required to secure objectives, block enemy forces, and provide flank protection for the exploiting force. Survivability operations are conducted to protect the force with the mission to secure terrain or deny escape

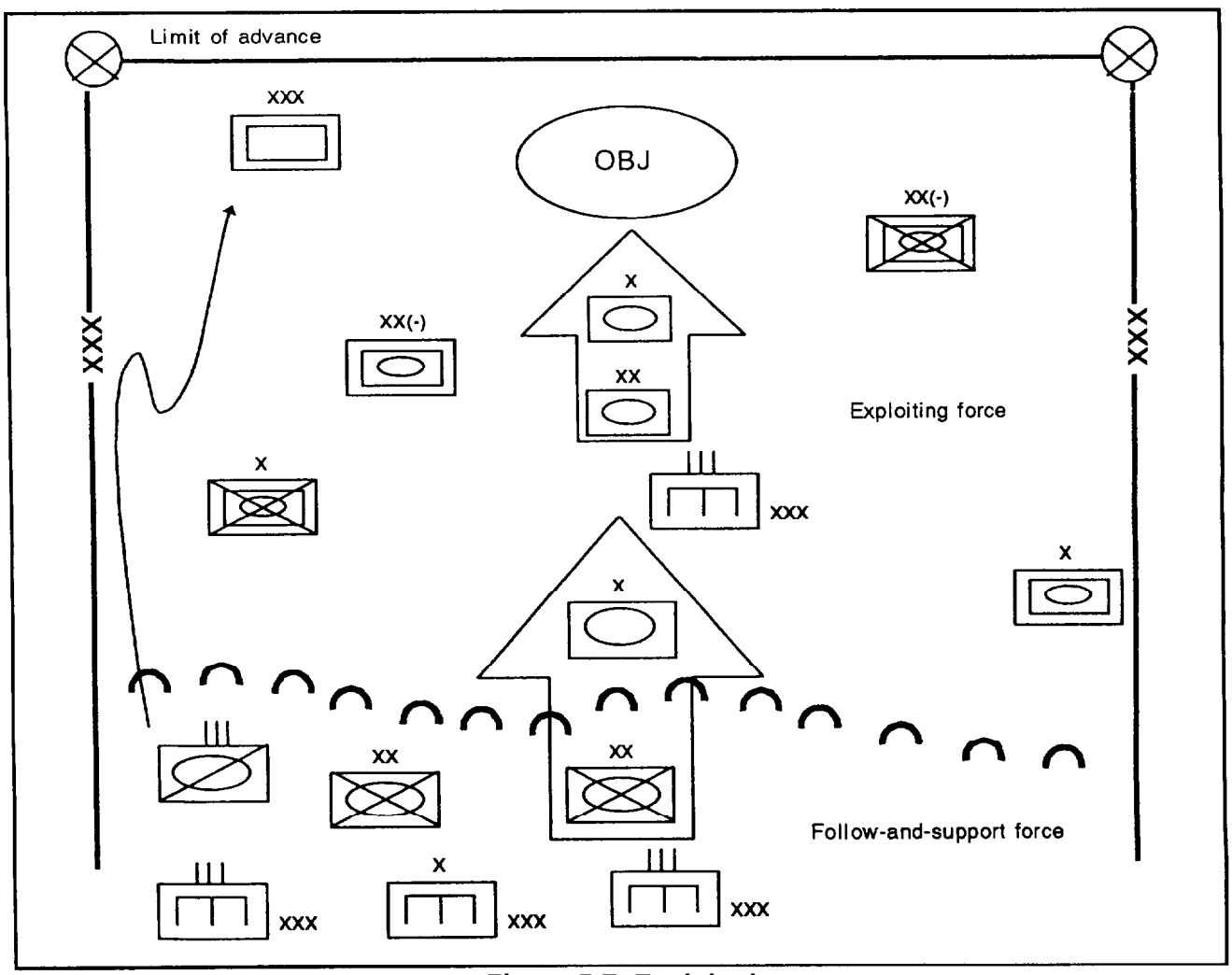


Figure 5-7. Exploitation

routes. Engineer support to the follow-and-support force includes the same mobility, countermobility, and survivability requirements as the exploiting force, along with extensive general engineering work being needed to keep LOC and MSRs open. Corps engineer support to the follow-and-support force is normally provided by engineer assets already in place. There may also be some time to plan and move other corps engineer units into position to provide needed general engineering support.

The corps engineer has several responsibilities when the corps conducts an exploitation. First, he plans to support the exploitation before the battle begins by providing a flexible corps engineer task organization to the attacking divisions. The exploitation mission is likely to be assigned to the corps follow-and-support force or its reserve. The corps engineer ensures that both of these forces contain enough engineer assets to support future contingencies, including exploitation operations. Second, because the situation is unclear during an exploitation, the corps engineer supports the G2 by assisting in the development of terrain intelligence-gathering requirements pertaining to the area being exploited. He provides information requirements for engineer missions, including locations and sizes of obstacle belts and zones and the location of enemy forces covering them, any friendly or enemy use of scatterable mines that will impact on the mission, the status of specific bridges key to the operation, and the impact of weather and terrain on mobility support. Third, the corps engineer is sensitive to the logistics posture of the engineer force supporting corps exploitation operations. He coordinates closely with the CO SCOM, ensuring that engineer logistics requirements are identified and met, especially with fuel and maintenance support.

PURSUIT

Pursuit is an operation against a retreating enemy force. It normally follows a successful exploitation. The pursuit's object is the destruction of the opposing force that is in the process of disengagement. Pursuit operations require a *direct-pressure force* and normally an *encircling force.* The direct-pressure force prevents enemy disengagement and subsequent reconstitution of the defense, and inflicts maximum casualties by attacking constantly on a wide front. The encircling force's mission is to get to the enemy's rear rapidly, block his escape and, together with the direct-pressure force, complete his destruction (Figure 5-8, page 5-14).

The corps engineer's initial priority is to support both forces with mobility assets. The direct-pressure force requires the capability to conduct decentralized, in-stride breaching operations. The encircling force requires mobility support to get into position, followed by countermobility and survivability support to block the enemy force. Due to the fast pace of pursuit operations, follow-on general engineering support to both pursuit forces is especially critical for timely logistics support to the corps. Due to the nature of the pursuit and its similarities to the exploitation, the corps engineer planning considerations and actions are the same as those of an exploitation.

CORPS OFFENSIVE FORMS OF MANEUVER

The corps normally uses a combination of the basic forms of manuver--envelopment turning movement infiltration, penetration, and frontal attack--when attacking, exploiting, or pursuing. They provide a useful means of conveying the corps commander's scheme of maneuver and what he intends his subordinate units to accomplish. For example, a corps commander may direct one division to effect a penetraction while another division envelopes a de-

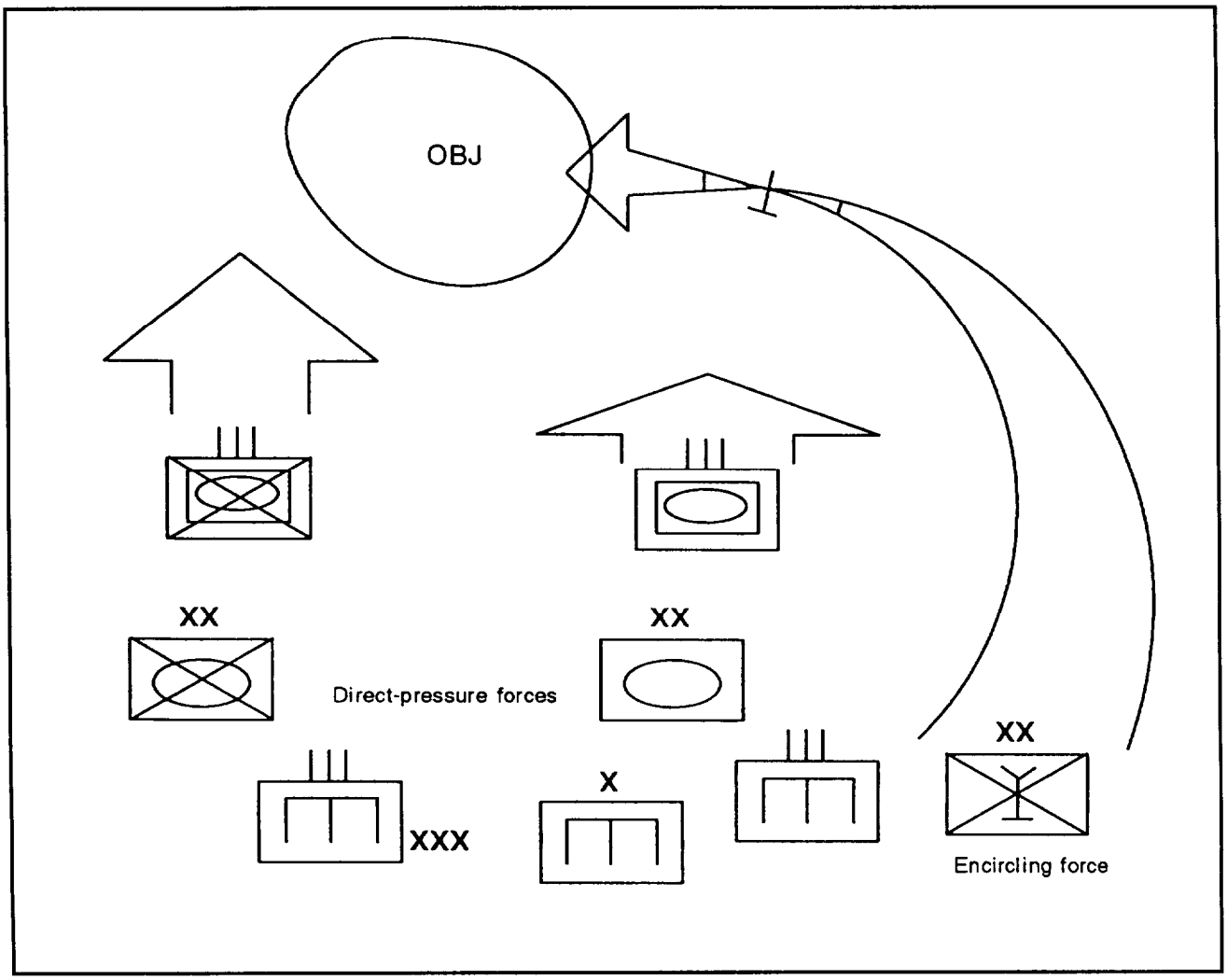


Figure 5-8. Pursuit

fending enemy force. The corps commander determines which form of maneuver to use based on METT-T. He uses the form of maneuver as an expression of intent and overall concept of the operation that gives focus to corps planning. The corps engineer understands each form of maneuver and its implications in developing the scheme of engineer support operations and task organization.

ENVELOPMENT

When attacking, the corps will normally attempt to envelope the enemy force along indirect approaches. This is especially true if the enemy force is of comparable size. To use this form of maneuver, commanders find or create an assailable flank, pitting their strengths against the enemy's weaknesses. The enemy is usually freed in place from the front by a supporting attack to hold him in position while the main effort passes around the main defense and attacks a flank (Figure 5-9). This is designed to delay or disrupt his reaction to the enveloping force and cause him to commit his reserve prematurely or ineffectively The main attack's objective can be either force-or terrain-oriented. The main attack may be used to attack and roll up forces in the main defensive belt, second-echelon defense, or reserves. When the objective is terrain-oriented, the main attack is normally focused on securing

key terrain, which cuts the enemy's LOC or escape routes.

In support of envelopments, the corps engineer develops a scheme of engineer operations that focuses on the mobility of the enveloping force and protection of its extended flanks and objectives, along with construction, improvement and maintenance of MSRs and logistics bases. The divisions and separate brigades that make up the enveloping force normally organize for instride breaching and flank obstacle-emplacement operations. The corps engineer develops a flexible and redundant engineer task organization that augments division and separate brigade breaching, bridging, and obstacle-emplacement capabilities with corps assets. The corps engineer may plan corps obstacle zones and directed obstacles that protect extended flanks and objectives. ORAs may be designated, allowing free movement of enveloping forces. The corps engineer also provides horizontal-construction capability to divisions and separate brigades serving as the enveloping force for extended MSR and logistics base construction improvement and maintenance.

The corps engineer develops engineer requirements for corps supporting attacks during the envelopment. Extensive obstacle breaching may be required by the supporting attack divisions or separate brigades. The main effort's

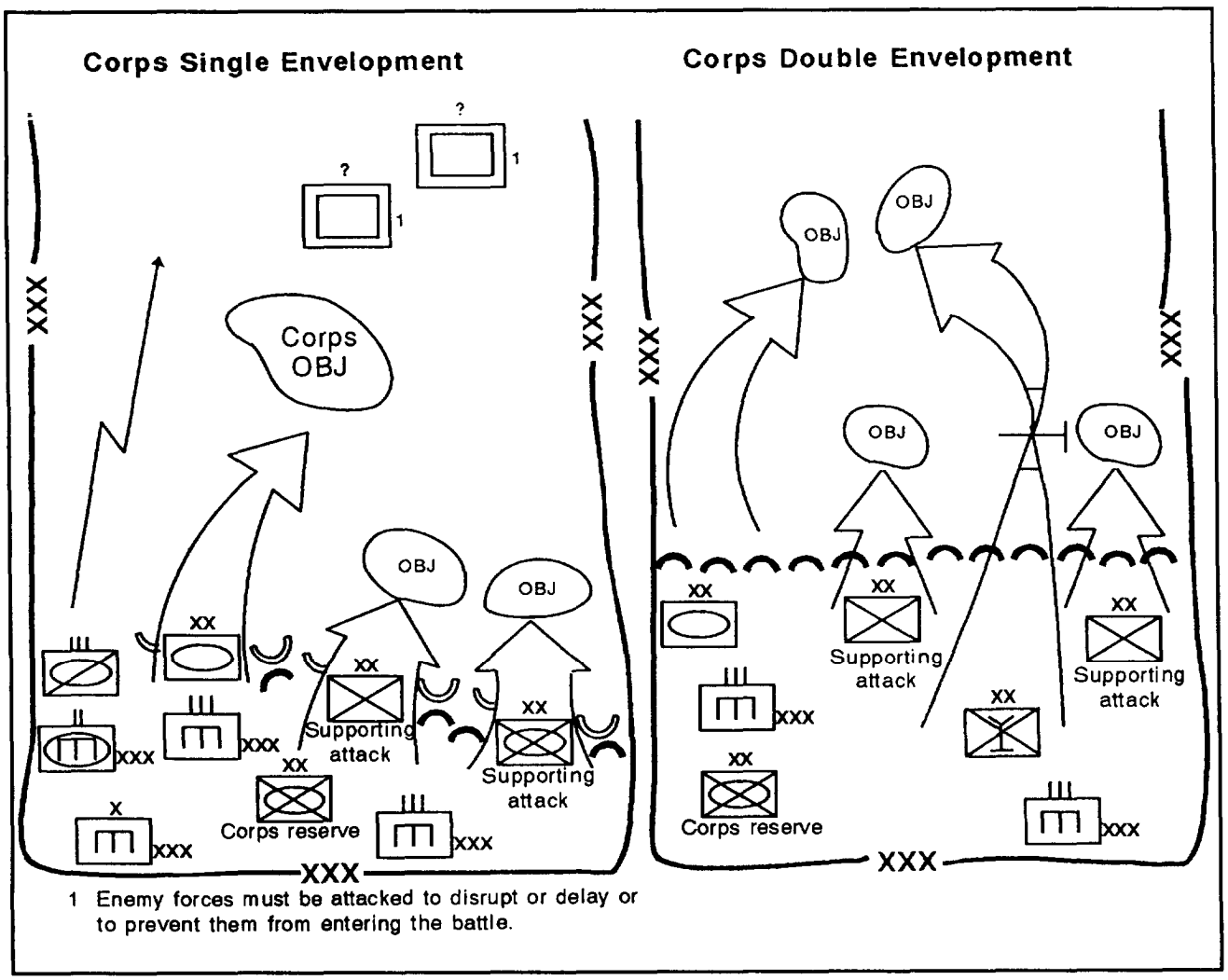


Figure 5-9. Corps single and double envelopment

success may hinge on the ability of the supporting attacks to penetrate the obstacles and cause the enemy to fight in two directions. Corps engineer augmentation to the supporting attack may be limited in scope, forcing the division or separate brigade to rely on organic engineer assets. The corps engineer may have to accept some risk and allocate the minimum essential engineer force needed to augment corps supporting attacks. To minimize this risk, he works closely with the corps G2 on a thorough IPB and obstacle intelligence (OBSTINTEL) collection effort to verify or deny enemy defensive capability facing the supporting attack.

TURNING MOVEMENT

The corps conducts a turning movement to envelop the enemy by striking at areas deep in the rear and at his LOC. The turning movement uses freedom of maneuver to create a decisive point where the enemy is unprepared. It is distinguished from an envelopment primarily by the depth of its objectives and by what the commander intends for it to accomplish. In a turning movement, the corps seeks to avoid the main enemy force, in pass around his defensive belts, and to secure an objective deep in the enemy rear to make the enemy position untenable (Figure 5-10). Due to the large distances involved, a turning movement does not always require a supporting attack to fix the enemy force.

In support of turning movements, the corps engineer develops a scheme of engineer operations similar to an envelopment. It focuses on the mobility of the turning-movement force and protection of its deep extended flanks and objectives, along with construction, improvement, and maintenance of long MSRs and many logistics bases. The divisions and separate brigades that make up the turning-movement force organize for in-stride breaching and flank obstacle-emplacement operations. The corps engineer develops a flexible and redundant engineer task organization that augments division and separate brigade breaching, bridging, and obstacle-emplacement capabilities with corps assets. The corps engineer may plan corps obstacle zones and directed obstacles that protect extended flanks and deep objectives. ORAs may be designated, allowing free movement of turning-movement forces. The corps engineer also provides extensive horizontal-construction capability to divisions and separate brigades serving as the turning-movement force for extended MSR and logistics base construction, improvement, and maintenance.

INFILTRATION

Infiltration uses the covert movement of forces through enemy lines to attack positions in the enemy's rear. Corps light infantry units are best suited to conduct an infiltration. The corps commander may use infiltration in conjunction with other forms of maneuver to attack lightly defended positions or stronger positions from a flank and rear, to secure key terrain in support of the main effort or to disrupt enemy rear operations. The size, strength, and composition of infiltration forces will usually be limited to avoid detection until the objective is reached. Limited objectives and tasks are also the norm with infiltration forces.

The corps engineer supports infiltration operations with light corps engineer units and equip ment as required. Covert obstacle-breaching, obstacle-emplacement, and long-range communications capabilities are packaged with sup porting engineer forces. Engineers perform any needed reconnaissance of terrain, obstacles, and enemy engineer capabilities.

PENETRATION

The corps commander uses penetration when the enemy's flanks are not assailable, to attack through the enemy's principal defensive positions, to break the integrity of the enemy defense, and to defeat the enemy in detail. Penetration is conducted when the enemy force is _ overextended, a weakness is detected, or an

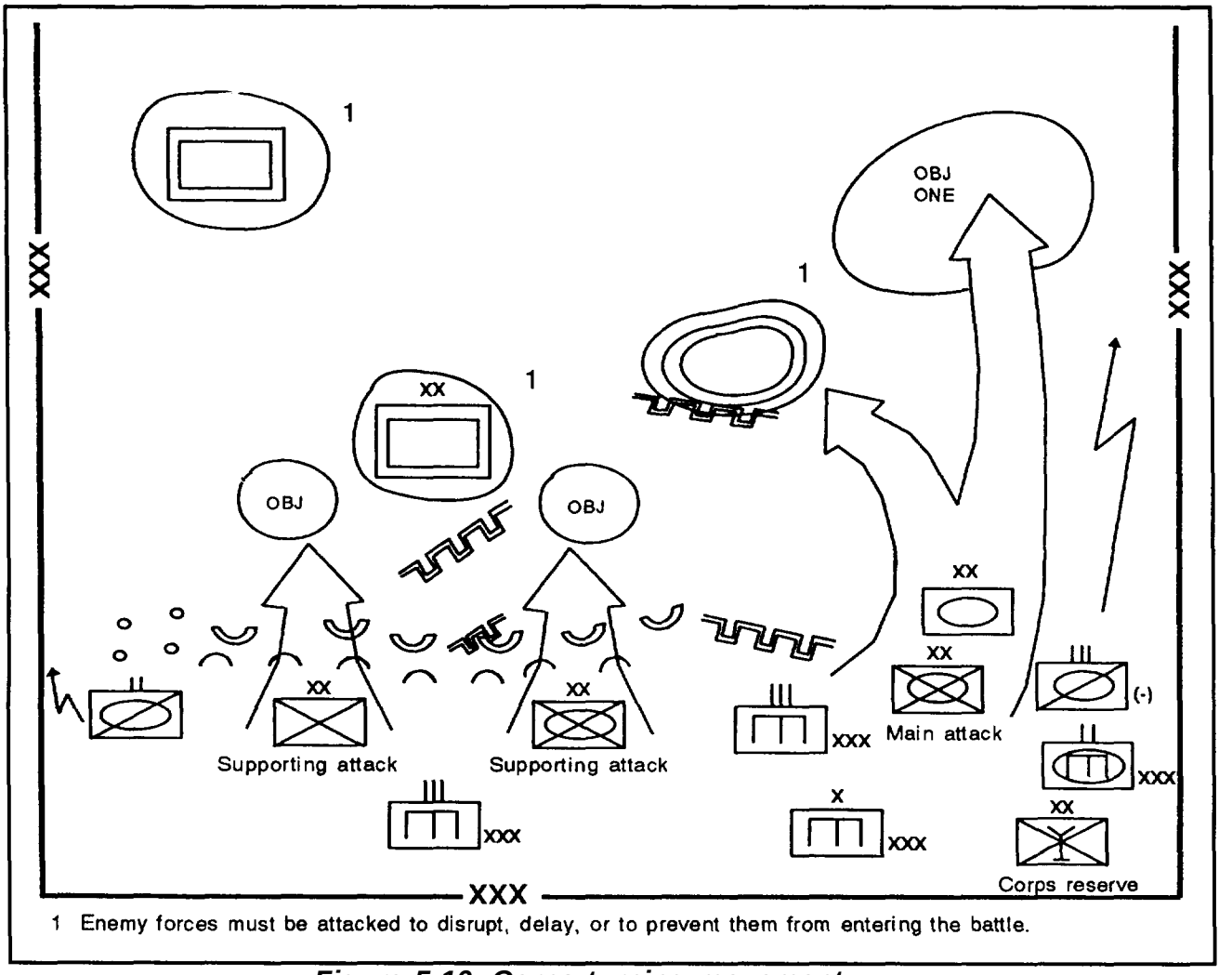


Figure 5-10. Corps turning movement

assailable flank is not available. The corps conducts a penetration with an infantry or armored attack supported by concentrated fires (Figure 5-11, page 5-18). An attacking division should be able to penetrate a defending enemy division into the main defensive belt. Corps supporting attacks and/or deep operations are employed to fix or draw off enemy reserves that can react to the zone of penetration. This includes regimental or larger-sized counterattack forces outside the assigned zone of the division conducting the penetration. After the main defensive belt is penetrated, the corps commits trailing divisions to either further penetrate or envelop subsequent defensive belts of the defending enemy army. The corps conducts penetration in three phases: rupturing the enemy's defensive positions, widening the gap, and securing objectives that destroy the continuity of the defense. The corps 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, or secure the lodgment from counterattack. The corps reserve is positioned to assist the main attack and exploit success. Multiple penetrations may be desirable if they force the enemy to disperse his fires and react to multiple threats before committing his reserves. The corps commander

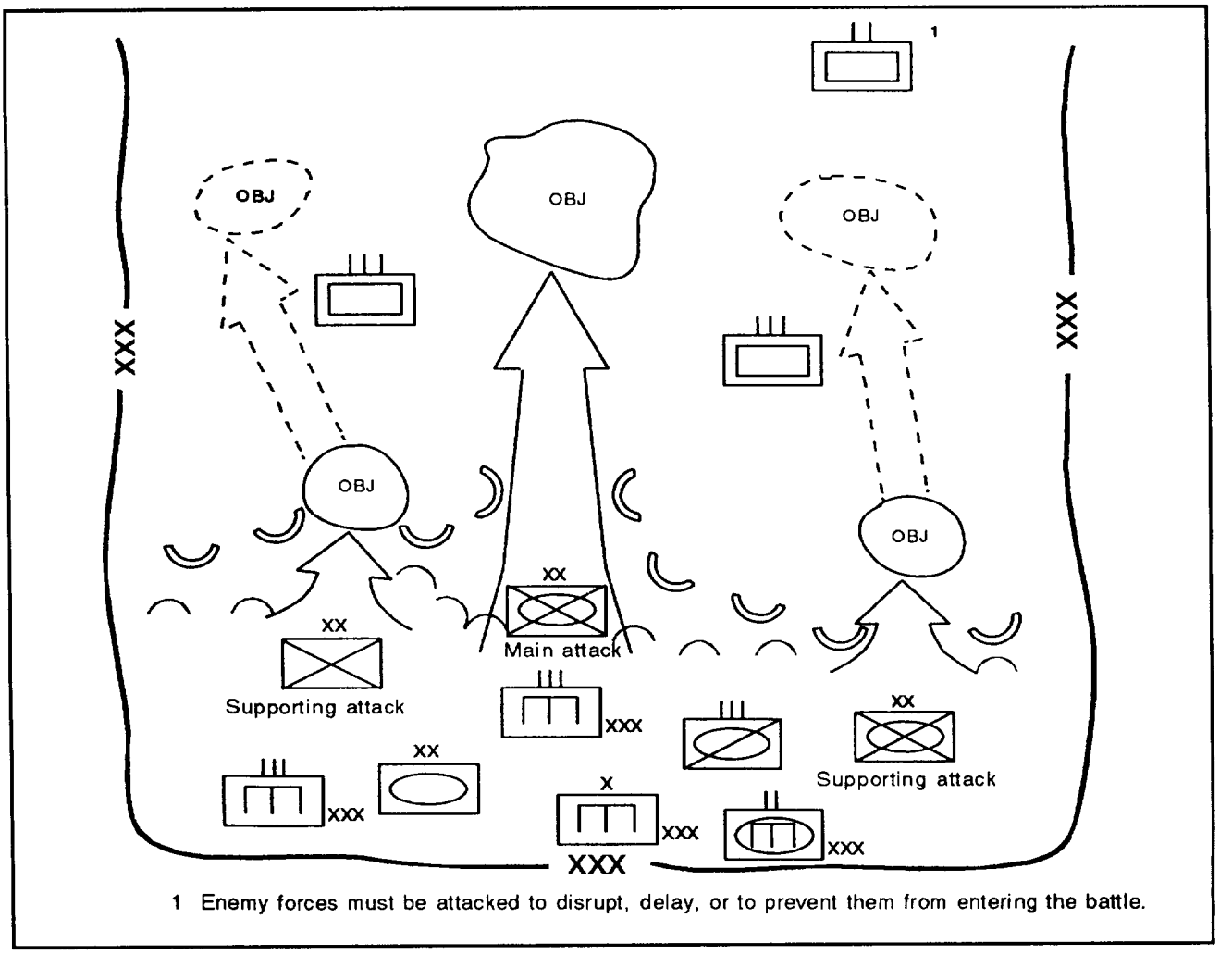


Figure 5-11. Corps conducting a penetration

weighs the advantage of penetrating on multiple axes versus the higher costs and casualties that may be inflicted.

The corps engineer supports a corps penetration by providing the lead division in the main effort with overwhelming mobility to decisively rupture the enemy's obstacle system. This remains the engineer's main effort until the penetration is achieved. The corps engineer masses obstacle-reduction assets into the main attack's division engineer brigade or battalion. Penetration requires the creation of more lanes along a more narrow front than normally associated with breaching operations. As penetration is achieved, the engineer main effort shifts to providing mobility to supporting attack and follow-and-support forces widening the gap. Depending on the enemy situation, countermobility may become the main effort to defeat counterattacks against the lodgment. The corps usually uses follow-and-support forces to secure the lodgment and defeat any counterattacks. The corps engineer anticipates the size of expected counterattack forces, analyzes likely avenues of approach, and allocates the countermobility assets needed to fix or disrupt counterattack forces. He may plan situational obstacle zones and directed corps targets that only become active on the corps commander's order. Once the lodgment is secured, the engineer priority shifts to assisting the corps in

exploiting its success by ensuring the mobility of its exploiting divisions. The corps engineer develops a scheme of engineer operations that allows for the rapid development of a lane network within the penetration. The lane network supports both the uninterrupted passage of the corps reserve to subsequent objectives and the logistics flow to forces in the penetration. The corps engineer constitutes an engineer follow-and-support force to expand, up grade, and maintain the lane network. The corps engineer also ensures the corps reserve has enough engineers to maintain its own mobility as it attacks deep into the enemy's rear area.

FRONTAL ATTACK

The corps uses a frontal attack to overrun, destroy or capture a weaker enemy force in position. The frontal attack strikes the enemy across a wide front, over the most direct appreaches, or against an enemy weakness or assailable flank. The frontal attack is used when the corps has overwhelming combat power and the enemy is at a clear disadvantage. A corps may employ a frontal attack as part of a supporting attack of a TA envelop ment. It is the least desirable form of maneuver because it inherently wastes lives and material unless there is some additional reason for it. Such reasons could be the lack of an assailable flank, critical time constraints, or the desire to deal a severe psychological blow to the enemy. In the frontal attack, the corps strikes along a wide front with two or more divisions abreast attacking in the zone (Figure 5-12, page 5-20). The frontal attack is an appropriate form of maneuver to be used by a fixing division conducting a supporting attack to an envelopment.

The corps engineer supports the frontal attack by providing adequate mobility support across a wide front along multiple axes. The mission's nature may prevent massing overwhelming mobility support from the corps perspective. However, the corps engineer ensures the task organization allows attacking divisions to mass engineers as required at their level. The corps engineer tries to balance mobility assets with each attacking division to allow the flexibility needed across the front. Follow-and-support corps engineers are decentralized and balanced across the front. They focus on widening lanes, breaching bypassed obstacles, and constructing and improving MSRs. The corps engineer also provides balanced countermobility and survivability assets for each division to establish a decentralized hasty defense on the objective. If the corps's plan is to establish a deliberate defense immediately upon consolidation, the corps engineer allocates needed corps engineer forces to the division at the outset of the frontal attack. He also plans for and coordinates with the corps G4 to pre-position and push necessary Class IV obstacle supplies and Class V mines and demolitions to the divisions.

CORPS OPERATIONS IN DEPTH

The corps engineer thoroughly understands the corps offensive framework to integrate effectively into offensive operations as both the engineer planner and the unit commander throughout the depth of the battlefield. Corps engineers supporting maneuver elements during offensive operations will normally be placed in a command relationship that provides responsive support to the division, separate brigade, or cavalry regiment. Corps engineers will normally weight the main effort but are prepared to shift the main effort rapidly to reinforce success. Maintaining the maneuver elements' mobility is the engineer effort's first priority in offensive operations. Corps engineer units can be task-organized to provide support for river-crossing operations, obstacle breaching, construction of combat trails, MSR maintenance, and other types of support. Corps engineers augment maneuver force engi-

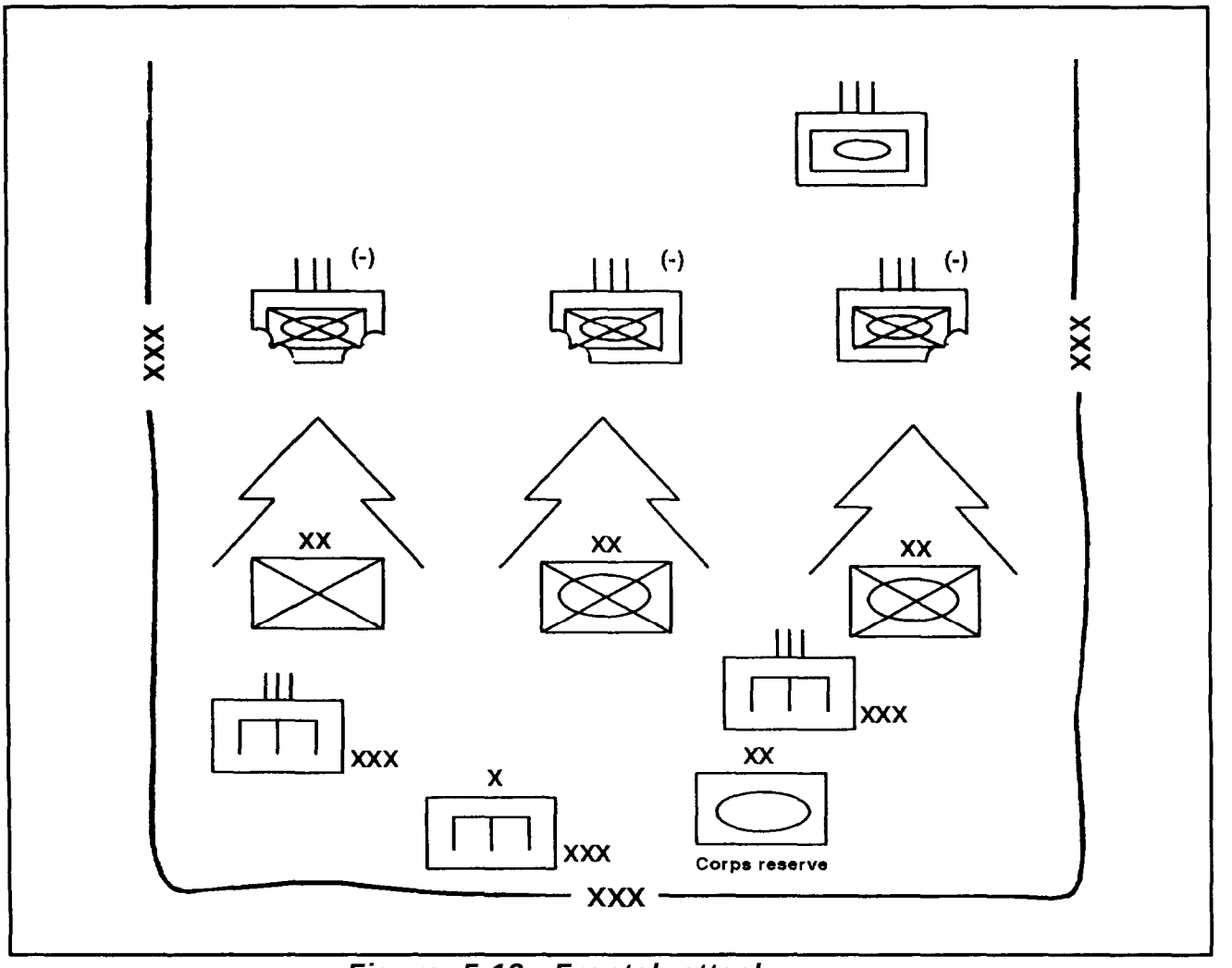


Figure 5-12. Frontal attack

neers to help develop and maintain multiple approach and attack routes. These routes allow forces to enter the fight quickly, building combat power at the point of concentration. During the offense, corps engineers folly support deep, close, rear, reconnaissance and security, and reserve operations simultaneously throughout the entire battlefield.

DEEP OPERATIONS

Corps engineer support to deep offensive operations is primarily accomplished in the areas of topographic engineering countermobility and ground maneuver mobility operations. Deep topographic support enhances the commander's ability to see the battlefield and develop courses of actions. Needed terrain analyses include the identification of MSRs, determining the current condition of MSRs and attack routes, the classification of bridges along the attack route, and the status of damaged or destroyed bridges. Various trafficability overlays and other terrain products are also developed. The corps engineer participates in deep countermobility targeting that synchronizes future mobility requirements and assists in the identification of HVTs such as dams, bridges, and other man-made facilities. Bridges in key mobility corridors may intentionally be left intact if their destruction might inhibit future offensive operations. The corps engineer also

recommends the employment of deep scatterable mines, such as the Gator and other air-delivered munitions, to disrupt the enemy's follow-on echelons and his logistical resupply. Light engineers with SOFs may be employed deep in the enemy's rear to protect key choke points or to interdict enemy movements and reinforcements. Corps engineer tasks in sup port of deep ground maneuver include augmenting ground forces with obstacle-breaching capability obtained from corps combat engineers equipped with breaching equipment, constructing combat trails and aerial resupply points, maintaining logistics supply routes, and providing countermobility and survivability support at deep objectives and to protect flanks.

CLOSE OPERATIONS

Close offensive operations are normally described in terms of the main attack supporting attacks, and follow-and-support forces. Close offensive operations must also consider implications of contingency and deception plans.

Main Attack

The corps engineer's main effort during close offensive operations is to provide dedicated engineer support to the main attack division with mobility assets. Corps engineers should remain focused on this effort until the mission and objectives are accomplished.

Supporting Attack

The corps engineer identifies the engineer requirements of the supporting attack by considering how the supporting attack assists the main effort. He then identifies the critical engineer tasks necessary to render that assistance. While the supporting attack is not normally the main effort of engineer support, certain essential engineer missions may receive priority resourcing. For example, the corps may task its supporting attack division to conduct a deliberate river crossing to fix an enemy counterattack force in position before it can be committed against the main attack. In this case, corps engineers committed to this supporting attack may be task-organized with the bulk of the corps's float-bridging assets, taking some flexibility away from the main effort. Corps engineers normally support division and separate brigade supporting attacks with mobility assets, countermobility (primarily through the use of scatterable mines) to the flanks, and survivability to units engaged in economy-of-force operations. Corps engineer units not committed to main or supporting attacks upgrade breach lanes and logistics supply routes and support deliberate river crossings for forward passage of exploiting divisions and separate brigades. They assist in rearward passage of covering-force units as well as support reserve forces, should they be committted.

Follow-and-Support Forces

The corps engineer understands the corps commander's intent for the use of follow-and-support forces during close offensive operations. He analyzes the engineer tasks inherent in the possible missions assigned to the follow-and-support force and task-organizes engineer support accordingly. Corps engineer forces may provide the bulk of engineer support to follow-and-support forces, especially to widen breaches or breach bypassed obstacles. However, the corps engineer avoids allocating corps engineer forces to follow-and-support missions at the undue expense of the corps main effort.

Contingency Plans

Corps engineers are sensitive to the corps's contingency plans, branches, and sequels. The corps engineer anticipates engineer requirements and plans for the improvement of routes between divisions to facilitate lateral shifts in combat power. In addition, the corps engineer develops plans for shifting critical engineer assets between divisions as the main effort or mission changes.

Deception Plans

The corps engineer participates in planning deception operations by identifying engineer requirements needed to support the overall deception plan. He also identifies the impact that committing engineer resources to the deception effort has on support to the corps main effort. For example, the corps may use a demonstration by a division to cause the enemy commander to position his reserve tank division away from the friendly main effort. This deception picture may not be complete without a show of engineer force, including corps augmentation to conduct breaches. The corps engineer determines the trade-offs necessary to accomplish this demonstration versus supporting the corps main attack.

REAR OPERATIONS

Corps engineers support offensive rear operations by constructing, maintaining, and improving fluid LOC necessary to sustain the force. The corps engineer, with help from the ACE and corps rear CP engineers, assists the corps deputy commander in developing and controlling engineer units committed to rear operations. The corps rear CP engineer, in coordination with the corps TAC and main CP engineers, anticipates mission requirements for Class IV obstacle supplies and Class V demolitions and mines to be pushed forward to attacking divisions. The ACE may develop clearly defined EWLs between corps, forward division, and theater engineers to support rear operations. EWLs are delineated to maximize engineer support and battle command. Because of this, they may or may not coincide with corps maneuver graphics, such as boundaries and phase lines. When all available corps engineer forces must be committed into the forward corps area, the ACE recommends movement of the corps rear boundary forward. If the boundary is not moved, an EWL should be designated to allow theater or host-nation engineers to work forward of the corps rear boundary. The ACE, the rear CP engineer, and the supporting rear engineer group designate, locate, establish and maintain follow-on bridging assets in corps bridge parks. As requirements are anticipated, bridge stocks are pushed to forward bridge parks. During offensive operations, the corps normally operates two airfields in the rear area until such time as joint or multinational services start to operate in or out of these airfields. Corps airfields and heliports are kept operational by corps engineers expediently repairing damage to facilities using landing mats and other surface and subgrade repair techniques. The ACE and the rear CP engineer, working with the corps G4, identify locations for the corps map depot. They also work with the G4 and corps chemical officer to provide construction support in order to develop operational decontamination and unit reconstitution sites that provide responsive support to corps units. In coordination with the corps RTOC, corps engineers assist in the development and survivability of logistics bases and base cluster defenses to protect sustainment units from threats in division and corps rear areas. This includes rear-area countermobility support in the areas of protective obstacles and on-order scatterable mining. Mobility support to designated TCFs is normally provided by corps engineers operating in the rear area.

RECONNAISSANCE AND SECURITY OPERATIONS

Corps engineers assist in reconnaissance in multiple roles. The corps engineer and ACE work closely with the corps staff to integrate engineer information requirements into the total corps intelligence-collection effort. The corps engineer assists the G2 cell in interpreting and analyzing this intelligence. He assists the corps commander and his staff in analyzing the impact engineer intelligence has on current and future corps operations. Because engineers are normally spread throughout the width and depth of the corps's AO, they make maximum use of engineer channels to forward engineer reconnaissance information and combat intelligence to higher headquarters and to

pass analyses to subordinates. Corps engineer battalions attached to cavalry regiments directly participate in corps reconnaissance operations. Other forward corps reconnaissance units are augmented with engineers to provide needed breaching assets and other mobility enhancements and to assist with obstacle reconnaissance. Corps engineer bridge companies with diving capability conduct extensive river reconnaissance when required. Engineer construction units continually assess the availability of local construction materials and equipment.

The corps engineer assists in corps security operations by identifying with the G2 likely mobility corridors and avenues of approach that threaten the corps's flanks and rear. He analyzes the threat and makes recommendations on the use of situational obstacles to assist guard and screening forces in their security missions. Security forces that are augmented with corps engineer forces emplace situational obstacles along the flanks. Topographic engineers actively collect engineer reconnaissance data for integration into the topographic data base and ensure that updated data bases and products are disseminated to corps units.

RESERVE OPERATIONS

The corps engineer understands all of the corps reserve forces' be-prepared missions and analyzes the engineer tasks involved. In the offense, engineers task-organized to support the reserves are essential. The premise that engineers are never held in reserve must not delay the commitment of the corps reserve by changes in engineer task organization necessary to accomplish its mission. Avoid the use of on-order support missions for engineers supporting corps reserve forces. Dedicated engineers are allocated to the reserve well in advance of their commitment due to travel, reorganization, and rehearsal time effecting task-organization changes. Corps engineer units supporting these reserves focus primarily on mobility operations. They can be used to guide maneuver units through breached obstacles. Task-orgainized corps reserve force engineers can also work rear-area type missions in the area of the reserve force as long as they can quickly react to commitment of the reserve force.

ENGINEER OFFENSIVE PLANNING

This section focuses on planning support for offensive missions. The engineer estimate provides the planning framework for the corps engineer to integrate into the corps command-estimate process. It provides a systematic procedure for developing the engineer task organization and scheme of engineer operations to support the corps in offensive operations. The corps engineer staff (the engineer brigade commander, the brigade staff, and the SES) conducts offensive engineer planning using the engineer-estimate process. Each staff element plans offensive engineer operations simultaneously sharing required information. The corps engineer blends this planning process into an engineer support plan that meets the corps commander's intent and concept of the operation. The basic engineer-estimate process is found in Appendix B.

MISSION ANALYSIS

The mission analysis phase occurs from the receipt of the mission through the identification of required engineer tasks. It includes analyses of terrain, enemy and friendly engineer capabilities.

Mission Receipt

The engineer-estimate and offensive planning processes begin with the corps engineer receiving his mission. This mission is extracted from

the TA, JTF, or other higher headquarters OPORD; the engineer annex; graphics; and the corps WARNORD. Based on the identified mission the corps engineer staff participates in the corps mission-analysis process by developing facts and assumptions. Working simultaneously with the G2 and G3, the corps engineer staff conducts an EBA This EBA consists of analyzing the terrain and assessing the enemy and friendly engineer capabilities.

Terrain Analysis

Terrain analysis is conducted by the corps engineer staff with the corps G2, corps terrain-analysis teams, and the corps topographic company using the observation and field of fire, cover and concealment, obstacles, key terrain, and avenues of approach (OCOKA) framework The terrain analysis is then used to develop the enemy situation template and corresponding scheme of maneuver. The corps topographic company will produce a detailed, large-scale (1:5,000 to 1:10,000) image map annotated with known obstacle locations, enemy positions, and key terrain features of the decisive terrain (obstacle belts and key objectives) for use in detailed planning. For the offense, the terrain analysis focuses on identifying where an enemy will defend, where the corps can move while conducting its offensive operation, and where the corps is vulnerable to flank attack and enemy counterattack.

Enemy Engineer Capability

The corps engineer staff works with the G2 in identifying the engineer capability of both the enemy maneuver and engineer forces. Based on the knowledge of how enemy engineers support defensive operations and the specific enemy engineer capability to support the defense, the staff plots enemy obstacle belts and the estimated survivability status on the enemy situation template. Based on the situation template, the staff develops specific engineer intelligence requirements and nominates NAIs to incorporate in the corps reconnaissance and surveillance (R&S) plan.

Friendly Engineer Capability

Working with the corps G3, the corps engineer staff analyzes friendly engineer capabilities based on the available engineer force to the corps, including organic division separate brigade, cavalry regiment, and theater engineers working in the corps area. The staff accounts for all available and mission-capable engineer assets that support the corps. Additionally the staff accounts for corps mobility assets, including specific breaching and bridging equipment, and checks scatterable-mine availability.

Engineer Tasks

The corps engineer staff continues the mission analysis by conducting a complete review of the higher command OPLAN or OPORD, including operational graphics. The staff focuses on identifying specified and implied tasks, additional engineer assets available in the task organization, the specified acceptable risk, and the time available to conduct the mission. Based on this analysis, the staff determines which engineer tasks are mission essential and provides this information to the G3 for inclusion in the restated mission.

COURSE-OF-ACTION DEVELOPMENT

Once mission-essential engineer tasks are identified, the corps engineer-staff analyzes the corps commander's intent and each developed COA for engineer implications. This includes weighting the engineer main effort, engineer C2 requirements, and engineer logistics requirements for each COA. The COAs are then war-gamed and recommended to the corps commander.

Corps Commander's Intent

The corps commander issues his guidance and intent following the development and approval of the restated mission. Based on his guidance and intent the corps engineer staff identifies the form of maneuver and the type of attack the corps will employ. The engineer staff confirms specified, implied, and essential engineer tasks

and prepares to support COA development by the corps staff.

Course-of-Action Analysis

Based on each corps's proposed COA, the corps engineer staff looks two levels down to the maneuver-brigade level and develops a scheme of engineer operations, focusing on essential engineer tasks. The staff uses the corps commander's intent, the terrain analysis, and the enemy situation template to identify the required mobility tasks and engineer assets needed to perform them. Next, the staff looks at countermobility tasks, including those required to provide flank and rear security during movement and those required to support hasty defenses on the objective. The staff identifies assets required to accomplish those missions and conducts the same analyses for general engineering and survivability missions.

Engineer Main Effort

Having identified the tasks and assets required for a COA, the corps engineer and his staff establish where the engineer main effort must be. The staff reviews the engineer and maneuver assets available, allocates engineer assets and recommends the allocation of maneuver assets, and identifies any shortfalls. If shortfalls exist, the staff confirms them by verifying available assets and requesting additional assets, including host-nation assets, from the higher headquarters command through the G3. If additional assets are not available, the corps engineer focuses on main effort tasks and reallocates assets to compensate for the shortfall. Any risk associated with the shortfall of engineer assets is identified and addressed during war gaming and COA comparison.

Engineer Command and Control

Following the allocation of engineer assets, the corps engineer staff focuses on engineer C2. The staff ensures assets assigned to each subordinate engineer headquarters do not exceed their span-of-control capability. If a shortfall exists, the staff analyzes all available C2 headquarters and upgrades the C2 structure. As a rule of thumb, an engineer C2 headquarters can effectively control five to seven subordinate units. Engineer communications capability is also identified, ensuring that corps engineer C2 headquarters can be adequately supported by the corps area signal network. If the engineer C2 capability cannot be upgraded, this shortfall is identified during war gaming and COA comparison. Other C2 considerations include identification of future task-organization changes, changes in effort, and essential tasks.

Engineer Logistics Support

The corps engineer staff analyzes logistics support requirements for each COA. Especially critical is the identification of shortfalls in engineer breaching and bridging equipment, Class V demolition supplies (such as MICLIC), fuel supplies, maintenance, and transportation capability. Critical engineer personnel shortages are also identified. If shortfalls exist, the staff verifies them and requests additional logistics capability from the higher headquarters command through the G3. If additional logistics capability is not available, the corps engineer focuses logistics support on main effort tasks and reallocates other logistics capability to compensate for the shortfall. Any risk associated with the shortfall of engineer logistics support is identified and addressed during war gaming and COA comparison.

ORDERS DEVELOPMENT

Once COAs have been war-gamed, compared, and recommended to the corps commander, he decides how the offensive mission will be conducted and gives his intent and concept of the operation. Based on this, the corps engineer staff refines the corps engineers' missions and develops a scheme of engineer operations that integrates engineers into the total corps scheme of maneuver. This scheme is included in the execution paragraph of the corps basic OPLAN or OPORD by the SES. To accomplish

these tasks, the SES finalizes the engineer task organization and command or support relationships, assigns engineer tasks to the corps's subordinate units (divisions, separate brigades, and the cavalry regiment) in subunit paragraphs and the coordinating instructions, provides engineer-specific input into the service and support paragraph and develops the engineer annex to the OPLAN or OPORD. The SES then briefs the corps engineer's plan to the corps' subordinate maneuver commanders ing the corps orders brief. Simultaneously the corps engineer brigade staff develops the engineer OPLAN or OPORD in coordination with the SES. It ensures complete dissemination to all engineer units working for the corps.

PREPARING FOR ATTACKS

During offensive operations, corps engineer commanders maximize time available for planning and issuing orders. Attack orders embody the commander's intent and concept of operation. During the offense, synchronization of engineer support to the combined arms team is especially critical. The corps engineer brigade staff produces an engineer DST and a synchronization matrix that fully supports corps offensive plans. Both are updated and modified as the attack progresses. The engineer DST and the synchronization matrix could highlight engineer support activities such as the following

- Integrated engineer participation in all combined arms planning, back briefs, and rehearsals prior to the attack.
- Corps topographic engineer units providing detailed terrain products of attack routes that assist corps planners in the IPB process. These products, especially the MCOO, can help identify obstacle and bypass locations.
- Forward staging of corps engineer battalions in forward attack positions with other field artillery (FA), ADA, and logistics units to allow the corps to strike quickly and deeply.
- Corps engineers operating in rear areas constructing mock-up complex obstacle systems and other terrain features that may be encountered, allowing integrated, combined arms, in-stride breaching rehearsals.
- Engineer participation with attack route reconnaissance forces ensuring that follow-on engineer forces are task-organized to meet the mobility requirements needed to keep the maneuver force moving.
- Pre-positioning bridge stocks and obstacle-breaching material forward to assist in forward movements.
- Constructing forward logistics bases prior to attacks, allowing uninterrupted logistics support during the attack.
- The loading and carrying of mines and other obstacle-emplacement material, ensuring protection against flank and objective counterattacks.
- Situational obstacle decision points concerning the emplacement of deep scatterable mines, such as the Gator, along with flank and rear corps-directed obstacles.

CONDUCTING ATTACKS

The corps engineer and his staff closely monitor the preparation and execution of the offensive mission refining the plan as necessary based on the situation. The staff reviews subordinate engineer unit OPLANs and OPORDs, along with the engineer annexes and engineer portions of maneuver unit OPLANs and OPORDS, for compliance with the corps commander's intent. The staff maintains continuous liaison with other command and staff organizations to ensure the synchronization of engineer actions within the scope of the corps offensive plan. Continuous communications between the corps staff, the corps SES, the corps engineer brigade, and subordinate engineer headquarters is vital to influencing engineer support to corps attacks. The goal is in avoid major engineer task-organization changes and shifts in engineer priorities during the attack through effective offensive planning.

CHAPTER 6
DEFENSIVE OPERATIONS

During the next twenty-four hours I Corps slowly withdrew closer to Seoul. At noon on April 28 (1951) it began occupying Line Lincoln (or Golden). After weeks of engineering work, the line was very strong. It was comprised of a series of deep, interconnected trenches and sandbagged bunkers bristling with machine guns, 57- and 75-mm recoilless rifles, and flamethrowers. It was protected on the north side by half a dozen lines of coiled barbed wire. Beyond and inside the barbed wire were dense fields of antipersonnel mines, booby traps, and "thousands" of gasoline drums (fougasses) filled with napalm and white phosphorus to be exploded by trip wire or remotely activated thermite grenades...

That night--April 28--the enemy made two attempts to crack Line Lincoln (or Golden). The first was mounted by the NKPA 8th Division against the ROK 1st Division sector Supported by Patton tanks of Hannum's B Company, 73d Tank Battalion, the ROKs yielded a hill, but then counterattacked, killing 1,241 NKPA troops. The second was a CCF attack at Gerry Kelleher's 35th Infantry sector After Kelleher's men had decisively repulsed the attack, he reported they had inflicted "an estimated 1,000 dead and wounded" casualties on the CCF.

From the book, The Forgotten War, America in Korea 1950-1953, by Clay Blair.

PURPOSE OF THE DEFENSE

The corps conducts defensive operations to defeat enemy attacks and regain the initiative. While military operations focus on maintaining the initiative through offensive action, the defense is an inherent part of any offensive action. The defense is only a temporary state; its purpose is to facilitate an offensive action. The corps may have to defend when it is not able to attack. The defense cannot be purely passive; the corps must seize or create opportunities to attack the enemy throughout its AO. The corps may need in gain time to build combat power or to hold key terrain to facilitate other operations. It may have to defend for the sole purpose of engaging and defeating enemy forces in order to erode their capabilities. During force-projection operations, the corps may have to defend the lodgment area until sufficient friendly forces have been deployed to assume the offense. Counterattacks and spoiling attacks are incorporated into the overall defensive plan. The plan should be flexible enough in terms of its concept and task organization to permit rapid changes. The corps fights a dynamic defense by continually attacking throughout the battle.

Corps engineers play a vital role in giving the corps a decisive edge while conducting the defense. Engineers understand the charac-

teristics of defensive operations and how they are applied. They also appreciate how engineer forces and missions integrate into the corps's defensive framework The engineer-estimate process remains as a base planning tool for integrating into corps defensive plans. While the process remains the same, each step is tailored to the needs for defensive planning.

CHARACTERISTICS OF DEFENSIVE OPERATIONS

The corps defense serves to defeat the attacking enemy and regain the initiative. It is an active, not passive, operation. It is characterized by flexibility and violence, attacking the enemy throughout the depth of his formations. Corps defensive operations include five distinct characteristics: preparation, security disruption mass and concentration of forces, and flexibility.

PREPARATION

Defensive operations have a distinct preparation phase that is vital to the corps's success. The defender arrives on the battlefield first and, as time allows, is afforded the opportunity to choose his ground in order to capitalize on the advantage of fighting from selected and prepared positions, and to set the conditions for the battle. The corps prepares for the defense by positioning forces, making use of and improving terrain, developing and war-gaming plans, organizing the force for movement and support rehearsing, and conducting surveillance and reconnaissance forward of the defended area. During the course of the battle, the corps looks for opportunities to wrest the initiative from the attacker. The corps commander prepares for this by identifying counterattack forces and rehearsing counterattack plans for eventual transition to the offense.

Corps engineer functions and forces area critical component in setting the conditions for combat and giving the corps an edge against an attacker. Corps engineers play a major role in defensive preparations, depending largely on their ability to conduct integrated planning with the corps staff and parallel planning with the corps engineer brigade staff. The corps engineer staff uses engineer channels to disseminate the information and intent needed to foster early defensive planning at all levels. Corps-level engineer planning provides a centralized focus for the defense while allowing decentralized execution. The corps engineer staff uses the scheme of engineer operations, obstacle-emplacement capability and control, survivability guidance, and counterattack mobility requirements to focus the corps's subordinate unit engineer efforts. The corps engineer considers the full range of engineer requirements for the total defensive framework deep, security close (MBA), rear, and reserve operations. Each element is considered during the engineer mission analysis and accounted for in the corps scheme of engineer operations. The corps engineer resources subordinates through task organization and the prioritization of Class IV obstacle materials and Class V mines and demolitions. This allows subordinates to anticipate limitations on their capabilities, to prioritize support, and to identify engineer asset shortfalls. Topographic engineers help prepare for defensive operations with detailed terrain-analysis products. Combat engineers perform engineer reconnaissance and intelligence collection support the siting and preparation of fortifications and obstacles that exploit the defender's advantages, and rehearse breaching drills with counterattack forces. Wheeled combat engineer battalions, combat heavy engineer battalions, and CSE companies provide general engineering support by constructing, upgrading, and maintaining MSRs and logistics bases throughout the corps's defensive AO.

SECURITY

Defending forces provide security to conserve combat power for use elsewhere. The purpose

of security in the defense is to coordinate and synchronize the defense, to provide early warning, and to begin disrupting the integrity of the enemy attack early and continuously. The corps provides defensive security through force-protection measures, deception, and physical means in the defensive area. The corps normally provides a security area with a designated covering force.

Corps engineers assist in the defense's security in several areas. Corps engineer battalions attached to covering-force units emplace situational obstacles in the face of the enemy and conduct timely terrain and enemy reconnaissances. Corps engineers operating in the MBA emplace tactical obstacles that fix turn, disrupt or block enemy formations. They also provide force protection during survivability operations for corps C2, artillery, air defense, and logistics facilities. Corps engineers support deception operations as required.

DISRUPTION

Corps defensive forces disrupt the enemy attack throughout the depth of his formations by—

- Destroying forces.
- Spoiling the timing or synchronization of his attack.
- Denying his freedom to maneuver.
- Misleading enemy reconnaissance.
- Breaking up formations.
- Interrupting fire support, logistics support, and C2.
- Seizing the initiative.

The corps defense includes a focused attempt to disrupt the enemy effort through deep, security, and deception operations. The attacker is never allowed to get set. He is hit with spoiling attacks before he can focus his combat power, and he is counterattacked before he can consolidate any gains.

Corps engineers aid in the disruption of the enemy attack throughout the depth of the battlefield. The corps engineer and his staff work closely with the corps staff to ensure that engineer functions are integrated into deep operations. For example, the corps engineer staff nominates deep targets that directly attack the enemy's engineer capability to conduct mobility operations such as bridging and breaching assets. Based on terrain analysis and engineer intelligence, the staff also nominates deep targets for destruction or denial and designs obstacle systems that fix or disrupt enemy formations. The staff ensures that engineer aspects of deep and MBA operations are mutually supportive. Corps engineers provide the security force with the countermobility means needed to disrupt the enemy's attack early and the mobility means needed to fight a fluid battle. Obstacles are used in disruptive deception efforts in the MBA. This causes the enemy to commit combat power prematurely or against a strength perceived as a weakness. Corps engineer forces provide the mobility required of corps counterattacking forces that will complete the defeat of the enemy force and regain the initiative. Corps engineer units also provide survivability support to defending forces. This support allows the massing of effects of lethal firepower to disrupt an attack.

MASS AND CONCENTRATION

The corps commander will concentrate his forces swiftly and mass the effects of overwhelming combat power where he chooses. He shifts that mass repeatedly with his point of main effort during the period of the enemy attack. The corps concentrates forces to exploit or create an enemy weakness. The corps commander may be willing to economize and accept risk in some areas to create the effects required. Economy-of-force operations or de-

ception maybe major factors in the corps's defensive plan. The corps retains and, when necessary, reconstitutes a reserve.

Corps engineers support the massing of forces and the concentration of effects through mobility. This allows rapid movement of forces and survivability to maximize protection of both fighting and support systems. Engineers support corps deception operations through a variety of tactical engineering missions or by providing forces. Corps engineers contribute significantly to economy-of-force operations by emplacing dense obstacle zones, enhancing survivability of massed firepower and C2, and constructing strong points. Engineers also provide mobility for the rapid movement of corps counterattack forces and reserves to allow the corps to take offensive action and exploit a broken enemy attack.

FLEXIBILITY

Corps defensive plans are flexible to allow agile execution. Corps defensive operations counter the enemy's blows, seize the initiative from the enemy force, and set the conditions for regaining the initiative. Agility requires the corps staff to read the battle, plan branches and sequels, organize the battlefield in depth, retain reserves, plan counterattacks, and have the ability to shift the main effort.

Corps engineers support the corps's flexibility and agility with all available units. Corps topographic engineers contribute to the corps commander's ability to see and read the battle by providing timely terrain analysis and special topographic products. Corps combat engineers provide tactical mobility to counterattack and reserve forces. Corps construction engineer forces provide general engineering that allows the corps commander to react quickly by building and maintaining routes that allow rapid shifts of combat and support forces. They also establish forward logistics bases. Engineer success is directly dependent on the ability of all engineer staffs within the corps to anticipate requirements and take actions to provide timely engineer support to the corps.

DEFENSIVE PATTERNS

Corps defensive operations generally take one of two patterns: a mobile defense or an area defense. The fundamental difference between these patterns is their focus-and-defeat mechanism. The scheme of engineer operations to support corps defensive operations is tailored to the type of defense and its focus-and-defeat mechanism. Mobile defenses focus on the destruction of the attacking force by permitting the enemy to advance into a position that exposes him to counterattack by a mobile reserve force. Area defenses focus on the retention of terrain by absorbing the enemy in an interlocking series of positions and destroying him largely by fires. Both forms of the defense employ static and dynamic elements. Defending corps commanders combine both patterns, using static elements to delay, canalize, and ultimately halt the attacker and using dynamic elements (spoiling attacks and counterattacks) to strike and destroy enemy forces. The balance among these elements depends on METT-T but generally involves a combination of both. Regardless of the pattern selected, success depends on the employment of both static and dynamic elements to defeat an attacking enemy.

MOBILE DEFENSE

The focus of the corps's mobile defense is the destruction of the enemy attacker. The mobile defense is organized to permit the enemy to advance into a position that exposes him to counterattack and envelopment by a mobile striking force. Therefore, the mobile defense trades space for time to achieve a decisive advantage against the enemy. The defeat mechanism is a large, mobile striking force that has combat power and mobility greater than the targeted enemy force. Corps defenders place

minimum forces forward, forming powerful forces with which to strike the enemy at his most vulnerable time and place.

Corps engineer forces support the mobile defense with mobility assets, decentralized engineer command relationships, and dedicated engineer forces committed to the maneuver mobile striking force. The mobility of the defending force is key to the success of a mobile defense. Engineers provide rapid breaching and mobility assistance through all encountered obstacles. A decentralized engineer force distributed among maneuver elements in command relationships allows maneuver commanders the flexibility necessary to execute a mobile defense. The maneuver force reserve normally has a dedicated engineer force assigned to it in a command relationship to ensure synchronized and responsive support. While engineer forces are not held in reserve, engineer support to the mobile striking force is a critical mission. The successful mobile defense depends on the synchronized integration of maneuver, fires, and obstacles to seize the initiative from the attacker within the defended area. Figure 6-1 shows an example of the framework of a corps mobile defense.

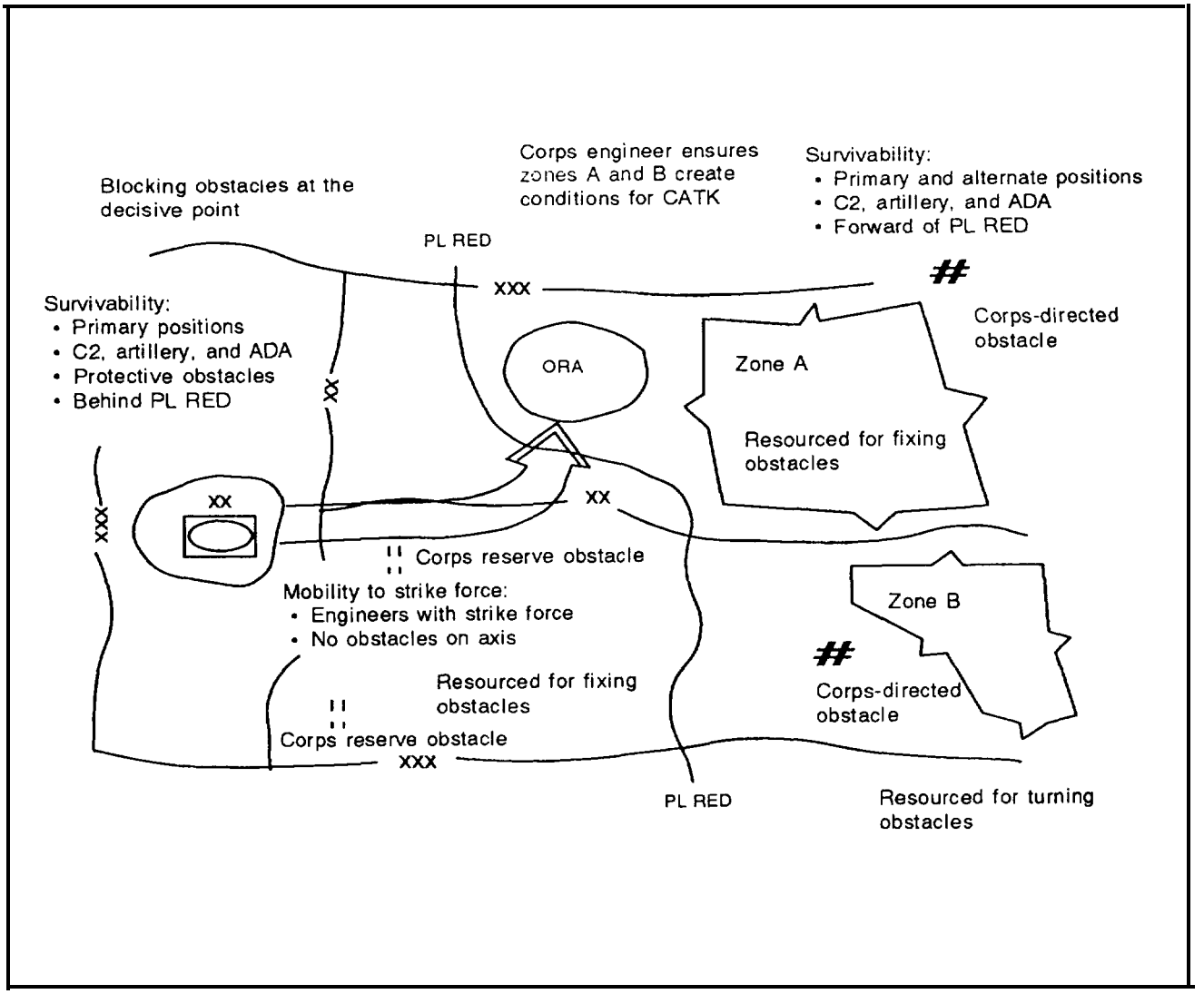


Figure 6-1. Mobile-defense framework

Countermobility support to the mobile defense concentrates on using obstacles to attack the enemy's ability to maneuver and preserves the mobility of the friendly force. Obstacle planning during the mobile defense is closely linked to the enemy's most probable maneuver course of action rather than terrain. Corps terrain analysis and topographic products assist the obstacle planning effort by identifying likely obstacle-emplacement areas used for attacking the enemy's maneuver in a way that supports his destruction by friendly counterattack. Corps obstacle planning during the mobile defense is usually more restrictive than permissive and reduces the flexibility of the divisions. Directed corps obstacle zones, reserve demolition obstacles, and ORAs will be the norm. This serves to mass division obstacle effort at critical areas and to preserve the mobility of the corps counterattack force into the MBA. Survivability effort trades space for time to create an enemy weakness to exploit by counterattack. To create the conditions for a counterattack, the divisions fight the depth of their sectors. Corps engineers provide survivability support to the divisions primarily by constructing alternate and supplementary fighting positions in depth. The nature of the mobile defense fight reduces the need for protective obstacles throughout the defense. Protective obstacle effort is concentrated in the final subsequent positions where the penetration must be blunted to allow counterattack to support the mobility of the mobile striking force. The staff first delineates obstacle control measures to ensure division obstacle efforts do not limit the mobile striking force's freedom to maneuver. Then, they ensure that the mobile striking force has the necessary dedicated engineer support to maintain its mobility during the counterattack. It must be able to reduce enemy or friendly obstacles found in its path. The counterattack cannot be stalled by lack of mobility. The corps engineer staff weighs the trade-offs between dedicating corps engineer forces to the mobile striking force or the obstacle emplacement and survivability requirements in the MBA. General engineering support to corps logistics agencies focuses on construtting and maintaining numerous MSRs and logistics bases that shift continuously during the mobile defensive fight.

AREA DEFENSE

The corps commander conducts an area defense to deny the enemy access to terrain or facilities for a specified time. The corps may conduct an area defense as part of a larger theater mobile defense. The bulk of defending forces deploys to retain ground, using a defeat mechanism that is a combination of defensive positions with interlocking fires and a small mobile reserve to defeat local penetrations. The area defense is organized to absorb the enemy into an interlocked series of positions from which he can be destroyed. A security area or covering force is also part of an area defense, METT-T drives the tasks to be done and determines priority. The maximum use of obstacles, flame weapons, engagement areas, and control and distribution of frees is key to successful area defense. The area defense does not promise outright destruction of the attacker; and it may require other simultaneous or subsequent operations to achieve a decisive defeat of the enemy. Figure 6-2 shows an example of the framework of a corps area defense.

Corps engineer forces support the area defense based on detailed corps plans and synchronization of all operational and tactical warfare components. Timely corps topographic and terrain-analysis products assist in the identification of key and decisive terrain. They also play a major role in organizing an area defense and become the focus of obstacle emplacement and survivability effort. Preparation of the area defense is important and engineer effort is extensive, particularly in that area designated as the corps's main effort. Retaining centralized control of corps engineer units and their resources is the most efficient method of preparing the area defense, so engineers are generally employed under their own commanders in a support relationship to maneuver com-

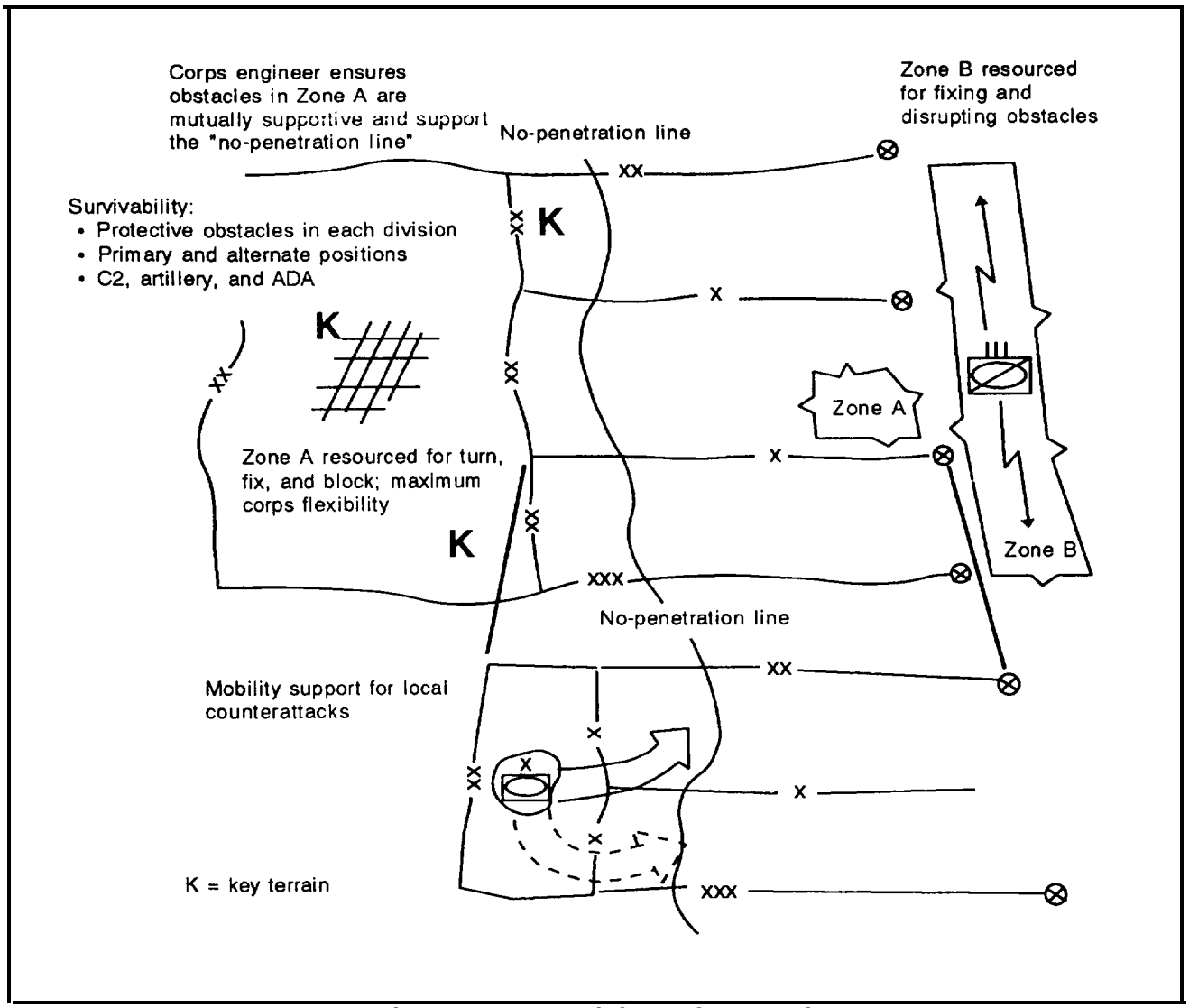


Figure 6-2. Area defense framework

manders. Corps obstacle planning uses minimum obstacle control measures to give maximum flexibility to the divisions while still focusing tactical obstacle effort around the retention of terrain. Engineer units in support of corps security forces assist in the disruption of attacking formations by emplacing planned and situational obstacles in the covering-force area. Other corps engineer forces help shape the battlefield to maximize the effects of friendly fires and enhance the survivability of friendly forces throughout the depth of the corps area. Survivability effort enables divisions to concentrate firepower from freed positions. The corps engineer staff is sensitive to the division's increased fortification needs in a corps area defense. The increased requirement for survivability also entails heavier employment of protective obstacles to break the attacker's assault. This increased need for division primary alternate, and supplementary fighting positions and protective obstacles requires more corps engineers to support the divisions. Once the battle is joined, a minimal number of corps engineers remain with committed forces in a command relationship. This allows for rapid repair of obstacles and fighting positions and provides mobility support for lo-

cal counterattacks. The bulk of the corps engineer force withdraws to continue to work on defenses in depth. General engineering support to corps logistics agencies focuses on constructing, maintaining, and protecting critical MSRs and logistics bases that are normally limited in number due to terrain constraints during the area defensive fight.

OPERATIONS IN DEPTH

In the defense, the corps seeks to maximize its firepower, mobility and shock effect to defeat the enemy's attack and transition early to the offense. Regardless of whether the mission calls for a mobile or area defense, the corps uses the following six elements of the defensive framework to plan the synchronization of its simultaneous deep, close, and rear operations as one battle:

- Deep operations in the area well beyond the forward line of own troops (FLOT).
- Security-force operations forward and to the flanks of the defending forces.
- Defensive operations in an MBA.
- Reserve operations in support of the main defensive effort.
- Rear operations to retain freedom of action in the rear area.
- Deception operations to reinforce the enemy's perception of his success and to delude him as to the true location and intended use of the corps's reserve forces.

DEEP OPERATIONS

Corps engineer operations in support of the deep defensive fight emphasize topographic support and countermobility. The corps topographic company supports the corps IPB process with terrain analyses and special products. This support is used to plan deep fires and deep obstacles in and beyond the corps covering-force area. The corps engineer and his staff at the corps main CP provide nominations for deep targeting (including corps-directed obstacle zones using air- and artillery-delivered scatterable mines and bridge destruction) along major enemy avenues of approach. Emplaced deep obstacles are covered by aircraft or artillery fire for full effectiveness. The corps engineer staff, along with the G3, G2, and other corps staff officers, identifies obstacle zone intent (normally fix or disrupt), obstacle locations, covering-fire support and timing in relation to execution criteria and decision points.

SECURITY OPERATIONS

The corps engineer anticipates the very decentralized execution of the screen cover, or guard mission by allowing maximum flexibility to employ tactical obstacles by the cavalry regiment through the use of corps-directed obstacle zones across the corps front or along a flank (see Figure 6-3 and Figure 6-4, page 6-10). The obstacle zone rear limit is normally a battle handover line (BHL). The security-force engineer has obstacle responsibility forward of the BHL. The MBA engineer has obstacle employment responsibility up the BHL. The MBA engineer is precluded from employing obstacles forward of the BHL. The corps engineer ensures effective coordination between the security force and MBA engineers which supports battle handoff and passage of the security force. The corps engineer considers scatterable mines to assist the cavalry regiment's disengagement. The regiment can be reinforced with modular pack mine systems (MOPMS), the air or ground Volcano, and artillery-delivered mines through coordination with the corps fire-support coordination officer (FSCOORD). Mobility and hasty survivability are critical to the cavalry regiment. Assault bridging augmentation may be required from the corps. Marking lanes

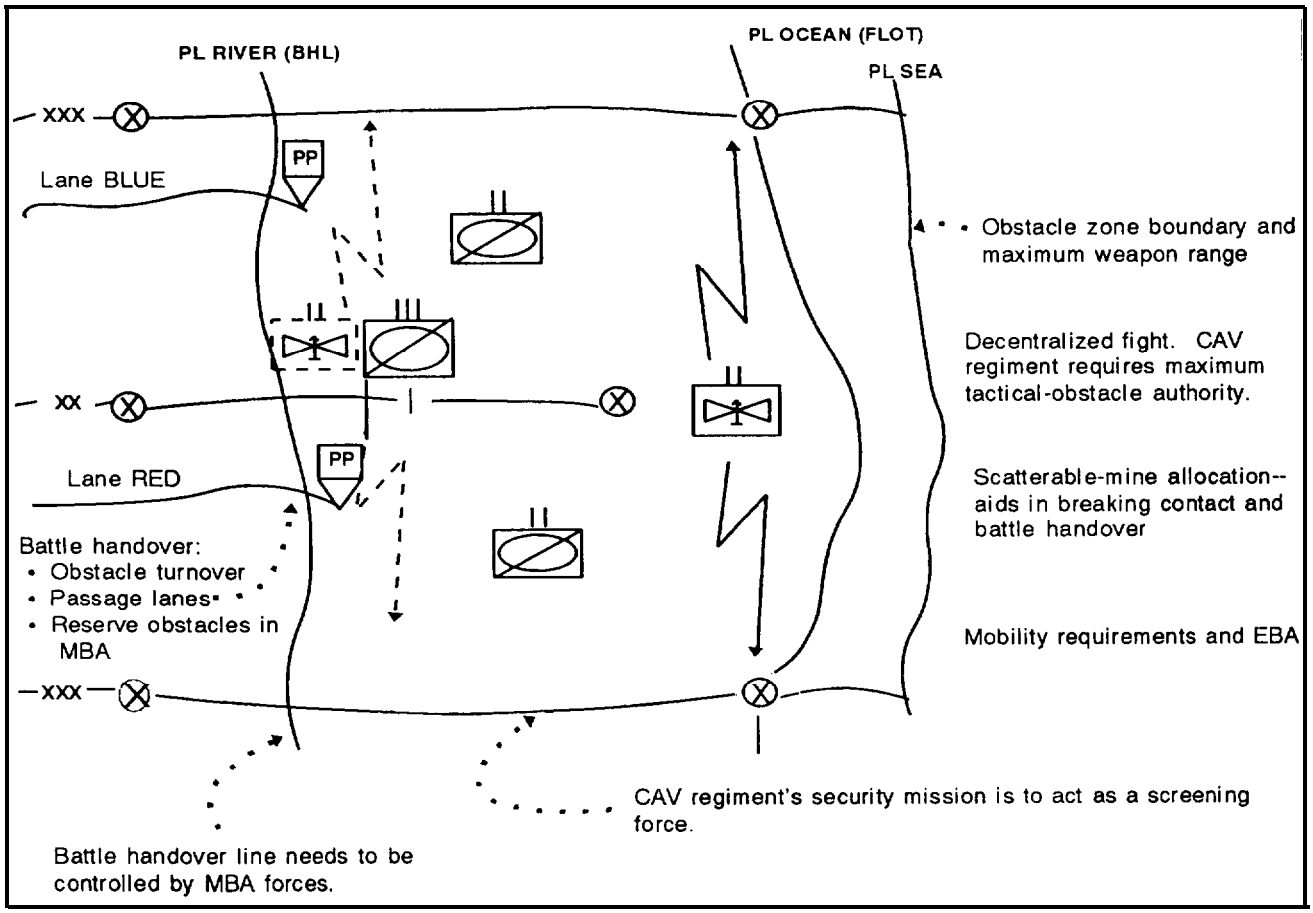


Figure 6-3. Security operations maneuver laydown

through obstacles and identifying fords and combat trails for egress routes are other needed mobility tasks. The cavalry regiment also requires numerous hull-defilade positions in depth in the covering-force area. Normally, corps engineers providing support to security forces will be placed in a command relationship to maximize responsiveness, such as attaching corps engineers to the cavalry regiment.

MAIN-BATTLE-AREA OPERATIONS

Corps engineer support to the MBA is extensive and involves the engineer functions of topographic engineering, countermobility, mobility and survivability support throughout the defensive structure (see Figures 6-5 and 6-6, pages 6-11 and 6-12). Division engineer units normally require significant augmentation from corps engineer forces during the defense, due to limited organic digging and obstacle-emplacement capability. Corps engineer units working in the MBA will normally be in a support relationship in order to maximize flexibility to the corps. In the end, however, METT-T will determine the engineer organization for combat.

Corps topographic engineering provides needed terrain products to support the IPB process and to identify engagement areas. Specific terrain-analysis products assist in the designation of corps-directed obstacle zones, reserve demolition targets, and ORAs. Accurate topographic surveying ensures that the corps fire-support systems are operating on a common grid during the defense.

Countermobility support is usually the primary focus of engineer support to the MBA. The

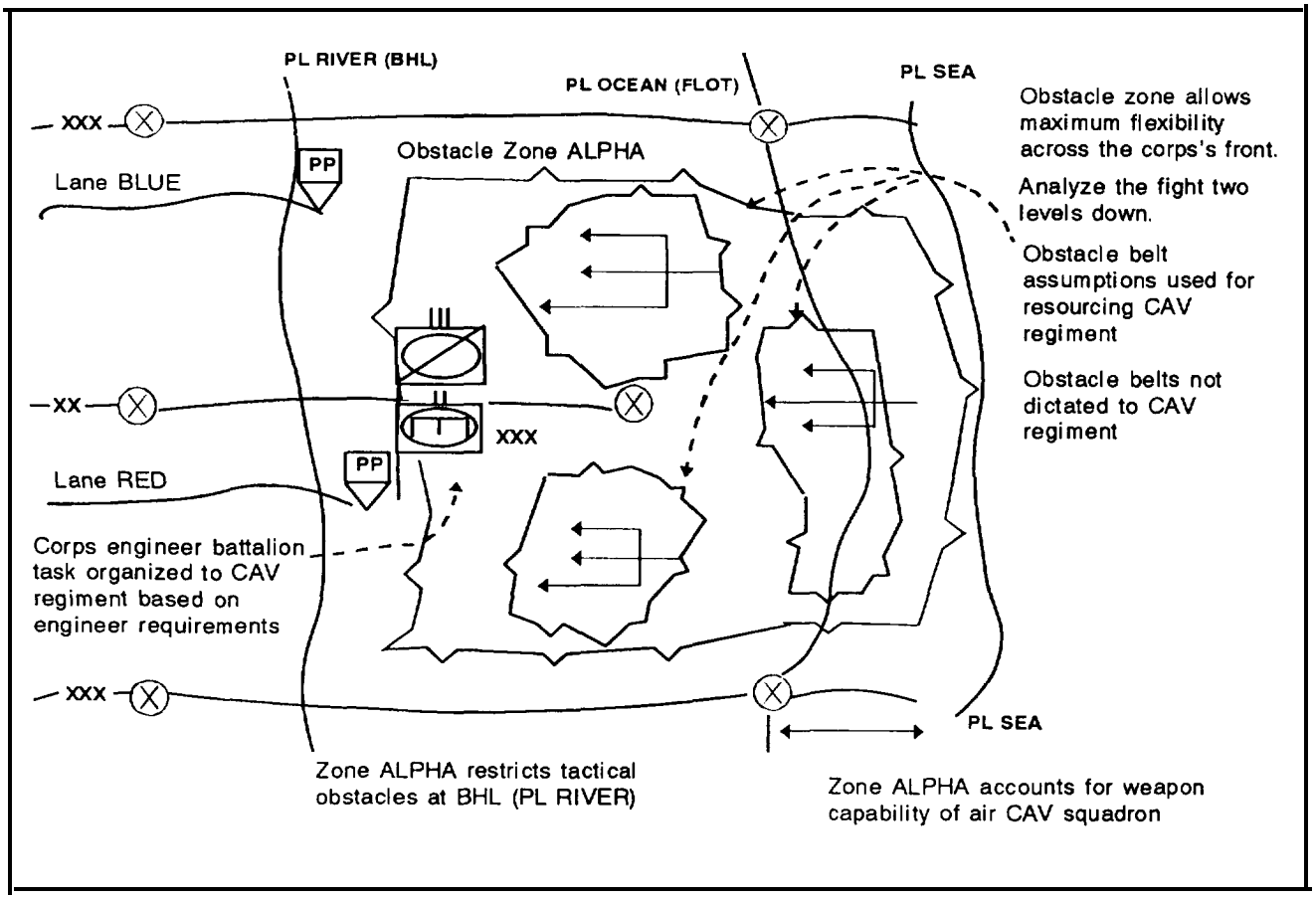


Figure 6-4. Security operations engineer laydown

primary intent of countermobility operations is to attack the enemy's ability to execute his plan by disrupting his combat formations, interfering with his C2, and creating confusion among his commanders that can be exploited by friendly forces. Corps engineer forces contribute to division countermobility by assisting the employment of tactical obstacles that are employed to reduce the enemy's ability to maneuver, mass, and reinforce and to increase his vulnerability to fires. Obstacle intent should be given for corps-directed obstacle zones. Reserve corps demolition obstacles should also be given an obstacle intent They are designed to produce one of four primary obstacle functions:

Ž Disrupt. These obstacles disrupt march formations, break up operational timing, exhaust breaching assets, and cause separation between forward combat elements and their support units. Obstacles are also used to disrupt assault formations, attacking the low-level C2 while the attacker is under direct fire.

- Turn. Turning obstacles move and manipulate the enemy to the force's advantage by enticing or forcing him to move in a desired direction by splitting his formation, by canalizing him, or by exposing his flank.

Ž Fix. Fixing obstacles are used to slow and hold the enemy in a specific area so that he can be destroyed with fires or to generate the time necessary for the force to break contact and disengage.

- Block Obstacles never serve to block an enemy force by themselves. Blocking

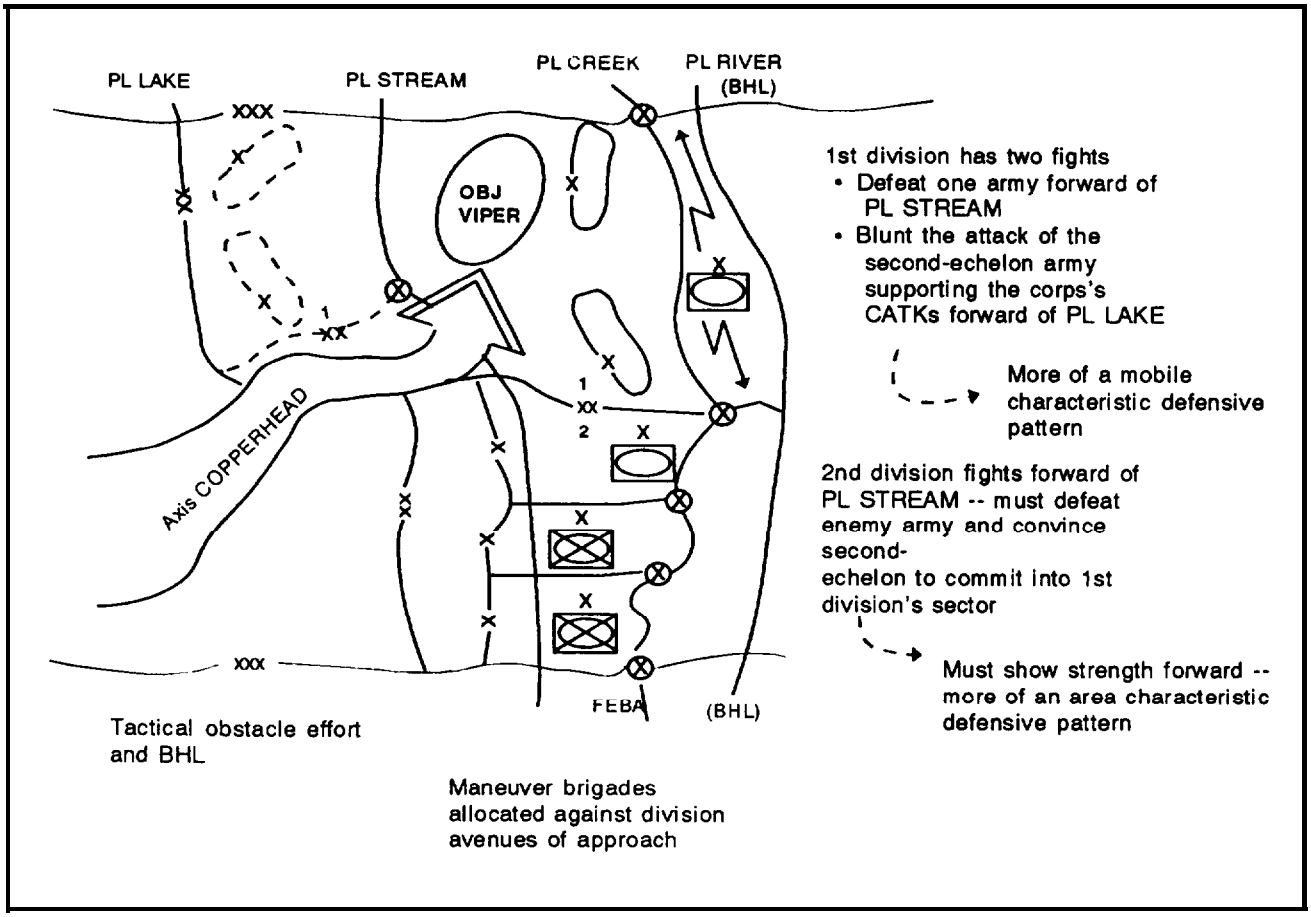


Figure 6-5. Main battle area maneuver laydown

obstacles are complex, employed in depth, and integrated with fires and flame weapons to prevent the enemy from proceeding along a certain avenue of approach (or to proceed only at unacceptable costs). Blocking obstacles serve as a limit beyond which the enemy will not be allowed to go.

FM 90-7 describes obstacle emplacement and control in greater detail. Obstacle planning develops a coordinated, synchronized obstacle system that supports the corps commander's mission and intent. The corps commander places the fewest possible restrictions on subordinate unit freedom to employ tactical obstacles. However, he may elect to direct tactical obstacle emplacement which is critical to the corps's defensive plan, including reserve demolition obstacles that may require an engineer demolition party to ensure destruction. Divisions usually designate obstacle zones and obtain approval from the corps. The corps may designate specific obstacle zones when necessary to develop the defense in a particular location such as to structure a salient or to allow a mobility corridor for corps-controlled counterattacks. In support of the latter, the corps most often directs ORAs to facilitate future corps-level maneuver. ORAs impose whatever restrictions the commander believes necessary. These restrictions are usually limits on the types of obstacles or the duration or approval authority for scatterable mines employed by subordinate units. While the corps commander limits the number of restrictions placed on subordinate units, he closely monitors the planning and emplacement of division

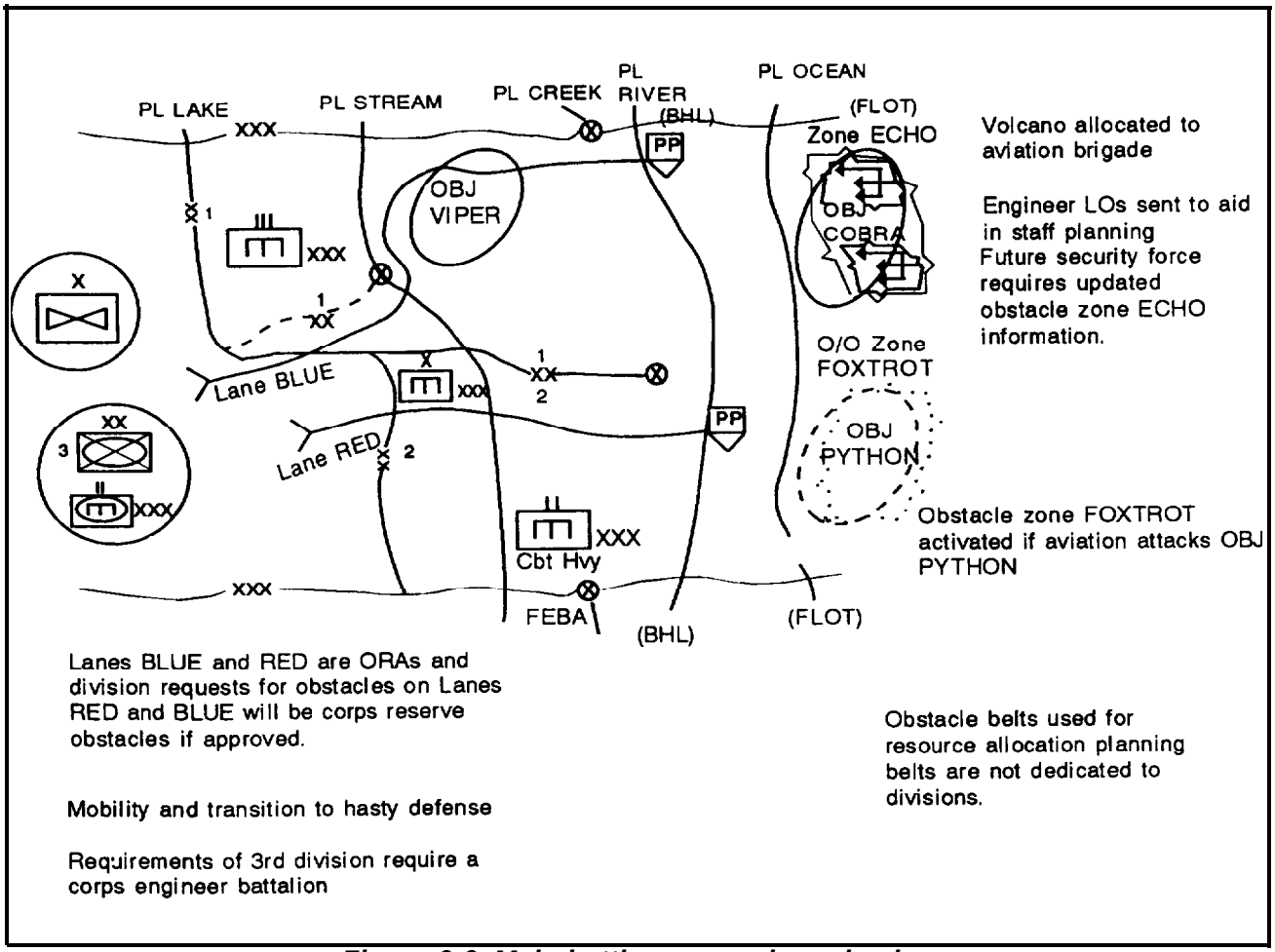


Figure 6-6. Main battle area engineer laydown

obstacle zones and brigade obstacle belts (two levels down).

Mobility requirements are preplanned in the defense. Corps engineers anticipate the corps commander's mobility requirements, with particular emphasis on counterattack routes and axes. Synchronization of these routes is particularly difficult when the counterattack is force oriented and the actual route and objective is not precisely known in advance. Mobility operations in support of the corps defense are conducted to shift the main defensive effort, to conduct withdrawals, or to conduct a relief in place. Corps reserve forces normally require augmentation with corps engineer forces and mobility assets, usually in a command relationship.

Survivability of corps forces is critical to the success of close operations in the MBA METT-T will determine the level of survivability required with all operational and tactical warfare components. The corps engineer and his staff are particularly concerned with protecting corps artillery, air defense, and critical C2 and logistics facilities in the MBA This may include the preparation of multiple positions in depth.

RESERVE OPERATIONS

Corps engineer support to the corps reserve force is identified early during the defensive planning process (see Figure 6-7). The reserve force normally receives additional engineer assets to primarily assist in its mobility to get to

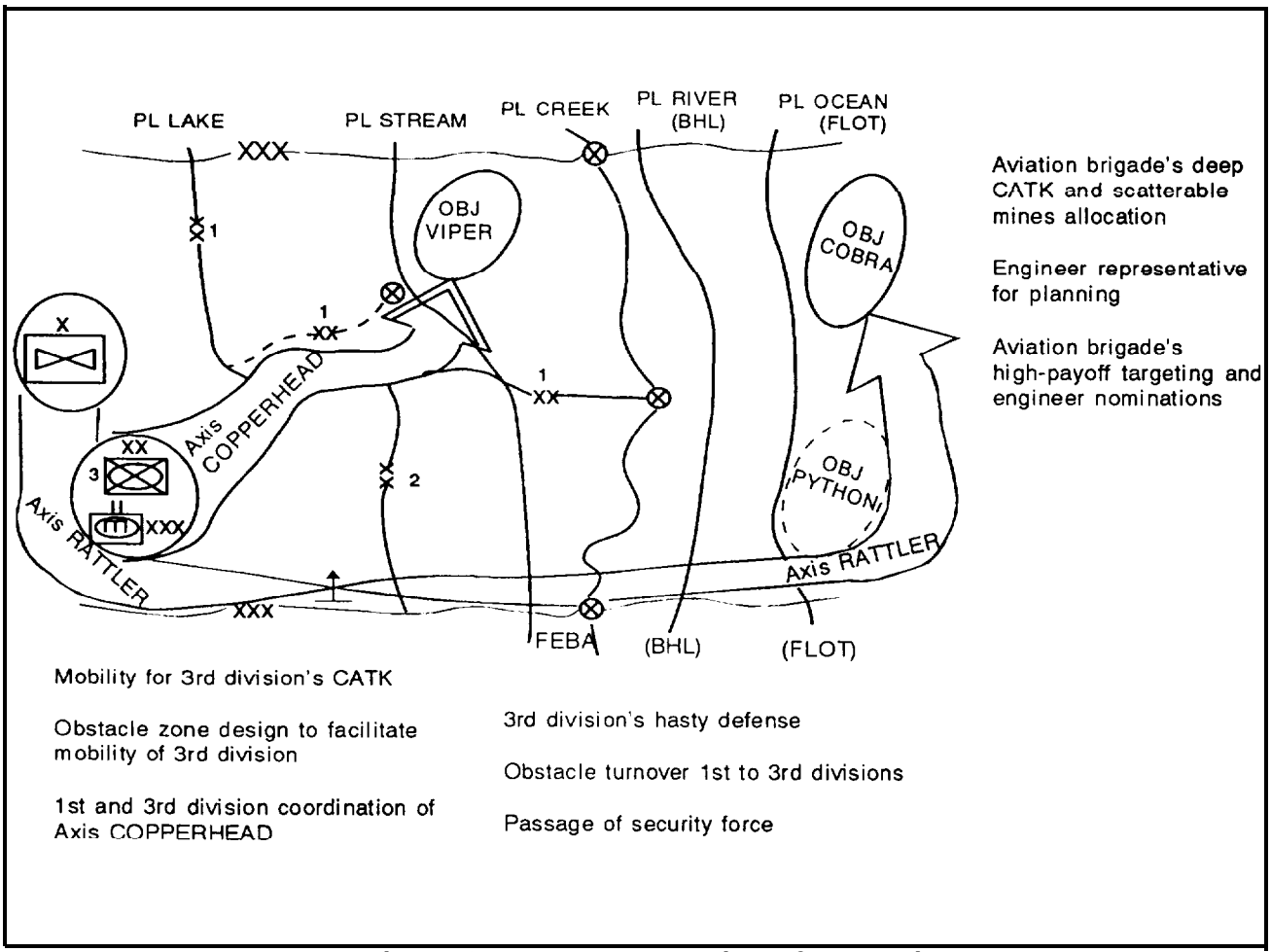


Figure 6-7. Reserve-operations framework

the point of commitment. These corps engineer units are normally placed in a command relationship to the reserve force to allow immediate responsiveness when committed. These engineer forces are not considered in reserve but are fully engaged in synchronizing their support to the reserve force through timely stall' integration and combined arms rehearsals. The corps engineer force remains with the reserve force when it becomes the corps main effort, avoiding confusing task-organization changes during the heat of battle.

REAR OPERATIONS

Corps engineer support to rear operations focuses on survivability and general engineering for units in the corps rear area and on maintaining mobility along corps LOC (see Figures 6-8 and 6-9, pages 6-14 and 6-15). Mobility and survivability support to corps rear-area base clusters is normally limited to C2 nodes, key logistics facilities, EW nodes, ADA sites, and corps aviation units and facilities. Engineer support to survivability includes the digging in of high-value systems and supplies, the construction of field fortifications, assistance in camouflage, the digging of sumps for thorough decontamination operations, and assistance to deception operations. The keys to successful employment of general engineering in the corps rear area are prioritization for engineer effort by the corps commander (in conjunction with his G3/G4), anticipation of requirements through all phases of the battle, and task organization of engineer forces in the corps rear

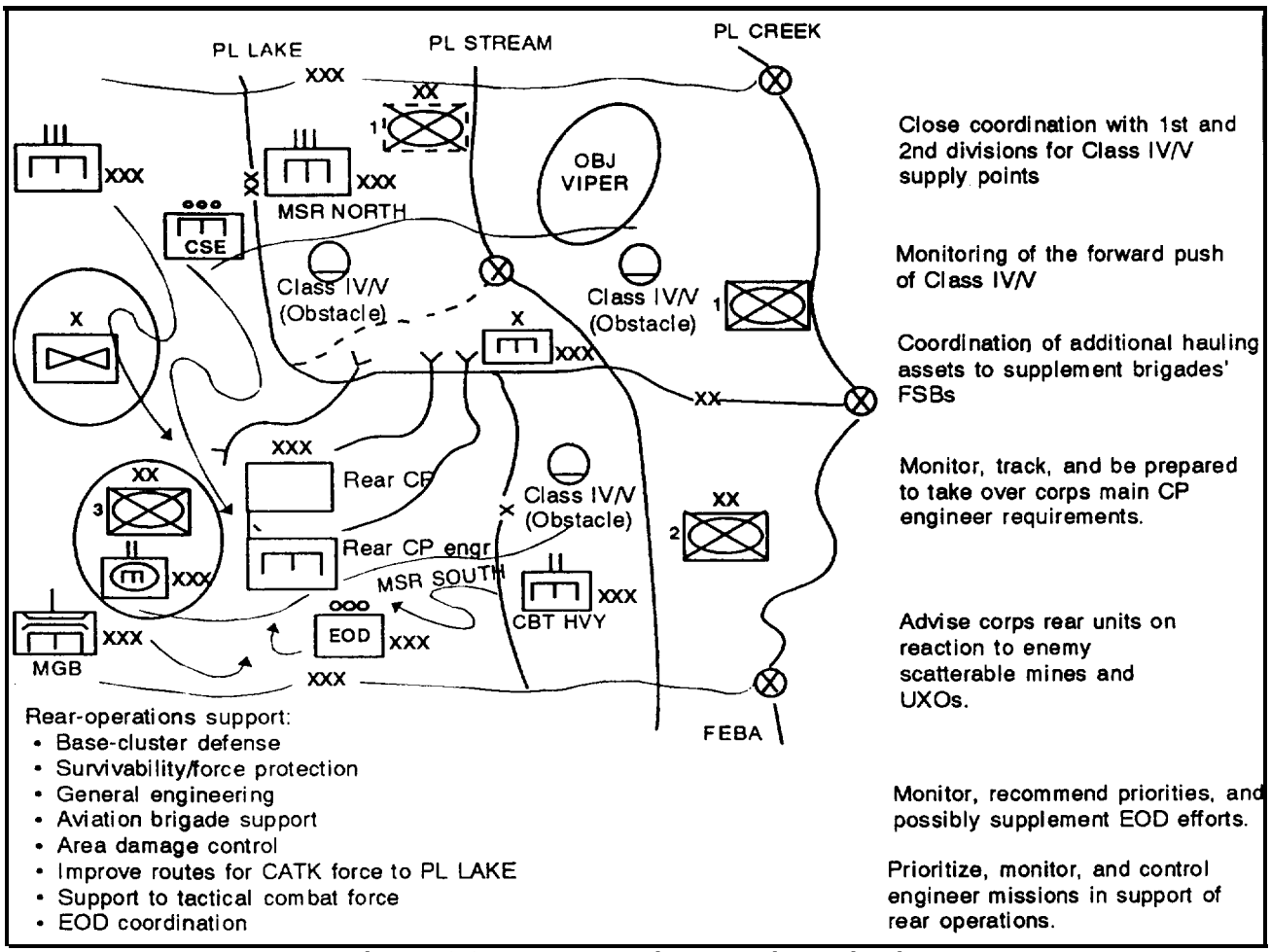


Figure 6-8. Rear-operations engineer laydown

area that clearly define command or support relationships. Defensive operations lend themselves particularly well to general-engineering support provided on an area basis. When this method is employed, corps engineer groups may be used to direct general-engineering effort in the corps rear area. Limited countermobility support may be provided by emplacing protective obstacles that protect key C2 and logistics facilities as well as corps flanks. A serious threat to the corps rear area may require the establishment of a TCF using corps engineer units when properly trained and augmented with free-support, logistics, medical, transportation, and C2 assets. The use of engineers as a TCF must be carefully evaluated by the corps commander as the reduction of critical engineer support could jeopardize other corps missions.

DECEPTION OPERATIONS

Observed engineer activity, since it is a scarce battlefield asset, is effective in painting a false picture. Dummy obstacles, phony minefield, shallow ditches, and weapon positions can all be used to deceive and aid force survivability. Most deception operations will be guarded information with only selected corps personnel knowing the full scale of the deception operation. In order to ensure OPSEC as it relates to the deception plan, corps engineer units sup porting deception should be given mission-type orders that do not reveal their direct participation in a deception operation.

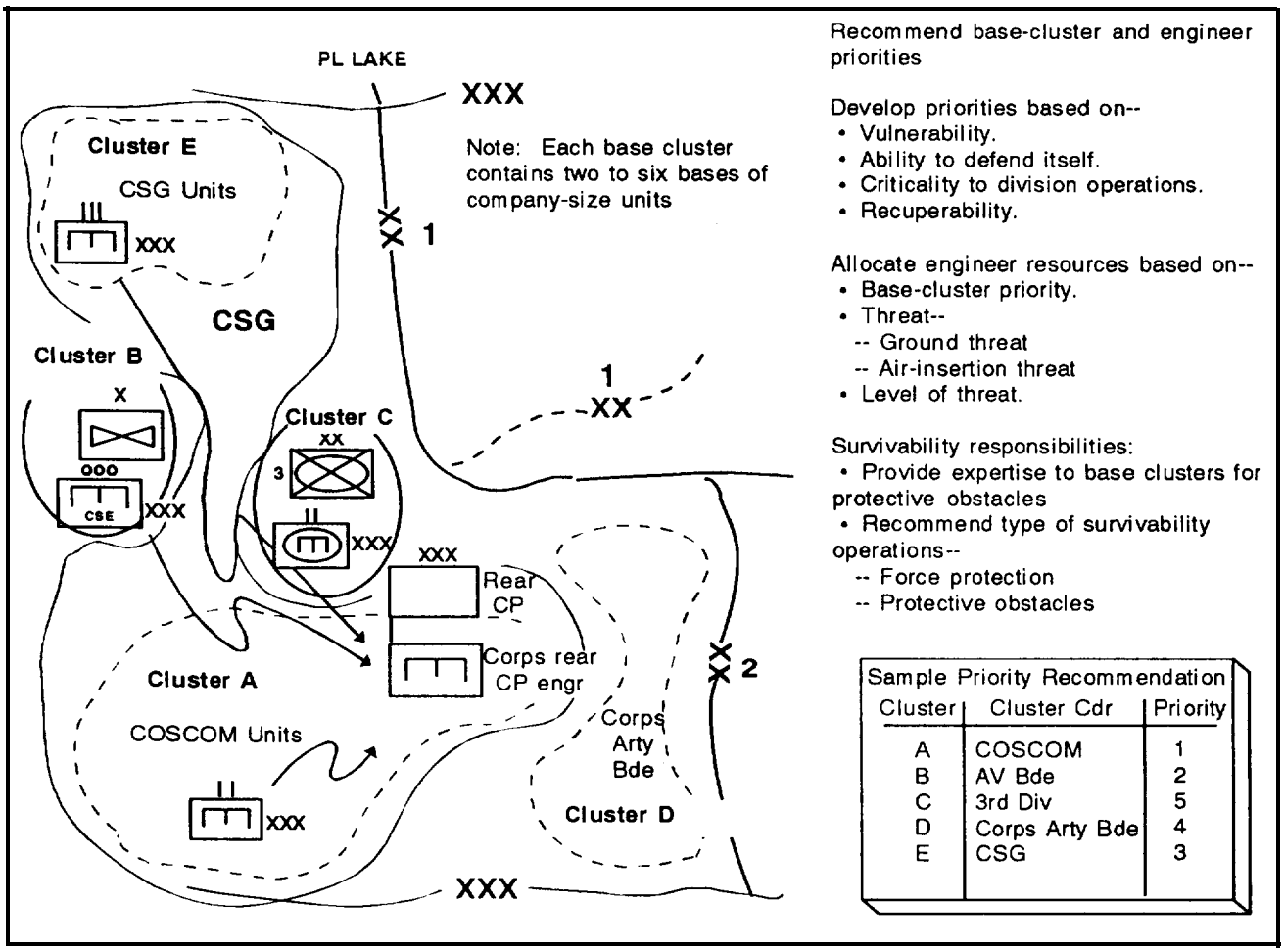


Figure 6-9. Rear-operations base-cluster engineer laydown

ENGINEER DEFENSIVE PLANNING

The engineer-estimate process provides the planning framework for the corps engineer to integrate into the corps command-estimate process (see Figure 6-10, page 6-16). It provides a systematic procedure for developing the engineer task organization and scheme of engineer operations to support the corps in defensive operations. The basic engineer-estimate process is found in Appendix B.

MISSION RECEIPT

The engineer-estimate and defensive-planning process begin with the corps engineer receiving his mission. This mission is extracted from the TA JTF, or other higher headquarters OPORD, the engineer annex; graphics; and the corps WARNORD. Based on the identified mission the corps engineer staff (the engineer brigade commander, the brigade staff, and the SES) participates in the corps mission analysis process by developing facts and assumptions. Working simultaneously with the G2 and G3, the corps engineer staff conducts an EBA. The EBA consists of analyzing the terrain and assessing the enemy and friendly engineer capabilities. A thorough, in-depth understanding of the commander's intent leads to a corps defensive obstacle plan that not only attacks the enemy where desired, but also assists counterattacks and facilitates future operations.

Mission

Corps's mission and theater/JTF commander's intent
Corps's allocation and plan for Class IV/V supplies
Corps's obstacle restrictions
Theater/JTF requirements for future mobility impacting on corps

IPB and EBA

Terrain:
- No-go terrain and obstacle effort
- Key or decisive terrain to focus countermobility effort

Enemy engineer capability and missions:
- Enemy mobility capability at regimental through corps
- Enemy corps and division countermobility capability for flank protection and transition to hasty defense

Friendly engineer capability:
- Countermobility capability by battalion
- Survivability by battalion
- Capability of theater engineer units
- Haul assets or support

Engineer Mission Analysis

Specified tasks - corps-directed obstacles
Implied tasks - mobility requirements for a passage of lines
Assets available - host-nation support
Time analysis - repositioning of the CATK force
Limitations - defeat mechanism
Risk - engineer's participation in deception
Essential tasks - engineer functions tied to defeat mechanism

Scheme of Engineer Operations

Engineer task organization and resource allocation supports corps's main effort
Obstacle control tied to maneuver-control graphics and force allocation

Figure 6-10. Engineer estimate in the defense

TERRAIN ANALYSIS

Terrain analysis is conducted by the corps engineer staff with the corps G2, corps terrain-analysis teams, and the corps topographic company using the OCOKA framework. The terrain analysis is then used to develop the enemy situation template, corresponding scheme of maneuver, and corps obstacle plan. For the defense, the terrain analysis focuses on where the enemy will attack and where the corps can defend and move to conduct counterattacks.

ENEMY ENGINEER CAPABILITY

The corps engineer staff works with the G2 in identifying the engineer capability of both the enemy maneuver and engineer forces. Based on the knowledge of how enemy engineers sup port offensive operations and the specific enemy engineer capability to support the offense, the staff plots locations of enemy obstacle breaching and bridging assets, along with deep obstacle-emplacement capability on the enemy situation template. Based on this situation template, the staff develops specific engineer intelligence requirements and nominates NAIs to incorporate in the corps R&S plan.

FRIENDLY ENGINEER CAPABILITY

Working with the corps G3, the corps engineer staff analyzes the friendly engineer capability based on the available engineer force to the corps, including organic division separate brigade, cavalry regiment, and theater engineers working in the corps area. The staff accounts for all available and mission-capable engineer assets that support the corps. Additionally, the staff accounts for corps countermobility and survivability assets, including specific digging, scatterable mine, and other obstacle-emplacement equipment. Defensive operations consume large amounts of Class IV obstacle material and Class V mines and demolitions that require time and transport to move forward. Early coordination with corps logistics planners is mandatory.

ENGINEER TASKS

The corps engineer stff continues the mission analysis by conducting complete review of the higher command OPLAN or OPORD, including operational graphics. The staff focuses on identifying specified and implied tasks, additional engineer assets available in the task organization, the specified acceptable risk and the time available to conduct the missions. Based on this analysis, the staff determines what engineer tasks are essential to the mission and provides this information to the G3 for inclusion in the restated mission.

CORPS COMMANDER'S INTENT

The corps commander issues his guidance and intent following the development and approval of the restated mission. Based on his guidance and intent the corps engineer staff identifies the pattern of defense and the defensive framework the corps will employ. The engineer staff confirms the specified, implied, and essential engineer tasks and prepares to support COA development by the corps staff.

COURSE-OF-ACTION ANALYSIS

Based on each COA proposed, the corps engineer staff looks two levels down at the maneuver-brigade level and develops a scheme of engineer support operations, focusing on essential engineer tasks. The staff uses the corps commander's intent the terrain analysis, and the enemy situation template to identify the required countermobility and survivability tasks and the engineer assets needed to perform them. Next the staff looks at mobility tasks, including those required to support counterattacks by reserve forces. Planned obstacles allow spoiling attacks and counterattacks to succeed. The staff identifies assets required to accomplish those missions and conducts the same analyses for general engineering missions.

ENGINEER MAIN EFFORT

Having identified the tasks and assets required for each COA, the corps engineer and his staff establish where the engineer main effort must be. The staff reviews the engineer and maneuver assets available, allocates engineer assets and recommends the allocation of maneuver assets, and identifies any shortfalls. If shortfalls exist the staff confirms them by verifying available assets and requesting additional assets, including host-nation assets, from the higher headquarters command through the G3. If additional assets are not available, the corps engineer focuses on the main-effort tasks and reallocates assets to compensate for the shortfall. Any risk associated with the shortfall of engineer assets is identified and addressed during wax gaming and COA comparison. Terrain preparation for the defense requires time for completion. Engineers cannot remain idle while final planning is in progress. Early parallel planning at all echelons helps buy time for the engineer. Operations requiring transfer of responsibility for in-place obstacles require detailed planning and coordination. This may include coordination with allied forces or other services. Also, detailed coordination with adjacent units identities locations of obstacles in the vicinity of the corps boundaries. The engineer organization for combat allows rapid transition to the offense, including designating an engineer force to be with the reserve force. Organization of corps engineers for combat through command or support relationships must be the result of a deliberate planning process. Reorganization of the corps engineer force upon execution of the defense will take time--time to convey orders, time to disengage engineers from current missions, time to move engineers from one part of the battlefield to another, and time to reorganize for new missions.

ENGINEER COMMAND AND CONTROL

Following the allocation of engineer assets, the corps engineer staff focuses on the centralized engineer C2 requirements needed during the defense. The staff ensures that assets assigned to each subordinate engineer headquarters do not exceed their span-of-control capability. If a shortfall exists, the staff analyzes all available C2 headquarters and upgrades the C2 structure. As a rule of thumb, engineer C2 headquarters can effectively control five to seven subordinate units. Engineer communiations capability is also identified, ensuring that the corps engineer C2 headquarters can be adequately supported by the corps area information network. If the engineer C2 capability cannot be upgraded, this shortfall is identified during war gaming and COA comparison. Engineer defensive battle-command requirements should also address task organization, changes of engineer effort and essential tasks.

ENGINEER LOGISTICS SUPPORT

The corps engineer staff reviews the supplies, personnel, maintenance, and transportation capabilities available to engineers for each COA. They recommend the allocation of each and identify any shortfalls, especially in the areas of obstacle emplacement equipment digging assets, Class IV obstacle supplies, Class V demolitions and mines, haul capability and critical engineer personnel shortages (see Figure 6-11). If shortfalls exist the staff verifies them and requests additional logistics capability from higher headquarters command through the G3. If additional logistics capability is not available, the corps engineer focuses on supporting main effort tasks and reallocates logistics assets to compensate for the shortfall. Any risk associated with this shortfall is identified and addressed during war gaming and COA comparison.

ORDERS DEVELOPMENT

Once COAs have been war-gamed, compared, and recommended to the corps commander, he decides how the defensive mission will be conducted and gives his intent and concept of the operation. Based on this, the SES refines the corps engineers' missions and develops a scheme of engineer operations that integrates

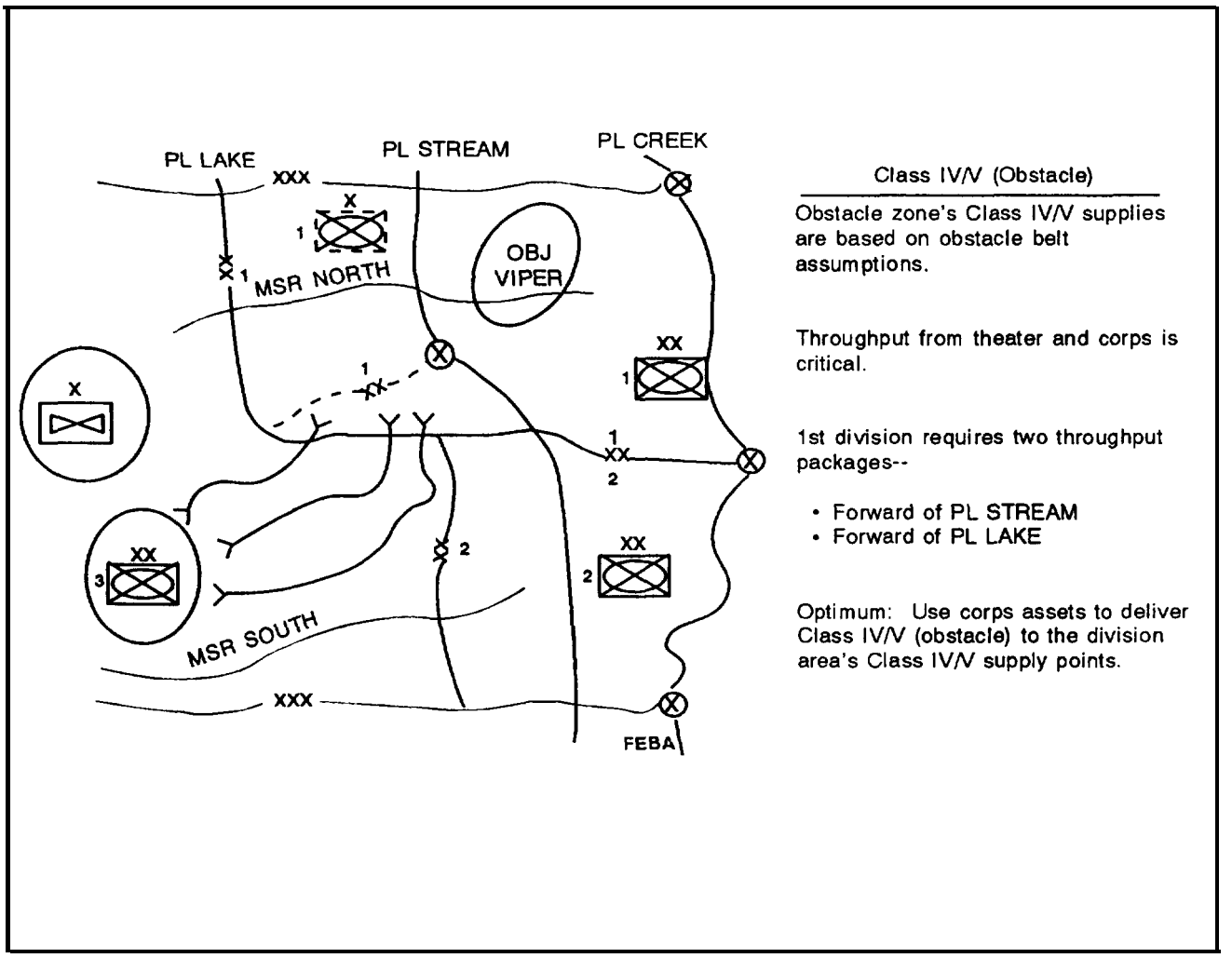


Figure 6-11. Class IV/V obstacle support planning

engineers into the corps's total defensive scheme of maneuver. This scheme is included in the execution paragraph of the corps basic OPLAN or OPORD. To accomplish these tasks, the staff finalizes the engineer task organization and command or support relationships, assigns engineer tasks to the corps's subordinate units (divisions, separate brigades, and cavalry regiment) in subunit paragraphs and the coordinating instructions, provides engineer-specific input into the service and support paragraph and develops the engineer annex (including obstacle and denial appendices) to the OPLAN or OPORD. The staff then briefs the corps's engineer plan to the corps's subordinate commanders during the corps's orders brief. Simultaneously the corps engineer brigade staff develops the engineer OPLAN or OPORD. It ensures complete dissemination to all engineer units working for the corps.

PREPARING, CONDUCTING, AND TERMINATING THE DEFENSE

PREPARING THE DEFENSE

During defensive operations, corps engineer commanders maximize time available for planning and issuing orders. Corps engineer preparation of the battlefield occurs simultaneously at all echelons throughout the corps's AO. En-

gineer preparations for the defense can occur early without the presence of maneuver and support forces in the area, therefore, adequate engineer planning is essential. The corps engineer brigade staff produces an engineer DST and a synchronization matrix that fully supports corps defensive plans. Both are updated and modified as the defensive battle progresses. The DST and the synchronization matrix could highlight specific engineer support activities such as the following:

- Corps topographic engineer units providing detailed terrain analyses of enemy attack routes and friendly counterattack routes that assist corps planners in the IPB process. These products, especially the MCOO, help identify any corps-directed obstacle zones, reserve demolition obstacles, or ORASs
- Deconfliction of division, separate brigade, and cavalry regiment obstacle plans to ensure mutual support and access for corps reserve counterattack forces.
- Ž Forward staging of needed Class IV obstacle materials and Class V mines and demolitions.
- Ž Engineer participation with security forces verifying enemy engineer breaching and bridging capabilities and ensuring that MBA engineers are prepared to counter advancing enemy formations with obstacles.
- Ž Completion of corps-directed obstacle zones and reserve demolition obstacles.
- Ž Construction of forward logistics bases and MSRs that support the corps defense.
- Engineer force integration with corps reserve forces, including rehearsals for counterattack missions.

CONDUCTING THE DEFENSE

During the defense, corps engineer commanders are physically and mentally agile. Corps engineers must understand the corps commander's intent for the defense and his critical items of information in order to properly advise maneuver and logistics commanders. Engineer units are prepared to move around the battlefield to reinforce successor to support a shift in the main effort. Engineers are proactive in ensuring that obstacles are continually maintained and covered by fires. Obstacle zone, obstacle belt and corps-directed tactical obstacle emplacement efforts are tracked by the corps engineer staff. Decision criteria outlined in the DST to execute corps reserve demolition obstacles are clearly followed by the corp engineer and his staff. Mobility along counterattack axes is continually monitored. At the commencement of the defense, selected corps engineers are normally withdrawn from division AOs to continue defensive preparations in depth. The status of engineer personnel, equip ment, and critical Class IV obstacle supplies and Class V mines and demolitions is monitored closely by the corps engineer staff. Throughout the conduct of the battle, general engineering tasks, including construction and repair of MSRs and logistics bases, continue and are closely monitored.

TERMINATING THE DEFENSE

The corps engineer anticipates the end state of defensive operations by planning for and prepositioning needed obstacle breaching and bridging assets where they can be passed quickly to attacking forces. Corps engineer forces remain flexible throughout the defense, being ready to transition to support the offense at a moment's notice. The corps engineer maintains an up-to-date status of the terrain, including emplaced and planned obstacle belts, corps-directed obstacles, and any reports of any concentrations of UXO from the artillery and Air Force that may impede future corps attacks. This updated status is crucial for the corps G2 and G3 to affect future offensive operations.

TRANSITION TO OFFENSIVE OPERATIONS

Engineers at all levels of command within the corps plan for the transition from the defense to the offense. The corps engineer ensures that the corps engineer structure is designed to provide the necessary physical agility for the transition. Prior to assuming the offense, corps engineer units are positioned well forward along with other maneuver and logistics support elements critical to rapid exploitation of success. Engineer forces are task-organized throughout the corps to assist rapid movement out of defenses and through hasty obstacles where the enemy attack has reached its culminating point. Rapid conversion to mobility missions, including obstacle breaching and bridging operations, is critical to success. Corps topographic engineer units provide timely terrain analysis to enable the commander to see the current corps battlefield and AO. Employment of ORAs permits free maneuver and allows offensive transitions to occur rapidly. General engineering units are poised to continue to construct and repair forward MSRs and logistics bases.

CHAPTER 7
OTHER OPERATIONS

I was first of all gratified to see how much had already been done by the 86th Pontoon Battalion. Working on their own behalf to get the ferry running, they had actually begun our work for us. As I surveyed the west-bank ferry site, the first of my own Company B bulldozers arrived to begin leveling the approach to conform to our own needs. Of equal importance, Captain Gene Hancock's 998th Treadway Bridge Company rolled in and got straight to work. I exchanged salutes and greetings with Captain Hancock and gave him leave to pitch right into work with his eager engineers. The general opinion throughout the 1111th (Engineer) Group was that the 998th was the best unit of its kind in the 1st Army.

Much to my surprise, as I gazed across the awesomely wide and swift Rhine, I chanced to see a bulldozer with flails clearing mines and working on the east-bank approach. I asked Captain Warren Rombaugh whose engineers they were and he proudly explained that Lieutenant Don Davis and Sergeant Bill Miller had purloined a ferry and had taken their platoon across at 0400 hours. The first unit of the 291st to cross the river had been working constantly under fire since then..

From the book, First Across The Rhine. The Story of the 291st Engineer Combat Battalion, by Colonel David E. Pergrin with Eric Hammel.

The corps conducts other operations to support both offensive and defensive operations. The corps may be required to conduct these operations in combination, sequentially and, in many cases, as part of an offensive or defensive plan. In all cases, they require special considerations during planning and execution. They are all difficult, complex, and often inherently risky. While the concept and basic goals of the operation remain constant, actual methods for their conduct will vary (due to METT-T) as they apply to each situation.

The corps engineer requires a fundamental understanding of these operations and their inherent special engineer considerations. The engineer missions involved in supporting other corps operations are essentially the same as outlined for offensive and defensive missions. Furthermore, the principles of engineer C2 still apply during planning and execution. The corps engineer and his staff use the special considerations discussed in this chapter to refine the offensive or defensive engineer mission analysis and force allocation.

LARGE-SCALE MOBILITY OPERATIONS

The corps conducts large-scale mobility operations primarily in two areas: obstacle breaching and deliberate river crossings. The doctrinal fundamentals for combined arms breaching operations (found in FM 90-13-1) and river-crossing operations (found in FM 90-13) can be applied to corps-level mobility operations. While large-scale mobility operations are normally planned in detail at the division level, corps have specific fundamental planning and resourcing responsibilities for these operations. The corps engineer and his staff are responsible for developing detailed schemes of engineer support and providing the extensive engineer forces and assets required for both missions.

LARGE-SCALE BREACHING OPERATIONS

A large-scale breach is defined as a breaching operation conducted by divisions and corps to create a penetration through a well-prepared defense and to pass follow-on divisions or corps. These operations are conducted in phases that serve to integrate them into corps and theater offensive plans. Corps-controlled breaching operations usually consist of corps-level operations using lead divisions to conduct the deliberate breach. The enemy main defensive belt is characterized as a linear area defense lacking depth at the first tactical echelon. Normally, the corps scheme of maneuver involves one or two lead divisions creating an initial penetration through which follow-on divisions or corps can pass. Lead divisions conduct either division or simultaneous brigade deliberate breaches to create the initial penetration. The focus of corps operations is to set the conditions for success, support the fight at the obstacle, and exploit lead division success to continue the attack.

Phases of a Large-Scale Breach

There are four distinct maneuver phases inherent in a large-scale breach from the corps's perspective. As with any obstacle crossing, a large-scale breach is only a subcomponent of a larger, continuous offensive operation. The breach may be an essential task but it is not the purpose of the attack Breaching phases assist the corps commander in more clearly delineating the tasks to be planned and executed at the corps, division, and brigade levels. The phases of a large-scale breach are to—

- Attack to the obstacle.
- Breach and assault.
- Secure the beachhead.
- Pass follow-on forces.

Attack to the obstacle. The corps begins the attack to the obstacle by setting the conditions for the operation's success. This is accomplished by conducting deep operations to isolate the close fight and to reduce enemy fire-support capability; providing adequate resources to the breach force; and ensuring that fundamental breach principles are applied. Deep operations serve to suppress the enemy's fire support and its ability to reinforce the first tactical echelon. These operations focus on enemy artillery groups, rocket artillery, or maneuver units. The corps applies both lethal and nonlethal fires to suppress enemy forces at the point of penetration and to further isolate and obscure the battlefield. These fires usually include artillery, attack helicopters, close air support (CAS), air interdiction (AI), EW, and PSYOP. Deception operations are used to deceive the enemy commander as to the exact time, location, and nature of the corps operation. A priority of the corps intelligence-collection plan is on the forward enemy's defenses and obstacle system. Aggressive corps ground and air reconnaissance and the use of satellite imagery provide lead divisions with timely intelligence updates on both obstacle and enemy dispositions. This phase ends as the lead divisions close with the enemy

main defensive area and begin executing their deliberate breach.

Breach and assault. The objective of the breach-and-assault phase is to penetrate the enemy's defense with the lead divisions and to isolate the division objectives with corps and theater assets. The fight at the obstacle is entirely a division fight. The focus of the corps and theater deep operations will continue to be on isolating the breaching areas from air and ground counterattack and to continue counterfire operations against enemy artillery. Enemy scatterable mine delivery systems are a likely PIR and are excellent HVTs for corps and theater fire-support systems. The corps engineer staff and the G2 plot likely minefield locations and delivery systems. The breach-and-assault phase ends when the divisions seize their initial objectives and eliminate enemy direct fire on the breaching sites.

Secure the beachhead. The attacking division quickly secures the beachhead in order to expedite the passage of follow-on forces. The corps-delineated beachhead line initially serves as a limit of advance and an area to pass follow-on forces. The size of the beachhead and the location of the beachhead line are driven by the size of the follow-on force, the amount of forces required to defend the beachhead from counterattack and the location of enemy first-echelon artillery groups and reserves. The immediate concern is to clear the beachhead and eliminate all direct fires and all observed indirect fires that can affect the passage of follow-on forces. Simultaneous with securing the beachhead, the division begins establishing the necessary lane network. Reducing and marking additional lanes necessary to pass the follow-on forces, as well as to sustain forces within the beachhead, is a division-level operation. A system of traffic control within the beachhead is quickly established to support rapid and controlled movement on the lanes. This phase ends when the necessary lanes for both the forward passage and sustainment traffic are reduced, the beachhead line is secure against counterattack, and organized enemy resistance within the beachhead poses little threat to the breach lanes.

Pass follow-on forces. Follow-on forces begin movement from TAAs in the rear of the breaching division to forward assembly areas (FAAs), to attack positions in the beachhead. Movement is centrally controlled by corps. As with any passage of lines, the breaching division controls movement within its sector as the in-place force. The beachhead line normally serves as the BHL for the in-place and passed units. While this phase is similar to any passage of lines, the restrictions imposed by moving on lanes through obstacles require some special traffic-control considerations. This phase ends with the completion of the forward passage of follow-on forces and the turnover of the lanes and traffic control to the corps.

Corps Commander's Responsibilities

The corps commander provides guidance and intent concerning the conduct of large-scale breaching operations. He controls the initial breach fight with lead divisions and the follow-on passage of divisions and corps. He and his key staff members may locate near the vicinity of the breach location for effective C2. He is responsible for applying the breaching tenet of intelligence; the breaching fundamentals of suppression obscuration security and reduction (SOSR); the breaching organization of sup port, breach and assault forces; mass; and synchronization to each echelon of planning.

Intelligence. Providing accurate, timely intelligence is critical to the success of a corps's breaching operation. This begins before the war-gaming process with the plotting of enemy unit locations in the first and second echelons, artillery locations, and the locations of obstacle systems (IPB situation template). Updated terrain products (such as current satellite imagery maps of the beachhead and the MCOO) produced by the corps topographic company and terrain teams support this intelligence effort. The corps intelligence-collection plan and

event template are developed during the wargaming process. A portion of the collection plan is dedicated to confirming template locations. This intelligence flow is continuous up to and beyond the start of the attack. The corps collection plan also focuses on deep operations that are critical to suppressing enemy fire-support assets and reserves, thereby isolating the battlefield. Every effort is made to push intelligence down to division level and below. The breaching division and its brigades supplement this plan by developing their own collection plans and R&S plans based on the same IPB process.

Breaching fundamentals. The corps commander maintains certain SOSR responsibilities at his echelon to allow the divisions and brigades to focus on the immediate fight at the obstacle. At corps level, the principles of SOSR are the same as at lower echelons, but the scope is different. The corps uses fire support and deep operations to *suppress* the enemy's defenses and isolate the battlefield. These operations serve to disrupt defenses at the breach sites and reduce the enemy's ability to reinforce or influence the battle by using its second-echelon forces or fire-support assets. The corps *obscures* the battlefield through the use of C2 countermeasures, including EW, OPSEC, and smoke/obscurants. Deception is also a critical aspect of corps-level obscuration of the breach operation which serves to mislead the enemy commander as to the nature, time, and location of the corps operation. Corps responsibilities under the *secure* tenet are accomplished through deep operations and fire support to isolate the breach sites and protect them from enemy actions. CAS, AI, deep fires, attack helicopters, and air defense weapons are all tools available to the corps commander. Corps responsibilities to *reduce* obstacles include—

- Accepting lane handover from the forward divisions.
- Upgrading existing lanes to handle additional traffic.
- Clearing additional lanes to support the passage of follow-on forces.
- Maintaining the lane network.
- Providing movement control.

Breaching organization. The corps commander maintains certain responsibilities that assist lower-echelon support breach and assault forces to allow the lead divisions to focus on the immediate fight at the obstacle. To assist division *support forces* in eliminating the enemy's ability to interfere with the breaching operations, the corps commander provides deep-operations fire support. This fire support suppresses the enemy's defenses and reduces its ability to reinforce or influence the battle with second-echelon forces or fire-support assets. The corps obscures the battlefield through the use of C2 countermeasures, including EW and OPSEC. Deception is also a critical aspect of corps-level obscuration of the breach operation that misleads the enemy commander as to the nature, time, and location of the corps operation. The corps supports division *breach-force* missions to create lanes that enable the attacking force to pass through the obstacle and continue the attack with additional breaching assets and suppressive deep-operations fire support, along with needed obscuration. This also helps the corps to secure the breach site. To assist the breach force in reducing obstacles, the corps accepts lane handover from the forward divisions, upgrades existing lanes to handle additional traffic, clears additional lanes to support the passage of follow-on forces, maintains the lane networlk, and provides movement control. The corps supports division *assault-force* missions to destroy or dislodge the enemy on the obstacle's far side, primarily with sup pressive deep-operations fire support.

Mass. Breaching is conducted by rapidly applying a concentrated force at a point in order to crack the obstacle and rupture the defense. Massed corps combat power is directed against

an enemy weakness. The location determined for large-scale breaching depends on a weakness in the enemy's defense where its covering fires are minimized. If the corps commander cannot find a natural weakness, he creates one by fixing the majority of the defending force and isolating a small portion of it for attack. The isolated portion is then suppressed to eliminate effective fire on division breach forces. Smoke and terrain are used to assist in isolating the force under attack. Suppression requires the corps commander to mass enough overmatching fires to achieve at least a 3:1 firepower ratio.

The corps commander also masses his engineers and breaching equipment to assist division breach forces reducing the obstacle. Division breach forces are organized and equipped to use several different reduction techniques in case the primary technique fails. Additional reduction assets--normally fifty percent more than required--are present to handle the unexpected. These additional forces are positioned with the division breach force. Achieving necessary mass for the assault requires the division breach force to open enough lanes through the obstacle to permit rapid passage and buildup of forces on the far side. A division normally requires a minimum of twelve lanes, allowing two brigades abreast with six task forces to pass simultaneously in column while minimizing lateral movement. The tactical situation may require additional lanes to pass a larger assault force quickly through the obstacle to achieve a sufficient combat-power ratio. The principle of mass influences the selection of the corps breaching location the task organization augmenting division support, breach, and assault forces; and the integration of engineers in force movement or attack formations.

Synchronization. Breaching operations require precise synchronization of the SOSR breaching fundamentals by support, breach, and assault forces. Failure to synchronize efforts can result in rapid, devastating losses of friendly troops in the obstacle or in the enemy's fire sack. The corps commander ensures synchronization through proper planning and force preparation. Fundamentals to achieve synchronization are—

- Detailed reverse planning.
- Clear subunit instructions.
- Effective C2.
- A well-rehearsed force.

Corps Engineer Support

Corps engineers support large-scale breaching operations in many ways. The corps engineer assists the corps commander by providing detailed engineer estimates for the breach. Corps engineers augment division breach forces by providing them with additional assets to clear the necessary number of lanes to ensure the movement of follow-on forces through the beachhead. Normally an engineer group with several corps engineer battalions is placed in a command relationship to each breaching division in order to give it efficient C2 of all engineer forces at the breach sites. This allows division engineers to accompany assault forces as they pass through the breaches to seize beachhead objectives. Corps engineers at the breach sites widen existing lanes and create additional ones to enhance corps mobility. As the beachhead is secured and follow-on forces pass through the in-place division, control of the breach site is passed to the corps to free the in-place division for future operations. Corps engineers continue route improvement and obstacle-clearance operations. Corps engineers with assault forces are prepared to install tactical obstacles to support the defense of the beachhead, including scatterable mines. Obstacles are also used in deep operations to isolate the battlefield and delay reserves. Corps engineers enhance movement in rear areas by maintaining and improving MSRs and repairing and upgrading bridges.

RIVER-CROSSING OPERATIONS

A river crossing is a special operation in that it requires specific procedures for success because the water obstacle inhibits ground maneuver in the usual way. It demands more detailed planning and technical support than normal tactical operations. It also features specific control measures to move the force across a water obstacle. The obstacle may be a river, lake, or canal. Unlike other obstacle types, the water obstacle remains effective during and after the crossing operation.

A successful river-crossing operation is one that moves more combat assets across a river than an enemy can mass against the crossing. Deliberate river-crossing operations are normally planned and conducted by corps and divisions. At the corps level, fundamental planning (including deception) and resourcing of corps assets to the division takes place. At these echelons, a major river crossing will involve most if not all, of the assets of the organization involved. Extensive use of corps assets is required in the conduct of the operation. Divisions do not have sufficient support-force structure or capability to conduct a river-crossing operation. They cannot cross major water obstacles without corps assistance and still be expected to press the fight. The corps assigns missions and provides the necessary support and equipment. Specifically, the corps provides augmentation in the following areas:

- Engineer forces.
- Fire support.
- Air defense.
- Smoke.
- MP.
- EW.
- Attack helicopters.

Rarely will a river crossing be a specified task within the corps's mission. More often, a river crossing will be an implied task for a lead division. The corps will designate the bridgehead for an offensive river crossing and will normally depict the bridgehead graphically using a bridgehead line or a set of division objectives. The bridgehead is the area on the far bank that is to be secured to continue the offensive. It provides space for those combat CS, and critical CSS elements that are necessary for the corps to continue the attack. The bridgehead must be defensible, be large enough to maneuver and deploy the force required to continue the mission, and facilitate continuation of the operation. For divisions crossing the river and continuing the attack a shallow bridgehead of about 30 kilometers (19 miles) maybe used. If the corps intends on passing a division through the bridgehead, a deeper bridgehead of 40 to 50 kilometers (25 to 30 miles) may be required, depending on the terrain. Divisions normally assign bridgehead objectives and control movement across the river. Brigades assault across the river and secure the bridgehead as an element of a larger force.

Both corps and division headquarters anticipate and plan for river crossings in advance. Division and brigade commanders organize their forces into bridgehead, support, and breakout forces for river-crossing operations. Bridgehead forces seize and secure the bridgehead. Support forces consist of corps combat engineer battalions; corps bridge companies; light engineer diving teams; and MR EW, and chemical units. These units provide crossing means, traffic control, and obscuration. Breakout forces cross the river behind bridgehead forces and attack out of the bridgehead oriented on subsequent objectives. The division commander normally designates an assistant division commander as the crossing-force commander (CFC) to take charge of controlling the division crossing. A crossing force receives planning support from a crossing-force engineer (CFE) who is normally the commander of a corps engineer group in support of the division. He provides additional staff planners for

the CFC and coordinates engineer support to the crossing area commanders (CACs), who are normally the maneuver brigade XOs. Additional communications support is required for the engineer group to operate in both the division and corps signal networks during river crossings. The corps engineer group commands and controls all corps engineer assets supporting the river-crossing operation, including bridge companies and combat engineer battalions. It is critical for supporting corps engineers to be totally involved in all facets of the river-crossing operation from initial planning through preparation and execution. This ensures a continuity of thought and action. Division and brigade engineer staffs focus on supporting the fight through the bridgehead. Some duties and tasks of the CFE may be to-

- Coordinate engineer support to the CACs.
- Coordinate with the corps engineer brigade for additional assets.
- Assist with division deception planning,
- Recommend R&S requirements to the division engineer.
- Coordinate planning between crossing area engineers (CAEs) and CACs.
- Coordinate with the CFC and division engineer.
- Inform all concerned parties of any potential problem areas.
- Develop a detailed crossing schedule for the division.
- Coordinate with the corps chemical officer on the use of smoke/obscurants.
- Coordinate with the corps MP brigade on traffic-control requirements.

Each forward brigade normally has a DS combat engineer battalion from corps to support the crossing. The corps engineer battalion commander is normally the CAE and is responsible to the CAC and CFE for engineer crossing means and sites. He informs the CAC and CFE of changes due to technical difficulties or enemy action that render a crossing means inoperable or reduces its capacity He commands those engineers tasked to move the force across the river obstacle; they remain at the river as the attack proceeds beyond the exit-bank objectives. The division and brigade engineers focus on supporting the lead brigades at the exit-bank intermediate, and bridgehead objectives with organic engineer units. They are not normally involved in detailed planning of the river crossing. Some duties and responsibilities of the CAE are to—

- Keep the CAC informed on all aspects of the engineer operation.
- Coordinate with the CFE.
- Control all corps bridge assets in his area.
- Recommend reconnaissance requirements to the CAC and coordinate execution.
- Prepare the crossing area with equipment parks, engineer regulating points, combat trails, call-forward areas, and crossing sites.
- Assist the CAC in developing his crossing plan.
- Coordinate smoke/obscurant support in the crossing area.
- Coordinate traffic-control support in the crossing area.

RETROGRADE OPERATIONS

Retrograde operations are conducted when it is necessary or desirable to move in an organized and orderly way to the rear or away from the enemy. They are planned, organized movements that include delaying actions, withdrawals, and retirements. These operations may be forced or voluntary but they require the approval of the next higher commander. The corps may direct a division to conduct a retrograde operation within the corps's AO, or the corps may be directed from the theater commander to conduct a retrograde operation as part of a larger theater operation. A well-planned, organized, aggressively executed retregrade operation provides opportunities for the corps to inflict heavy damage on enemy troops and material while continuing to maintain its fighting integrity. The purpose of a retrograde operation is to preserve the corps's integrity for future operations; however, the retrograde can be conducted to—

- Disengage forces from combat.
- Avoid combat under undesirable conditions.
- Shape the battlefield, drawing the enemy into an unfavorable situation.
- Gain time without fighting a decisive engagement.
- Ž Reposition forces on more favorable terrain.
- Permit the use of a portion of the force else where.
- Ž Harass, exhaust resist, and delay the enemy.
- Ž Shorten LOC and supply.
- Conform to the movements of other friendly forces.

DELAYS, WITHDRAWALS, AND RETIREMENTS

Corps retrograde operations normally include a combination of delaying actions, withdrawal operations, and retirement actions executed in conjunction with other combat operations. A delay is an operation in which the corps trades space and time to inflict maximum damage on the enemy without decisive engagement. A withdrawal is an operation in which the corps in contact withdraws to free itself for a new mission. A retirement is an operation in which a corps not in contact moves away from the enemy. These operations may occur simultaneously or they may be sequential actions. To accomplish these purposes, retrograde operations are accompanied by efforts to reduce the enemy's strength; to bring up additional forces; to concentrate forces elsewhere for an attack to prepare stronger defenses to the rear; and to maneuver the enemy into areas where he can be counterattacked.

RETROGRADE RIVER CROSSINGS

Planning and executing river crossings during retrograde operations are similar to operations discussed earlier in this chapter. The following special considerations are taken into account when planning a retrograde river crossing.

- Command and control. Command, control, and coordination are difficult in a retrograde river crossing. Delaying, defending, and supporting forces require explicit missions and tasks. Effective liaison support is required between retrograding units, the crossing-force headquarters, and supporting units.
- Deception. Deception is planned and executed to conceal the extent of the operation and the actual crossing sites to be used. Smoke/obscurants, electronic deception, and dummy sites re-

duce the enemy's capability to disrupt the crossing. OPSEC measures are required.

- Crossing sites. Retrograde crossing sites are initially controlled by friendly forces. They may be insufficient in number and may be attacked by enemy forces early in the operation. Planning and developing additional sites provide flexibility against this probability. Any crossing site must be protected against enemy action using security forces to counter all battalion-sized air assault or airborne insertions.

Ž Support forces and bridging. The corps commander attempts to pass all nonessential support forces across the river early and disperse them in locations that can support the operation. Fixed bridging equipment should be recovered early and replaced with ribbon bridging that can be recovered quickly. Other bridging equipment that cannot be recovered quickly may have to be destroyed. Existing bridges and other crossing means, such as ferries, may need to be destroyed. Close coordination with delaying forces precludes cutting off friendly forces.

RETROGRADE PLANNING

The complexity and fluidity of retrograde operations and the absolute need to synchronize the entire corps operation dictate the need for detailed, centralized planning and coordination and decentralized execution of the operation. Corps planning for retrograde operations begins with the preparation of plans for the follow-on mission. It is driven by the commander's concept of the operation and his intent. A number of key planning fundamentals receives special emphasis during the retrograde planning phase, including the following:

- Leadership and morale. The nature of retrograde operations involves an inherent risk of degrading the command's morale; therefore, maintaining offensive spirit is especially essential among subordinate leaders and soldiers.

- Surveillance and reconnaissance. Intelligence requirements for the commander are dramatically increased as forces are echeloned to the rear, and the forward combat power is subsequently reduced. Tracking the enemy situation is aggressive and accurate. The commander takes maximum action to conserve his combat power while still accomplishing his mission.

- Mobility. The larger the mobility differential achieved by the retrograding force over the enemy, the greater the probability of a successful retrograde operation. The corps achieves this mobility advantage by providing for corps mobility and degrading that of the enemy force.

- Battlefield deception. Deception is integrated into all aspects of retrograde operations to cover movements of friendly units and to enhance the possibility of surprise. Deception operations target the enemy force to cause indecision and delay enemy actions and to prevent him from concentrating combat power at a friendly weakness.

- Liaison. Liaison between higher, adjacent, and subordinate headquarters is critical considering the degradation of communications during large unit movements.

- Rear operations. Maximum efficiency of terrain management is essential during retrograde operations.

Ž Logistics operations. Logistics support challenges are intensified by the requirement to move logistics bases while still sustaining the corps.

CORPS ENGINEER SUPPORT

The corps engineer contributes to corps retrograde operations by working with the corps staff to focus intelligence-collection efforts on key information requirements. These requirements indicate enemy strengths, weaknesses, and intentions. The corps engineer staff assists the corps G2 cell in analyzing combat intelligence, particularly enemy engineer activities (for example, a delaying division may report a concentration of low-density breaching assets indicating the location of the enemy's main effort). The corps engineer staff also assists in developing high-value targeting for corps deep-strike assets (for example, he may plot the location and employment of enemy assault bridges, recommend their location as a PIR, and recommend their destruction as an HVT.

Corps engineer support to corps retrograde operations is crucial. The engineer's dominant role is achieving superior mobility over the enemy Engineers at all levels focus on increasing the mobility differential between the retrograding corps and the enemy force. Corps engineers accomplish this by improving routes, constructing combat trails, repairing or replacing destroyed or underclass bridges, breaching minefield and other obstacles, and clearing routes of damaged or destroyed vehicles. As part of degrading enemy mobility corps engineers supplement covering-force and rear-guard-force engineers by installing obstacles to disrupt or block enemy movement and to allow friendly forces to break contact and not become decisively engaged. Corps engineers in rear areas emplace obstacles for subsequent defensive positions for the covering force and rear-guard forces. Priority is given to using point obstacles. Control and execution of corps reserve demolition obstacles are essential. To protect the force, corps engineers augment covering-force and rear-guard-force engineers by assisting in the preparation of protective fortifications for combat vehicles. Engineers in rear areas prepare subsequent positions.

RELIEF IN PLACE

A relief in place is a combat operation in which all or part of a corps in a combat area is replaced by another corps. It is normally ordered when the relieved unit is either in a hasty or deliberate defense. The relieving unit usually assumes the same defensive responsibilities and initially deploys the same as the relieved corps.

CONSIDERATIONS

Key considerations in planning and executing a relief in place are—

- Secrecy. Because of the inherent vulnerabilities created by a relief in place, the operation is concealed from the enemy as long as possible. Deception and OPSEC are all-important from the outset.

- Speed. Relief-in-place operations are extremely vulnerable to enemy spoiling attacks once they begin. Unnecessary delays during the execution are avoided to prevent giving the enemy time to acquire, target, and mass fires on the relief.

- Control. Intermingling of forces places increased demands on corps C2, particularly if enemy contact is made during the relief in place.

CORPS ENGINEER SUPPORT

Corps engineers contribute most to the relief in place by assisting the corps in achieving speed and control. As the two corps G3s collocate to develop the maneuver plan for the relief in place, the collocated corps engineer staffs develop a tied scheme of engineer operations. Both corps engineer staffs fully understand the scope of the mission, including the defensive plan and the concept for the relief in place, in order to determine engineer tasks needed to maintain speed and control.

Mobility Support

Both staffs recommend engineer task organizations that provide in-stride mobility operations to brigades moving to, through, and from friendly defensive positions. A review of the relieved unit's defensive plan overlaid with the relief-in-place concept is conducted. The routes and avenues for entering and exiting units are clearly identified and marked, with mobility requirements being determined for each route. The relieved corps has the responsibility to fully prepare the routes through its AO. The relieved corps engineer staff allocates mobility resources to assist in preparing these routes for movement. Additionally, both corps engineer staffs ensure their respective corps have the capability to conduct in-stride breaching operations in the event lanes are closed during movement.

Obstacle Turnover

The relieved corps engineer staff consolidates and provides obstacle locations, configuration, and composition to the relieving unit. The two corps engineer staffs develop detailed plans for the turnover of corps reserve demolition obstacles, corps obstacle zones, and planned ORAs. When developing the obstacle-turnover plan, the relieved corps engineer staff requires detailed and current status on the obstacle belts and zones in his AO. They receive updated obstacle reports from all subordinate units and compile a complete list of all individual obstacles emplaced in the corps area and updates the corps obstacle overlay. This information is then passed to the relieving corps engineer staff. Both staffs determine the details of how existing corps reserve demolition obstacles or those obstacles being emplaced will be exchanged. The presence of engineer LOs at every echelon of the relieving unit down to the maneuver company or team level is critical to the speed and control of obstacle turnover. Upon linkup, the engineer LOs from the relieving units become thoroughly familiar with the existing obstacles, including the direct- and indirect-fire control measures integrated with the obstacles. The engineer LO also assists the relieving maneuver commander in integrating obstacles into his defense plan and improving unit defenses against subsequent enemy attacks.

PASSAGE OF LINES

A passage of lines is an operation in which one force moves through another. A passage of lines can be conducted forward or rearward. The corps as a whole may participate in a passage of lines as the passing or stationary force. Additionally corps offensive and defensive operations often include passage of lines involving subordinate units. An example of a corps forward passage of lines is when a corps, as an operational or theater reserve, conducts a counterattack through friendly forces in contact with the enemy. An example of a rearward passage of lines is when a corps-controlled covering force passes through and transfers combat responsibility to MBA divisions.

PLANNING

Successful passages of lines are characterized by detailed, centralized planning and decentralized execution. The passing of control between passing and in-place corps or the corps's

subordinate units is one of the key considerations in any passage of lines. The commanders of the corps involved establish a mutually agreed-upon event that triggers the passage of control. Once control is passed, the passing corps exercises tactical control (TACON) over the in-place corps until all of its forces are beyond the direct-fire range of the in-place forward divisions. However, during a rearward passage of lines, control is passed from the rearward passing unit to the in-place corps unit. Forces in the rearward-passing corps come under TACON of the in-place corps once they are committed to the passage routes or corridors. Whether conducting a forward or rearward passage, the in-place corps has the responsibility to provide mobility for the passing unit along cleared routes or corridors through its sector.

CORPS ENGINEER SUPPORT

The corps engineer and his staff thoroughly understand when engineer fictional and unit control is passed, the disposition of engineer forces, and engineer missions at the time of passage. Close coordination and joint planning between corps engineer staffs are critical to the success of the passage of lines. When control is passed between corps, the corresponding corps engineer brigade commander may assume TACON of all engineer forces of the passing or in-place corps. The corps engineer brigade commander can then task engineers of the adjacent corps based on immediate requirements during passage. This is critical in the forward passage of lines, since it affords the passing corps engineer brigade commander with a means of accomplishing unforeseen engineer tasks with minimal impact on engineer support to the subsequent attack.

Collocated Corps Engineer Staff Planning

The corps engineer staffs of both passing and passed corps collocate during the planning and execution of the passage of lines. They focus initially on exchanging information including individual obstacle locations and routes through the sector. This information also ineludes the details and execution criteria for corps-directed reserve demolition targets and situational obstacles. The passing corps engineer staff then ensures dissemination of the information to subordinates through coordination with the G3 and instructions in the corps OFORD, engineer annex and overlays. C2 of both passed and passing corps engineer units during the passage of lines transfers to the corps exercising TACON. The corps engineer staff of the corps with TACON facilitates control of engineer units during planning and execution of the passage by having an accurate status of all engineer assets, activities, and obstacle control measures in the sector.

in-Place Corps Engineer Execution

The in-place corps engineer staff conducts a complete analysis of the passage-of-lines concept of operations. The in-place corps normally tasks subordinate maneuver units to prepare the passage routes or corridors. The in-place corps engineer staff recommends a task organization of engineer forces to the divisions, separate brigades, and cavalry regiment based on assets needed to clear assigned routes and corridors. Clearing operations are conducted prior to the initiation of the passage. Additionally the in-place corps engineer staff plans the closure of lanes through obstacles, if required, once the passage is complete.

Passing Corps Engineer Execution

The passing corps engineer staff task-organizes corps engineer assets to assist in-stride breaching operations prior to the passage of lines. This ensures 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 corps's obstacles requires permission from the corps exercising TACON. Authority to reduce friendly obstacles in response to an immediate tactical situation may be given to the corps's subordinate units. This authority is included in the coordinating instructions of the corps

order. Under all circumstances, this action is reported to the passed unit so that the obstacle can be repaired. The passing corps engineer staff closely monitors the passage during execution to advise both corps commanders on the impact of such occurrences.

ENCIRCLED FRIENDLY-FORCE OPERATIONS

From the corps's perspective, encirclement is of concern whether it pertains to all or a portion of the corps. A unit is considered encircled when all ground routes of evacuation and reinforcement have been cut off by enemy action. A unit may become encircled when it is—

Ž Ordered to remain in a strong position on key terrain to deny the enemy passage through a vital choke point following an enemy breakthrough.

• Given a mission of becoming encircled as part of a larger plan.

Ž Cut off from friendly forces unintentionally through its own maneuver, errors, exhaustion, or other cause.

CORPS COMMANDER RESPONSIBILITIES

Once encircled, the corps commander basically has three options: breakout defend, or exfiltrate. The decision to breakout to the rear or to continue the attack deep, defend encircled, or exfiltrate must be made promptly and executed with resolve. The longer a force remains encircled, the more depleted it becomes and the more organized and stronger the containing enemy becomes. The decision on which option to take will be based on the intent or orders of the higher commander. Prior to conducting any of these options, the corps commander reestablishes an effective chain of command, develops a viable perimeter defense to preserve what forces are available, and plans subsequent operations. In order to reorganize and consolidate forces effectively in the encircled AO, the corps commander—

• Establishes security.

• Reestablishes communications with higher headquarters and within units.

• Continues to employ intelligence assets to assess the immediate threat and ongoing enemy rear operations.

• Establishes a reserve.

• Reorganizes fire and logistics support.

Ž Limits vulnerability to NBC weapons.

Ž Maintains morale.

• Continues improving the defense.

CORPS ENGINEER SUPPORT

Corps engineers will play a very important role in any of the options selected. A thorough understanding of the operation and input into the planning process by the corps engineer SW is essential. Of significance to engineers will be the conservation of corps breaching, bridging, and obstacle-emplacement equipment Class III POL; Class IV materials; and Class V mines and demolitions. As resupply will probably be sporadic, disciplined use of available resources will be paramount. While encircled, corps engineer units assist greatly in improving the encircled force's defense, reducing vulnerability to fires, and providing mobility assets to reconnaissance forces.

BREAKOUT OPERATIONS

The attack to breakout requires that the corps maintain a simultaneous defense in other areas of the perimeter. To do this, the corps commander must—

- Deceive the enemy.
- Exploit gaps and weaknesses.
- Exploit limited visibility.
- Organize the breakout force with necessary attack and guard components.
- Coordinate internal and external supporting attacks.
- Concentrate overwhelming combat power at the breakout point.
- Provide for forces left behind.
- Prepare for linkup operations.

In support of breakout operations, the corps engineer staff plans for—

- Installing obstacles in depth to support a shrinking perimeter.
- Constructing strong points and battle positions.
- Eliminating obstacles in the breakout corridor.
- Maintaining evacuation routes.
- Clearing drop zones for resupply.
- Destroying excess ammunition and equipment.
- Supporting the breakout force with breaching, bridging, and flank obstacle-emplacement equipment.
- Conducting decontamination operations, including exit routes.
- Conducting reconnaissance of exit routes.
- Supporting feints or demonstrations as part of deception.

ENCIRCLED DEFENSE

Encircled corps forces may be required to maintain and defend their positions. The corps commander considers the following:

- The mission of unit and higher headquarters.
- The terrain available for defense.
- The availability of reinforcements or relief of the force before the enemy can eliminate it.
- The mobility differential of the enemy forces being greater allowing the enemy to destroy corps forces during a breakout attempt.

If the encircled force decides or is ordered to defend in place, corps engineers could be expetted to—

- Provide mobility assets to reconnaissance forces.
- Continue to improve the defense by emplacing obstacles and constructing fighting positions and battle positions in depth.
- Maintain aerial resupply areas.
- Destroy excess supplies and equipment if the situation demands it.
- Perform other survivability missions as resources allow.

EXFILTRATION

If the corps is ordered to exfiltrate its encircled position, it will do so through the movement of small units over multiple routes. The paramount consideration of this operation is se-

crecy and stealth. Corps engineers may be used for--

- Construction and maintenance of combat trails and roads.
- Dust control.

Ž Reconnaissance of multiple exit routes.

Ž Destruction of excess supplies and equipment after the force has evacuated.

ENCIRCLED ENEMY FORCES

Encirclement operations are conducted to cause enemy forces to lose freedom of maneuver by denying them the capability to defend or delay in an organized manner. Additionally encircling operations seek to cut off evacuation and reinforcement routes.

The principles in developing encirclement operations are deception, rapid and sudden penetration and swift exploitation in combination with persistent frontal attacks. Deception is necessary so that the breakthrough and further exploitation may be a complete surprise to the enemy. Additionally the attack is executed such that enemy units attacked are not just defeated, but destroyed by fires alone or with fire and maneuver. The enveloping forces must be able to exploit success quickly and without stopping. Their strength enables them to quickly destroy on-coming reserves as well as inflict the defeat of forces being bypassed.

Corps engineers are deeply involved in the encirclement-operations planning process at all levels of command. This ensures the availability of engineer support required at the correct time and place in the operation. Mechanized corps engineer battalions are well suited to support the encircling maneuver forces. These could be followed by wheeled corps engineer battalions to do the follow-on tasks that are not maneuver speed intensive. Corps bridge companies and CSE companies may also fill engineer requirements during an encirclement. Corps engineer missions during an encirclement may include—

- Obstacle emplacement to keep encircled forces confined and to prevent potential linkup by reserves.
- Route maintenance to ensure a steady flow of logistics to the encircling force.
- Assistance with decontamination operations.
- Obstacle removal to support the encircling force.
- Possible river-crossing operations.
- Support of maneuver forces in the attack.

Ž Preparation of LAPES for aerial resupply.

Ž Establishment of EPW compounds or holding areas.

- Participation in deception operations.

LARGE-SCALE UNIT MOVEMENT

Heavy corps, divisions, and brigades are powerful weapons in any kind of conflict as long as they have the space to move and concentrate quickly in fast-developing situations. They can only go where the road nets or cross-country conditions allow them to march and maneuver

on multiple routes and avenues of approach. Commanders fully understand the magnitude and importance of corps-sized movements. These movements will be successful when based on anticipation and prior planning, command involvement at all levels, and ruthless discipline. Movements are considered to be either administrative or tactical, based on the likelihood of enemy contact. No matter what type of move occurs, detailed planning is involved by all participants with the G4, COSCOM, and CMCC. The movement of typical heavy corps having 25,000 vehicles can last from hours to days depending on the weather, the number of routes used, and METT-T.

Corps engineers play an important role in large unit movements. Besides moving themselves, they must also support the operation from the concept until after the movement has been completed. This responsibility falls mainly on corps engineer units so that organic division separate brigade, and cavalry regiment engineers may remain in their respective formations and be ready to support their maneuver unit operations at any time.

The corps engineer and his rear CP staff work closely with the G4, COSCOM, and CMCC to integrate engineer support with these types of movements. In a corps-sized movement, corps engineers could be expected to perform the following functions:

- Route reconnaissance and classification.
- Preliminary route maintenance and upgrade, including turn outs for narrow roads.
- Upgrade or construction of lateral routes.
- Establishment of refugee holding areas along the routes.
- Upgrade of bridges and culverts to withstand corps loads.
- Preplacement of construction materials and equipment along the route to speed repairs.
- Mine and obstacle clearance.
- Construction of forward logistics bases prior to the movement.

During the movement, corps engineers position themselves at intervals along the route for—

- Assistance in clearing routes of refugee and stranded vehicles.
- Performing emergency road and bridge repairs.
- Recovering disabled military vehicles.
- Dust control.
- Chemical decontamination support.

Once the movement has been completed, corps engineers quickly bring the used routes up to military standard to ensure that follow-on forces and logistics can move forward without delay to support the corps in its mission.

LINKUP OPERATIONS

The corps may be required to conduct a linkup with another force as part of a larger theater-directed operation, or it may be required to direct a linkup of subordinate units as a phase of a larger corps operation. Corps linkup operations may be conducted when—

- Maneuver forces are attacking on separate but converging axes.
- An advancing force reaches an objective area previously seized or occupied by

amphibious, airborne, air assault, or special operations forces.

- It is necessary to complete the encirclement of an enemy force or during the breakout of an encircled force.

Ž A counterattack moves in the vicinity of a stationary friendly force.

Corps engineer forces engaged in linkup operations provide needed mobility and countermobility support prior to the linkup. Following linkup, corps engineers prepare for subsequent mission support. The corps engineer and his staff integrate engineer support into all linkup operations plans. Key planning considerations include—

- Providing needed topographic and terrain-analysis products showing converging force routes and corridors along with the linkup objective area.
- Establishing engineer command or support relationships between the converging forces both during and after completion of the linkup.

Ž Establishing obstacle control measures needed with both converging forces to ensure safe passage routes and corridors.

- Updating the obstacle emplacement status of both converging forces, including corps-directed tactical obstacles and reserve demolition obstacles.
- Ensuring the availability of mobility assets needed to conduct in-stride breaches for both converging forces, along with needed countermobility and survivability assets for a hasty defense in the linkup area.
- Ensuring the availability of follow-on mission engineer support requirements after the linkup has been affected.
- Ensuring the availability of engineer liaison requirements for both converging forces to ensure effective coordination prior to and during the linkup.

Ž Constructing or improving linkup points and passage routes.

RECONSTITUTION

FM 100-9 defines reconstitution as an extraordinary action that commanders plan and implement to restore units to a desired level of combat effectiveness commensurate with mission requirements and available resources. Reconstitution transcends normal day-to-day sustainment activities, with the status of a unit being key to initiating reconstitution. Three major elements are part of reconstitution reorganization assessment and regeneration.

REORGANIZATION

Reorganization is the action of shifting resources within a degraded unit to increase its combat effectiveness. All subordinate corps commanders conduct reorganization. They reorganize before considering regneration. Reorganization may be immediate or deliberate, depending on time and resources available. It includes cross-leveling of equipment and personnel; matching operational weapons systems with crews; and forming composite units. Normal logistics operations continue through the reorganization process.

Corps engineer units are prepared to conduct internal reorganization operations as required during combat operations. Corps engineer companies reorganize platoons; corps engineer battalions reorganize companies and platoons; corps engineer groups reorganize battalions and separate companies; and the corps engi-

neer brigade reorganizes groups, battalions, and separate companies.

ASSESSMENT

Assessment measures a unit's capability to perform its mission. The unit commander continually assesses his unit before, during, and after operations. If he determines that the unit is no longer mission capable, even after reorganization, he notifies his higher commander. Higher headquarters can either change the mission of the unit to match its degraded capability or remove it from combat. External elements may also assess the unit after it disengages with a more thorough evaluation to determine regeneration needs and resources available.

Corps engineer commanders and their staffs continually assess the mission-capable status of their units and develop change-of-mission or regeneration plans for corps engineer units supporting close maneuver operations that may quickly become mission incapable. Other corps engineer units that become mission incapable report this information as quickly as possible to the corps engineer staff for resolution.

REGENERATION

Regeneration of corps engineer units is the rebuilding of those units. It requires large-scale replacement of engineer personnel, equipment, and supplies. These replacements may require further reorganization. Corps engineer unit regeneration also involves reestablishing or replacing the engineer chain of command and conducting engineer mission-essential training to get the regenerated engineer unit to standard with its new soldiers and equipment.

Other corps engineer units that are not being regenerated can support corps regeneration efforts with personnel, equipment and training support. The corps engineer and his staff work closely with the corps G3 and G4 in determining the following engineer support requirements:

- Recommending the allocation and redistribution of engineer units, personnel, and equipment.
- Participating in regeneration site and terrain reconnaissance and the site selection process.
- Ž Preparing, constructing, and maintaining regeneration sites, facilities, training areas, and access and egress routes. This includes identifying and procuring needed Class IV construction material requirements.
- Ž Developing corps engineer staff requirements and structure for the corps regeneration task force (RTF).
- Ž Providing engineers for additional regeneration site force protection, mobility, countermobility, and area damage-control support.

LARGE-SCALE DECONTAMINATION OPERATIONS

The threat of weapons of mass destruction on the battlefield cannot be overlooked. This threat knows no boundaries; it is not just limited to high-intensity conflicts fought by large armies. Many small nations now possess NBC weapons that can be delivered into a corps's AO. The potential of large-scale contamination of equipment, personnel, and terrain must not be overlooked. Most units have some degree of decontamination capability but for larger operations many more assets are required.

The corps engineer and his staff coordinate engineer support requirements with the corps chemical officer for large-scale decontamination operations prior to, if possible, enemy NBC strikes. Reconnaissance of possible decontami-

nation sites is conducted, followed by deliberate planning of support at identified locations. During combat operations, the corps engineer staff closely monitors the NBC status in order to anticipate future support requirements. Corps engineer units are well suited to respond to this situation. There are many functions engineers may perform in support of decontamination operations prior to and after NBC strikes. Some of these are—

- Identifying and developing water sources.
- Developing large decontamination stations, including constructing road networks, decontaminating terrain, building sumps and pits, hauling supplies and water, and maintaining routes to the site.
- Conducting route decontamination on both hard- and loose-surface roads.
- Conducting airfield decontamination of runways, parking areas, and routes.

Most corps engineer units are equipped to handle all or part of these tasks. The wheeled corps engineer battalion, combat heavy engineer battalion, and CSE company have bulldozers, graders, loaders, heavy trucks, and water distributors that can support most decontamination operations.

CHAPTER 8
OPERATIONS OTHER THAN WAR

In the early morning hours of 24 August 1992, Hurricane Andrew slammed into the southern tip of Florida. The eye of the hurricane passed directly over Homestead Air Force Base and the surrounding communities of Homestead and Florida City with an estimated wind speed of over 160 mph . . . .

Late on 27 August 1992, the XVIII Airborne Corps was alerted and directed to send a logistical task force to aid in the relief operations. The 20th Engineer Brigade was directed to begin deployment of forces and to have an airborne engineer battalion on the ground within 24 hours . . . .

During the time frame to deploy all military engineers, those units on the ground were busy with a varied amount of work. After the area's main roads were opened, debris operations became a lower priority mission. The clearing of areas for the establishment of disaster assistance centers (DACs), life-support centers (LSCs), mobile kitchen trailer (MKT) feeding sites, and the removal of associated trash and refuse from those areas, became priority tasks. Furthermore, the clearing of debris from schools grew in importance when local authorities decided to reopen them on 14 September 1992 . . . .

From "Hurricane Andrew: The 20th Engineer Brigade Perspective" by Major Robert M. Ralston and Lieutenant Colonel Douglas L. Horn, 20th Engineer Brigade, 1 October 1992.

INTRODUCTION

Organizing and training for war fighting remains the primary mission of the corps and its supporting engineers. However, the corps can be called upon to conduct OOTW. The corps commander and his staff quickly identify situations that may require the commitment of corps assets, including engineers, in OOTW missions. This facilitates planning and execution based on METT-T. Corps force-projection planning includes the possibility that forces committed to the OOTW mission may become involved with combat operations. Corps forces may conduct a wide variety of OOTW missions that may involve engineers, including—

- Arms control.
- Ž Attacks and raids.
- Combatting terrorism.
- Ž Disaster relief.
- Humanitarian assistance.

- Nation assistance.
- Support to insurgency and counterinsurgency.
- Noncombatant evacuation operations (NEOs).
- Peace operations.
- Demonstrations and shows of force.
- Security assistance.
- Support to civil authorities.
- Support to counterdrug operations.

All corps forces, including engineers, cooperate fully with and act in support of federal, state, and local civil authorities during domestic OOTW operations. Overseas, the corps stresses a unified effort with joint and multinational forces and with the host nation's civil, military and police agencies.

PRINCIPLES OF OPERATIONS OTHER THAN WAR

The doctrinally based principles of war (such as mass, maneuver, unity of command, and surprise) have withstood the tests of time and experience. However, they do not always apply to conducting activities other than warfare. The following OOTW principles have been developed for application by the corps based upon the mission and operational environment. Corps engineer considerations are also provided for each OOTW principle.

OBJECTIVE

In OOTW, as in war, the corps commander conducts a mission analysis that clearly defines attainable objectives for the corps. The obscure nature of OOTW may require multiple tasks involved in a single mission. The military objective may be political or humanitarian. The objective may be limited. Success is usually measured against the stated mission; however, there is a probability that the operation will expand (such as mission creep).

Corps engineer forces understand the corps's goals and objectives during OOTW Engineers are easily drawn into mission creep because of the unique equipment and personnel capabilities in support of OOTW. Engineers can help identify defined operational objectives. Engineer mission and project completion times can be used to determine the desired end state. Engineer commanders and their staffs should not expand their missions unless completing additional tasks is critical to accomplishing their primary missions. Engineers may have their objectives and missions expanded with each perceived success, as well as contracted with setbacks.

UNITY OF EFFORT

Unity of effort is more difficult to attain in OOTW than in war. In such operations, other government agencies will often have the lead. The environment may be multinational, interagency, or under another branch of government where a single chain of command does not exist. Therefore, the corps attempts to obtain unity of effort. Unity of effort involves extensive coordination cooperation, and liaison in the pursuit of common interests toward mission accomplishment. This is done in the face of divergent goals and political interests. The corps's primary task is consensus building it understands the capabilities and limitations of each service, agency and host-nation force as well as their legal and political requirements and limitations.

Corps engineers facilitate unity of effort by understanding and blending the various capabilities of military engineers and civilian contractors to meet mission requirements. Delineat-

ing engineer work areas helps avoid duplication of effort. The efficient use of engineer forces, equipment, construction materials, and repair parts increases force productivity.

LEGITIMACY

Legitimacy is the subjective judgment that authority is being exercised by the right people in the proper way for correct purposes. Legitimacy in OOTW involves three areas--the government or agency exercising authority, the presence of US forces in the AO, and the execution of law-and-order operations. The people of the assisted nation, the world populace, and the US public all perceive the legitimacy of the involvement of US forces differently. They all can extensively influence and effect an operation if legitimacy is not established and maintained. Corps OOTW activities support certain political objectives, affecting how both the host government and US forces are perceived by their respective publics. Whenever possible, the corps ensures that its operations enhance the legitimacy of the host nation and its armed forces in the eyes of the people of that nation. In cases where a legitimate government does not exist, the corps uses caution when dealing with individuals or organizations to avoid unintended legitimization of those individuals or organizations.

Corps engineers are well-suited for enhancing the legitimacy of the US presence during both short- and long-term OOTW missions. The visible construction and rehabilitation of public facilities, schools, water wells, and roads in support of OOTW objectives enhance the legitimacy of US forces in the eyes of the host-nation's public. USACE personnel and their contractors are well-respected throughout the world as a legitimate US government agency.

PERSEVERANCE

The corps plans to achieve its OOTW objectives as rapidly as possible. However, many causes of confl ict tend to be persistent and not quickly resolved. Conflict resolution is very time-consuming and may require a long-term commitment of corps forces. Corps elements employed in OOTW exercise adaptability, patience, determination, and perseverance in order to continue the mission for as long as required.

Corps engineers persevere in OOTW through versatility and agility to meet varied and quickly-changing mission requirements. Units supporting maneuver forces with combat engineering skills may have to construct logistics support facilities and structures on a moment's notice. Construction engineers may be required to breach urban obstacles with heavy equipment. Combat engineers may constantly breach land mines emplaced in the same stretch of road over many days and months. Maintaining supply routes with engineer equipment can become redundant in many OOTW scenarios. Corps engineers demonstrate perseverance and staying power through professionalism and technical and tactical competence in all assigned missions.

RESTRAINT

When a corps is committed to an OOTW mission, it will normally be constrained and limited by the terms of the mission statement, the terms of reference, and the rules of engagement (ROE). Restrictions on the type of force, the weapons used, and the ROE are established by the corps commander and clearly communicated to subordinate units in order to prevent the escalation of violence in an activity.

Corps engineer forces operate fully within the restraints defined by the corps commander. The ROE concerning the use of land mines, demolitions, and protective emplacements are clearly established and written by the corps engineer staff. Constraints on the use of host-nation engineer equipment, laborers, and construction materials are also identified.

SECURITY

All OOTW contain some degree of risk; therefore, regardless of mission, commanders secure their forces. The presence of corps forces will bring about a wide range of actions and reactions. Commanders take appropriate measures to ensure hostile factions, including terrorists and criminals, do not acquire an unexpected advantage. Seemingly benign situations may possess the inherent circumstances that place soldiers at risk. The OOTW threat is not always easily recognizable. Mission restraints and the ROE may limit response options. Corps force dispersion, diverse activities, and nontraditional OOTW tasks make force and individual soldier security difficult.

Corps engineers enhance OOTW security by understanding all ROE and mission constraints, securing their own forces at work sites and in base-camp locations, and providing force-protection construction support to the corps. This includes building protective structures, digging emplacements, and emplacing barriers and barricades. OOTW security also includes protecting the engineer force by safely operating engineer too;ls and equipment and by keeping engineer soldiers safe and healthy.

ENGINEER SUPPORT TO OPERATIONS-OTHER-THAN-WAR MISSIONS

Corps engineer support is fully integrated with corps OOTW planning processes. Versatile corps engineer forces provide unique personnel and equipment capabilities that can effectively support complex and sensitive situations in any corps OOTW. All OOTW situations relate directly to wartime corps engineer missions and tasks. In many cases, the only difference between a wartime engineer mission and an OOTW engineer mission is the threat level. The basic engineer tasks remain the same in both environment. FM 5-114 details engineer support to various OOTW missions.

ARMS CONTROL

Arms control focuses on promoting strategic military stability. It encompasses any plan, arrangement, or process that controls the numbers, types, and performance characteristics of weapons C2, logistics support, and intelligence-gathering systems.

Corps engineers may support arms-control operations by providing topographic and imagery products used to verify treaty compliance and by constructing logistics support facilities to hold and store weapons involved with the arms-control process. Corps engineers also assist EOD units in destroying munitions and hardware.

ATTACKS AND RAIDS

The corps conducts attacks and raids for specific purposes other than gaining or holding terrain. The corps conducts them to—

- Create situations that permit seizing and maintaining political initiative.
- Place considerable pressure on governments and groups supporting terrorism.
- Damage, destroy, or seize HVTs, equipment, or facilities that threaten national security interests.
- Demonstrate US capability and resolve to achieve a favorable result.
- Support counterdrug operations by destroying narcotics production or tr ansshipment facilities or by supporting host-nation activities in this arena.

Corps engineers construct rehearsal sites for the force involved in attacks and raids, Topographic engineers produce large-scale

photomaps or graphics to help guide forces to their objectives. Corps engineers participating in the mission may require refresher training in specialized skills such as air-assault techniques, military operations on urbanized terrain (MOUT), or reorganization to fight as infantry. During attacks or raids, corps engineers may be tasked to—

- Protect flanks, withdrawal routes, and landing zones.
- Emplace and man roadblocks.
- Breach obstacles.
- Move or destroy captured equipment.
- Use captured equipment to perform missions.

COMBATTING TERRORISM

Combatting terrorism has two major components: anti terrorism (defensive) and coun - terterrorism (offensive). The corps combats terrorism mainly through anti terrorism. This includes those active and passive measures taken to minimize vulnerabilities to terrorist attack. Anti terrorism is a form of force protection, which makes it the responsibility of all corps units and personnel. Counterterrorism is the full range of offensive operations against terrorists or those who support terrorists. The corps rarely conducts counterterrorism operations.

Corps engineers may become targets for terrorists because of how and where they perform their missions, especially construction projects and other wide-area missions. Equipment parks and supply yards are large and difficult to defend. Soldiers operating equipment or hauling materials are vulnerable to ambush by direct and indirect fires, mines, and booby traps, Corps engineer leaders support antiterrorism by—

- Developing a good IPB and EBA of threat forces.
- Establishing and enforcing sound operating procedures.
- Organizing security elements.
- Constructing secure LSAs and CPs.
- Constructing protective shelters for key facilities.
- Emplacing vehicle barriers.
- Clearing standoff zones around facilities.
- Erecting predetonation screens to protect units and installations.

DISASTER RELIEF

The corps participates in disaster-relief operations to promote human welfare and to quickly reduce the loss of life, pain and suffering, and destruction of property as a result of natural or man-made disasters. These operations may be a combination of joint, multinational, and interagency support. The corps continually coordinates and cooperates with local, state, federal, and nongovernmental agencies. This is critical for timely response in the disaster area. FM 100-19 provides further details for domestic support operations.

Corps engineers provide personnel and equipment capabilities that are extremely useful during disaster-relief operations in the following areas:

- Removing debris.
- Reestablishing utilities.
- Rebuilding LOC.

- Assisting with the distribution of aid, including food and clothing.

- Building temporary facilities and structures for displaced persons.

HUMANITARIAN ASSISTANCE

The corps possesses an ability to rapidly respond to emergencies that are caused by natural or man-made disasters or other endemic conditions such as human pain, disease, famine, or privation in countries or regions. The State Department approves most humanitarian-assistance operations and Congress funds them through specific appropriations. Corps commanders coordinate their efforts through the DOD, the United States Agency for International Development (USAID), and the US ambassador. The corps can be tasked to provide the C2 support necessary to plan and execute the ground portion of any hum anitari anassistance operation. The corps may be tasked to provide the logistics support necessary to relieve human suffering. It may also be tasked to provide forces to secure an area in order for the humanitarian-relief efforts of other agencies to proceed.

Corps engineer assistance may include constructing and repairing rudimentary surface-transportation systems, basic sanitation facilities, and rudimentary public facilities and utilities. Other tasks may include drilling water wells, constructing feeding centers, and disposing of human and hazardous waste.

NATION ASSISTANCE

Nation assistance includes the civil and military assistance actions (other than humanitarian assistance) rendered to a nation by the corps within that nation during war, conflict, and peace. Nation assistance supports the host nation's efforts to promote development, ideally through the use of host-nation resources. The goals of nation assistance are to promote long-term stability; to develop sound and responsive democratic institutions; to develop a supportive infrastructure; to promote strong, free-market economies; and to provide an orderly political change and economic-progress environment. All corps nation-assistance actions are integrated through the US ambassador's country plan and the CINC's regional plan. These goals can only be met through education and transfer of essential skills to the host nation. To be effective in meeting these goals, the host nation must develop a sense of ownership of nation-assistance actions and projects.

Typical corps engineer missions in support of nation-assistance operations include the following:

- Engineer staff visits and exchanges of engineer subject-m atter experts (SMEs) between the US and the foreign nation to discuss specific engineer topics.

Ž The exchange of engineer officers and NCOs to work in the host-nation's army.

Ž Deployments of engineer units to perform multinational engineer training with the host-nation's military. This training may include the construction of roads, airfields, structures, and ports; well drilling; construction-material production; and topographic engineering.

SUPPORT TO INSURGENCY AND COUNTERINSURGENCY

At the direction of the National Command Authority (NCA), the corps may assist either insurgent movements or the host-nation government opposing an insurgency. In both cases, the corps predominantly supports political and economical objectives. Through SOF, the corps covertly supports insurgences that oppose repressive regimes that work against US interests. The corps provides overt support to a host-nation's counterinsurgency operations through logistical and training support in

concert with the US ambassador's country plan.

Corps engineer support to insurgency forces is limited to providing topographic products and constructing SOF operating bases located outside the AO. Corps engineer missions for counterinsurgency operations are similar to those for humanitarian and nation assistance. They include water supply and sanitation improvements; road, airfield, and port construction; and multinational training.

NONCOMBATANT EVACUATION OPERATIONS

NEOs are conducted to evacuate threatened US and authorized host-nation or third-country citizens from locations in a foreign nation or a safe haven. A NEO involves swift, temporary occupancy of an objective. It ends with a preplanned withdrawal. If the use of force is involved, the minimum amount of force to accomplish the mission will be used. A NEO is normally conducted as a joint operation by the corps and sometimes involves multinational forces.

Corps engineers that support a NEO generally operate as part of a joint force and may conduct a wide variety of tasks, including—

- Constructing temporary facilities and protective structures in country or in another country for either US forces or the evacuees.
- Providing needed topographic products and data for the operation.
- Conducting route reconnaissance and mobility operations for land evacuation.
- Repairing airfields and clearing helicopter landing zones for use in air-evacuation operations.

PEACE OPERATIONS

Peace operations encompass three types of predominantly diplomatic activities: preventive diplomacy, peacemaking, and peace building. It also includes two complementary, predominantly military activities--peacekeeping and peace enforcement. Corps engineer involvement in shows of force, preventive deployments, military-to-military relations, and security-assistance programs all support preventive diplomacy and peacemaking efforts. Corps engineers support peace building primarily through postconflict missions such as repairing utilities and roads, FM 100-23 provides further details for peace operations.

Peacekeeping Operations

Peacekeeping operations (PKOs) support diplomatic efforts to establish or maintain peace in areas of potential or actual conflict, They are undertaken with the consent of all belligerents, Corps PKO forces monitor and facilitate the implementation of an existing truce or ceasefire and they support diplomatic efforts to reach a long-term political settlement. Strict appearance of neutrality, an adequate means of self-protection, and the avail ability of timely and effective support are critical. The corps may be tasked to conduct PKOs over a considerable time period, under multinational control (such as the United Nations (UN)), or under a unilateral peacekeeping umbrella.

Corps engineer missions in PKOs range from facilities construction to minefield clearance. The size and composition of the corps engineer unit will vary depending on the specific tasks that the unit must perform. If the force is moving into an area with no facilities, the requirement for construction engineering skills will depend on whether the force will construct its own facilities, another country's engineers will construct them, or the work will be contracted. If the peacekeeping force moves into existing facilities, the requirement for construction skills will depend on who is tasked to maintain the facilities. Although the require-

ment for combat engineers maybe small, there is a possible need for this type of force to construct barriers, provide assistance and training in engineering skills, or conduct countermine operations, either in contested areas or along peacekeeping-force patrol routes. The majority of engineer operations fall into one of two categories: general engineering and combat engineering support.

General engineer missions include those tasks that support the force through the construction and repair of billeting, support and logistics facilities, as well as LOC. These tasks may include constructing, maintaining, and operating electrical and sanitation utilities as well as locating water sources, operating reverse osmosis water purification units, and drilling wells, if necessary for water supply. General engineering support must be in accordance with agreements between the parties in the conflict and the host nations, as applicable, and must comply with Title 10, USC 401 unless support is provided under Section 551 of the Foreign Assistance Act of 1961 (22 USC 2348).

The purpose of general engineering is to provide an adequate support base for the peacekeeping force. The base must provide secure and healthy living conditions. It must provide sufficient administrative and maintenance space for the units supporting the force and secure storage for all associated supplies and material.

Specific general engineering missions include —

- Base-camp construction.
- Air bases, ports, and other logistics facilities construction.
- LOC construction.
- Potable water-source development.
- Base and LOC maintenance.

There are several construction missions essential for PKOs. These missions include constructing observation posts (OPs), checkpoints, and roadblocks.

Combat engineering tasks (such as mobility, countermobility and survivability tasks) may be conducted by US engineer units in support of PKOs. Engineer missions specifically related to PKOs include—

- Constructing CPs, bunkers, and OPs.
- Constructing force-protection structures such as earth revetments, wire obstacles, and defensive positions.
- Clearing fields of observation.
- Demolishing fortifications.
- Clearing or marking minefield (including minefield-fence maintenance).
- Clearing mines and booby traps.
- Providing backup support for identifying, marking, removing, or destroying explosive ordnance.

Peace-Enforcement Operations

Peace-enforcement operations (PEOs) are military intervention operations in support of diplomatic efforts to restore peace or to establish conditions for conducting PKOs. PEOs are intended to halt violence and restore more normal civil activities. PEOs seek to restore order and political and diplomatic dialogue. Unlike PKOs, in PEOs the consent of all belligerents will not be obtained. Typically, one or more of the belligerents will not be in favor of employing PEO forces. When conducting PEOs, the corps deploys sufficient combat power to present a credible threat, to protect the force, and to conduct the full range of combat operations necessary to restore order and to separate warring factions when required. PEOs are nor-

really conducted in cooperation with other counties and agencies but may be unilateral in scope.

Corps engineers support PEOs with—

- Combat engineer missions in support of combat operations.
- Topographic engineering support.
- Lodgment and theater infrastructure development, including the construction and repair of protective facilities, roads, airfields, ports, and troop life-support facilities.

DEMONSTRATIONS AND SHOWS OF FORCE

Demonstrations and shows of force portray American resolve in a situation vital to our national interests to potential adversaries. They can take the form of multinational training exercises, rehearsals, forward staging of units, or force buildup in the AO. A corps's involvement in a show of force may range in size and scope from a publicized, heightened state of alert at the home station to the completion of an unopposed force-projection entry into the AO. The corps must plan for the possibility of a show of force deteriorating into a combat operation. Political concerns dominate shows of force.

Corps engineer support to demonstrations and shows of force is normally a joint and multinational effort. Corps engineer tasks are very similar to the ones described in Chapter 3. The overt use of engineer forces during shows of force may aid in the operation's political intent.

SECURITY ASSISTANCE

Security assistance provides defense material, military training, and defense-related services by grants, loans, creditor cash sales to further national policies and objectives. Security-assistance operations do not normally have an impact on a corps. When they do have an impact on a corps, it is normally through the Security Assistance Training Program (SATP). The two primary subcomponents of this program are the International Military Education and Training Program (IMETP) and the Foreign Military Sales Program (FMSP). However, in cases where security assistance must be surged to meet urgent operational requirements, the corps may be required to supervise the preparation and transfer of major end items of equipment by subordinate corps units to a foreign nation.

Corps engineers may be involved with security assistance by constructing required logistics facilities that support the FMSP. Corps engineer mobile training teams are also able to support the IMETP.

SUPPORT TO CIVIL AUTHORITIES

These operations provide temporary support to domestic civil authorities when permitted by law. They are normally taken when an emergency overwhelms the capabilities of civil authorities. The type of support provided by the corps is divided into four categories: disaster relief, environmental assistance, community assistance, and law enforcement.

Corps engineer forces may be called upon to support civil authorities in various missions such as fighting forest fires, removing snow, removing hazardous wastes, providing riot control, and constructing emergency bridges and airfields. FM 100-19 describes in detail how corps engineers support civil authorities.

SUPPORT TO COUNTERDRUG OPERATIONS

Because of US Code restrictions, the corps does not normally participate in domestic counterdrug operations. National Guard corps units may participate in counterdrug operations while under the state's control. The corps may become involved with cooperating foreign governments to interdict the flow of illegal drugs at the source, in transit and during distribution. Corps support of foreign counterdrug op-

erations is normally coordinated by the CINC of the region, his special-operations command, and a country's military-assistance groups. The corps will normally supervise the preparation, deployment, and possible sustainment of small specialized units to meet CINC or SOF shortfalls.

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

- Constructing or rehabilitating law-enforcement target ranges; helipads; and fuel-storage, billet, CP, and maintenance facilities.

Ž Producing photomaps and other topographic products of likely counterdrug operations areas.

Ž Constructing or upgrading access roads for drug-interdiction patrols.

Ž Clearing observation fields for counterdrug teams.

ENGINEER CONSIDERATIONS

OOTW are joint, multi agency, and multi national efforts. Effective engineer liaison with all involved military units and civilian agencies is critical to mission success. The corps engineer tailors engineer support based on mission requirements. This support may be radically different than for supporting combat operations. The following discussion highlights key corps engineer OOTW considerations:

ENGINEER ASSESSMENT

An early, on-the-ground assessment by corps engineer forces is critical to properly tailor and logistically support the follow-on engineer OOTW force. Results of this assessment are quickly passed to deployment planners to ensure that an adequate engineer support force arrives in the AO in a timely manner. Failure to provide an adequate and timely engineer force may cause inadequate troop bed down, sanitation, and force protection to the deployed force. This early, on-the-ground engineer assessment identifies—

Threat engineer capabilities in likely lodgment areas, including combat engineering requirements for force protection, countermine, counterobstacle, and early-entry force support operations.

The status of the infrastructure in the AO, including airfield, road, port, logistics base, and troop bed-down facilities; real estate acquisition; construction material supply; construction management; and line-haul requirements.

Existing topographic product availability and requirements for new terrain visualization products.

Specialized engineer requirements such as prime-power, fire-fighting, water-detection, and well-drilling support.

Engineer C2 requirements, including headquarters staffing, communications, and information systems support.

Ž Engineer liaison requirements, including linguists and civil-affairs personnel.

• Mission objectives and end-state, mission-success, and liaison procedures.

• Requirements for officers with contracting officer's representative (COR) or USACE experience.

Ž The use of LOGCAP, contractor responsibilities, contract construction procedures, and initial work areas.

JOINT ENGINEER COMMAND AND CONTROL

Because of the joint, multi agency, and multinational nature of OOTW, a key consideration is how various engineer forces are commanded and controlled. At the joint and multinational staffing level, the engineer staff should be placed under the operational (J3) staff or as a separate SES. Engineers should avoid being placed under the auspices of the joint or multinational logistics (J4) staff. Lessons learned from continuing OOTW deployments show that when staff engineers are placed under the J4, engineers are tied up supporting logistics forces in theater at the expense of maneuver and other deployed units. A separate engineer headquarters should be identified to command and control diverse OOTW engineer support.

TOPOGRAPHIC SUPPORT

By their nature, OOTW missions are normally conducted in areas of the US and the rest of the world that have limited up-to-date topographic coverage from the DMA; the United States Geological Survey (USGS); and other civilian, allied, and host-nation sources. It is critical that the corps engineer ensures that the following functions are accomplished when providing topographic support to a corps JTF or ARFOR OOTW mission:

• Evaluate the availability of standard and nonstandard map products in the OOTW's AO. If shortfalls exist, the corps engineer and the Intelligence Directorate (J2) or ARFOR G2 define specific requirements and coordinate the collection and creation of necessary data to build the JTF or ARFOR topographic data base.

• Coordinate with the J2/J3 or the ARFOR G2/G3 for the early collection of terrain information in the OOTW's AO through reconnaissance, topographic survey, and satellite imagery.

Ž Ensure that terrain analysis and topographic reproduction capability are available early to the JTF or ARFOR or provided through split-basing these capabilities from CONUS locations.

• Establish a topographic-product storage-and-distribution capability in the OOTW's AO in conjunction with the J4 or ARFOR G4.

Ž Establish special topographic product procedures with SOF and other deployed forces.

CONSTRUCTION SUPPORT

OOTW missions are normally conducted following the destruction of the area's infrastructure because of man-made or natural disasters or conflicts between warring factions. OOTW highlight the requirement for engineers to establish some type of bare-base infrastructure that supports deployed forces or displaced civilians with minimal life support and a protected, healthy, and safe environment. Sanitary living and working areas are usually nonexistent. Water supplies are usually contaminated. Electric power grids are normally off-line. Airfields and ports may not be operating at full capacity due to damage. Criminal activity may be widespread. The corps engineer en-

sures that the following functions are accomplished when providing construction support to a corps JTF or ARFOR OOTW mission:

- Ž Determine the status, availability, and acquisition procedures for existing infrastructure facilities, utilities, airfields, ports, roads, and construction materials in the OOTWs AO.
- Ž Estimate minimal engineer construction standards for life support and force protection, including the need for base-camp packaging such as Force Provider. Define the construction end state with the JTF or ARFOR commander. Avoid mission creep.
- • Determine what construction will be conducted by US or host-nation military engineers or civilian contracting through LOGCAP, based on deployment time lines and the threat level.
- • Ensure that the JTF or ARFOR has adequate. construction-management capability in the OOTW's AO, including the use of joint, ENCOM, or USACE augmentation teams.
- • Ensure that joint, ENCOM, or USACE real estate acquisition teams are deployed.
- Ž Conduct thorough terrain analysis to ensure adequate construction-site drainage, heavy-equipment access, and protection.
- Ž Ensure that required construction materials are procured and shipped in a timely manner to meet initial deployed force-protection and life-support needs. Flow in construction materials with deploying forces. Establish with the JTF J4 or ARFOR G4 specific construction-material yard locations and requisition and distribution procedures.

COUNTERMINE OPERATIONS

It is estimated that there are more than 100 million uncleared land mines spread throughout 62 countries. This equates to approximately one land mine for every 50 people on our planet. Land mines are cheap and easily obtained or constructed. They have become the third world's weapon of choice. They directly threaten civilian populations and corps forces during OOTW missions. US forces do not conduct demining operations; they clear mines only as required for military operations. It is critical that the corps engineer ensures that the following functions are accomplished when providing countermine support to a corps JTF or ARFOR OOTW mission that is threatened with land mines:

- Ž Work closely with the JTF J2 or ARFOR G2 to determine the land-mine threat in the OOTW's AO. Publish mine-recognition handbooks for deploying forces. Exploit all sources of intelligence to identify mined areas in the OOTW's AO.
- Ž Ensure that deployed forces are trained to identify, mark, and report encountered land mines.
- Ž Ensure that engineers are fully confident in the employment of countermine equipment and that the equipment is operational. Conduct land-mine detection, marking, and removal training for soldiers conducting countermine missions.
- Ž Provide necessary individual protective equipment and mine-resistant vehicles to soldiers conducting countermine operations.
- Ž Establish, disseminate, and enforce route and area land-mine clearance and marking procedures for the OOTW's AO. Include these procedures with established ROE.

FORCE PROTECTION

Corps engineers have unique equipment and personnel capabilities that can be used to support deployed force-protection efforts during OOTW missions. Engineers construct protective facilities, bunkers, emplacements, vehicle barriers, fences, and other structures needed to protect the force. The corps engineer ensures that the following functions are accomplished when providing force-protection support to a corps JTF or ARFOR operation:

- Establish with the JTF or ARFOR commander the required level of protection needed in the OOTW's AO, based on the expected threat.
- Develop force-protection construction standards for operating and life-support bases, including the need for security fencing, lighting, obstacles, and guard posts.

Ž Ensure that adequate force-protection construction materials are provided to early-entry forces.

- Establish facility security-inspection procedures with military and local law-enforcement personnel to quickly identify and repair breaches.

APPENDIX A
ORDERS AND ANNEXES

Orders and annexes are critical components of corps engineer C2. The corps engineer brigade commander exercises functional control over engineer operations within the corps (engineer units supporting maneuver divisions, separate brigades, and cavalry regiments) by including critical instructions in the corps order and the engineer annex. The corps engineer brigade commander also issues a unit order to exercise both fictional and unit control over forces committed to corps-level operations. These units are normally task-organized by the corps under the control of the corps engineer brigade commander. Therefore, it is imperative that the corps engineer brigade commander understands how to use the combination of corps and unit orders to convey the plan.

This appendix is divided into two major sections. The first section deals with the corps OPORD, the engineer annex and the topographic operations annex. This section provides the base format of the corps OPORD, highlighting areas where the corps engineer may have direct input. It also outlines the format and content of the engineer and topographic operations amexes and provides sample overlays. The second section focuses on corps engineer unit orders. It provides a format and content for the corps engineer unit WARNORD and OPORD, including possible annexes, overlays, and FRAGOs.

THE CORPS OPORD, THE ENGINEER ANNEX, AND THE TOPOGRAPHIC OPERATIONS ANNEX

CORPS OPORD

Figure A-1, pages A-2 through A-5, is a sample format of the corps OPORD. Paragraphs in which the corps engineer brigade commander may provide engineer input are highlighted.

ENGINEER ANNEX

The engineer annex contains information not included in the base corps order that is critical to the corps engineer plan or required for subordinate engineer planning. It does not include instructions or orders directly to corps engineer units. All instructions or tasks are addressed to maneuver divisions, separate brigades, and cavalry regiments--not supporting corps engineer units. More important, 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 a unit order. For example, it does not give subunit orders and service sup port instructions to engineer units remaining under the corps engineer brigade command; those orders and instructions are contained in the corps engineer brigade order. The engineer annex should meet the following general criteria:

- Includes critical information derived from the EBA process.
- Ž Contains all critical information and tasks not covered elsewhere in the order.

(Classification)

Copy _____ of _____ copies
Issuing Headquarters
(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 unit's supporting maneuver divisions, separate brigades, and cavalry regiments, including the command or support relationship.
- List units under the corps engineer brigade commander's command.
- List units remaining under corps control.

1. SITUATION.

a. Enemy Forces. Include recant enemy engineer activities or capabilities that are critical to maneuver division, separate brigade, and cavalry regiment commanders or are essential to understanding the corps 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. For example, releasing corps control of bridge units to divisions.

2. MISSION.

3. EXECUTION.

Intent.

a. Concept of the Operation.

(1) Maneuver.

(2) Fires.

(3) Counterair operations.

Figure A-1. Corps OPORD

A-2 Orders and Annexes

(4) Intelligence.

- Include the focus of engineer intelligence-collection efforts that impact on the maneuver plan.
- Provide subordinate units with information requirements that are command PIR, as coordinated with the G2 and the corps commander.
- Include special topographic product Information, such as river and trafficability data.

(5) Electronic warfare.

(6) Engineer.

- Describe the concept of engineer operations to support the maneuver plan.
- Establish the priority of effort and priority of support by mission and unit for each phase of the operation.
- Focus primarily on support to simultaneous deep, close, and rear operations.
- Discuss corps-level missions only as they impact on division, separate brigade, and cavalry regiment commanders.

(7) (Others, as needed.)

b. Tasks to Maneuver Units.

- Mission-essential engineer tasks to be accomplished by a specific maneuver element.
- Mission-essential tasks to be accomplished by engineers task-organized to maneuver elements.

c. Tasks to Combat Support Units. May include corps-level tasks assigned to the corps engineer brigade. Only listed to inform division, separate brigade, and cavalry regiment commanders of tasks under corps control using corps-level forces.

d. Coordinating Instructions.

- Critical engineer instructions common to two or more maneuver units.
- Does not normally include SOP information unless it is needed for emphasis.
- May Include times or events In which corps-directed obstacle zones and ORAs become effective, if they differ from the effective time of the order.
- Establish initial mission-oriented protective posture (MOPP) level for operation.

4. SERVICE SUPPORT.

a. General Concept of Logistics Support.

- Concept for push of Class lV/V supplies.
- Concept for logistics support of organic and supporting corps engineers task-organized to maneuver divisions, separate brigades, and cavalry regiments, if not listed in service

Figure A-1. Corps OPORD (continued]

support annex.

- Concept for bridging supplies.

b. Materiel and Services.

(1) Supply.

- Division, separate brigade, and cavalry regiment allocations of Class IV or engineer Class V supplies, if not contained in the engineer annex.
- Tentative locations for transfer of Class IV/V supplies to maneuver divisions, separate brigades, and cavalry regiments.
- Locations of bridging supplies in the corps area.
- Standard map-product supplies.

(2) Transportation. Transport of engineer-related supplies by corps units or organic engineer haul assets.

(3) Services.

c. Medical Evacuation and Hospitalization.

d. Personnel.

e. Civil-Military Cooperation.

f. Host-Nation Support.

- Real estate procurement procedures.
- Use of host-nation construction forces.

g. Contracting.

- Construction contracting procedures.
- Use of LOGCAP.

h. Miscellaneous.

5. COMMAND AND SIGNAL.

a. Command.

b. Signal.

Figure A-1. Corps OPORD (continued)

A-4 Orders and Annexes

Acknowledge

Commander's Signature (optional)
Commander's last name
Rank

OFFICIAL:
(Authentication)

Annexes:

Distribution:

Figure A-1. Corps OPORD (continued)

- Does not contain items covered in SOPs unless the mission requires a change to the SOP.

Ž Contains information and tasks directed to major subordinate elements of the corps, not supporting engineer units.

- Contains clear, complete, brief, and timely directives, but avoids qualified directives.

- Includes only information and instructions that have been fully coordinated with other parts of the OPORD, the corps commander, and the staff.

The engineer annex includes any combination of written instructions, matrices, or overlays necessary to convey the essential details of the engineer plan. The engineer annex 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 operation and engineer plan. A standardized annex format makes it easier for the engineer staff officer to remember what should be included, as well as for subordinate staff officers to find required information. The format tailors the five-paragraph order to convey critical information.

The engineer annex may also include matrices and overlays, as necessary, to convey the plan. Matrices may be used as part of the body of the annex or as separate appendices. They are used to quickly convey or summarize information not needing explanation, such as logistics allocations, corps obstacle zone priorities and restrictions, or the task summary (execution matrix). Finally overlays are used to give information or instructions and expedite integration into the overall combined arms plan. At corps level, information shown on overlays may include but is not limited to—

Ž All existing and proposed friendly obstacles and control measures (obstacle zones, restrictions, and lanes; directed and reserve obstacles; and corps-level situational obstacles, including associated NAI/TAI).

- Known and plotted enemy obstacles (must also be on situation template).

Ž Logistic locations and routes, as they apply to engineer operations.

- NBC-contaminated areas.

- Scatterable mine restrictions.

Ž River-crossing locations and restrictions.

Ž Proposed thorough decontamination sites.

Figure A-2, pages A-7 through A-11, is a sample format of a written engineer annex Figures A-3 through A-5, pages A-12 through A-14, provide sample matrices and overlays.

TOPOGRAPHIC OPERATIONS ANNEX

The corps prepares a topographic operations annex to all OPORDs. This annex provides the direction needed by subordinate elements of the command to obtain support from topographic units and guidance for the employment of those units. The format for the topographic annex is shown in Figure A-6, pages A-15 through A-18. Proper preparation of the annex demands detailed identification and definition of all requirements for topographic products and services, whether provided by the DMA or field units. The preparation of the topographic annex is not limited to topographic products, but applies to any products and services in the MC&G field which are required to support the corps OPORD.

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(Date-time group, month, year)
(Message reference number)

Annex_____(Engineer) to OPORD _____

Reference: Map(s) and other references required.
Time Zone Used Throughout the Order:

Task Organization: List all engineer units and task-organize them to maneuver divisions, separate brigades, and cavalry regiments; the corps engineer brigade organization; or the corps.

- List all engineer units supporting the corps and engineer 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.
- Must track with basic order.

1. SITUATION.

a. Enemy forces.

- Terrain. Critical aspects of the terrain impacting operations, including river and trafficability data.
- Weather, Critical aspects of the weather impacting operations.
- Enemy engineer capability/activity.

-- Known and plotted locations and activities of enemy engineer units.

-- Significant enemy maneuver and engineer capabilities that impact on engineer operations.

-- Expected employment of engineers based on the most probable enemy course of action.

b. Friendly forces.

- Designation, location, and activities of higher and adjacent engineers impacting on corps or requiring coordination.
- Nonengineer units capable of assisting in engineer operations (such as nonengineer units capable

Figure A-2. Engineer Annex

of emplacing scatterable mines).

c. Attachments and Detachments.

- List units attached or detached, only as necessary to clarify task organization.
- Highlight changes in engineer task organization occurring during operations along with effective times or events.

2. MISSION. Same as corps mission statement.

3. EXECUTION.

a. Scheme of Engineer Operations.

- Describe the concept of engineer operations to support the maneuver plan. Must tie critical tasks or main effort to the corps defeat mechanism.
- Establish the main effort of the engineer effort by mission and unit for each phase of the operation.
- Focus primarily on corps engineer support to simultaneous deep, close, and rear operations.
- Discuss corps-level engineer missions only as they impact on division, separate brigade, and cavalry regiment commanders.

(1) Obstacles.

- Supplement the narrative above, focusing specifically on details of the countermobility effort.
- Identify directed obstacle zones and ORAs used to support simultaneous corps deep, close, and rear operations, Assign zone responsibilities, priorities, and restrictions to obstacle zones. Zone 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 corps-directed tactical and reserve demolition obstacles. Also, provide execution criteria for reserve obstacles.

(2) Situational obstacles.

- Concept for the employment of situational obstacles. Focus on how they will be used to support the corps maneuver plan, including scatterable mines.
- Corps-planned and executed. Clearly identify location, intent, and execution criteria of corps-level obstacles planned and executed by the corps.
- Corps-planned/division, separate brigade, or cavalry regiment-executed, Assign responsibilities for executing corps situation obstacles emplaced and resourced by the corps. Discussion must include details on NAIs, TAIs, decision points, and execution criteria.
- Corps-resourced/division, separate brigade, or cavalry regiment-planned and executed. Assign intent and allocate resources to divisions, separate brigades, and cavalry regiments. May also state execution criteria.
- Authority. For each type, clearly state the headquarters maintaining the authority to use scatterable mines and any restrictions on duration (by zone).

Figure A-2. Engineer Annex (continued)

(3) Bridging.

- Concept for the employment of float and fixed bridging in the corps area.
- Concept for host-nation bridging support.
- Locations of corps bridge parks/host-nation bridge supply points.

(4) Construction.

- Concept for horizontal and vertical construction in the corps area.
- Host-nation or contract construction capability.
- Standards of construction.
- Environmental guidance.
- Use of LOGCAP for construction.
- Use of EWL.

(5) Topographic engineering. Refer to the Topographic Operations Annex to the corps OPORD.

b. Subunit Instructions. (All tasks listed as division, separate brigade, and cavalry regiment missions or engineer units under corps control.)

- Engineer tasks to be accomplished by a specific subordinate unit and not contained In the base OPORD.
- Engineer tasks to be accomplished by engineers supporting maneuver elements (only as necessary to ensure unity of effort).
- Corps-level tasks assigned to the corps engineer brigade organization are included, List only to inform subordinate unit commanders of tasks under corps control using corps-level forces.

c. Coordinating Instructions,

- Critical engineer instructions common to two or more maneuver units not already covered in the bae OPORD.
- SOP Information, only if needed for emphasis.
- Times or events in which obstacle zones and ORAs become effective, if they differ from the effective time of the order.
- Corps PIR that must be considered by subordinate engineer staff officers or that require reports to the ACE.
- Mission reports required by the ACE (if not covered in Signal paragraph or unit SOP).
- Explanation of EWL, If used.

4. SERVICE SUPPORT.

a. Command-Regulated Classes of Supply.

Figure A-2. Engineer Annex (continued)

- Highlight subunit allocations of command-regulated classes of supply that impact on the operation's CSR.
- May summarize in a matrix or table.

b. Class IV/V Supplies Distribution Plan.

- State the method of supply (supply point or unit distribution) to be used for Class IV/V supplies for each subunit.
- Give tentative locations for Class IV/V supply points or locations for linkup of corps or theater push packages directly to units.
- Give allocation of Class IV/V supplies by division, separate brigade, cavalry regiment, zone, or a combination. May be summarized in a matrix or table.

c. Transportation.

- Allocation and priority of support of theater and corps haul or airlift assets dedicated to division, separate brigades, and cavalry regiments for Class IV/V supplies haul.
- Requirements for divisions, separate brigades, and cavalry regiments to supplement corps transportation of mission loads (for example, divisions, separate brigades, and cavalry regiments responsible for haul forward of PL ____, each division, separate brigade, and cavalry regiment provides ___ heavy expanded mobility tactical trucks (HEMTTs) to haul mission).

d. Health-Services Support. Address arrangements made for theater engineer units operating in corps areas.

e. Host Nation.

- Types and locations of host-nation engineer facilities, assets, or support.
- Procedures for requesting and acquiring host-nation engineer support.
- Limitations or restrictions on host-nation support (for example, host-nation personnel not authorized forward of PL____).

f. Personnel Support. Address arrangements made for theater engineer units operating in corps areas.

5. COMMAND AND SIGNAL.

a. Command.

- Location of key engineer leaders.
- Designated chain of command.
- Designated headquarters that controls the effort within work lines on an area basis.

b. Signal.

- Nets monitored by the ACE and the corps TAC and rear CP engineers for reports, if different than SOP.
- Designated critical engineer reporting requirements of subordinates, if not covered in coordinating

Figure A-2. Engineer Annex (continued)

Instructions or SOP.

ACKNOWLEDGE

COMMANDER
Rank

Official
/s/
Name
Position

Appendices
--Obstacle overlay (Figure A-3)
--Large-scale breach overlay (Figure A-4)
--Rear operations overlay (Figure A-5)

Figure A-2. Engineer Annex (continued)

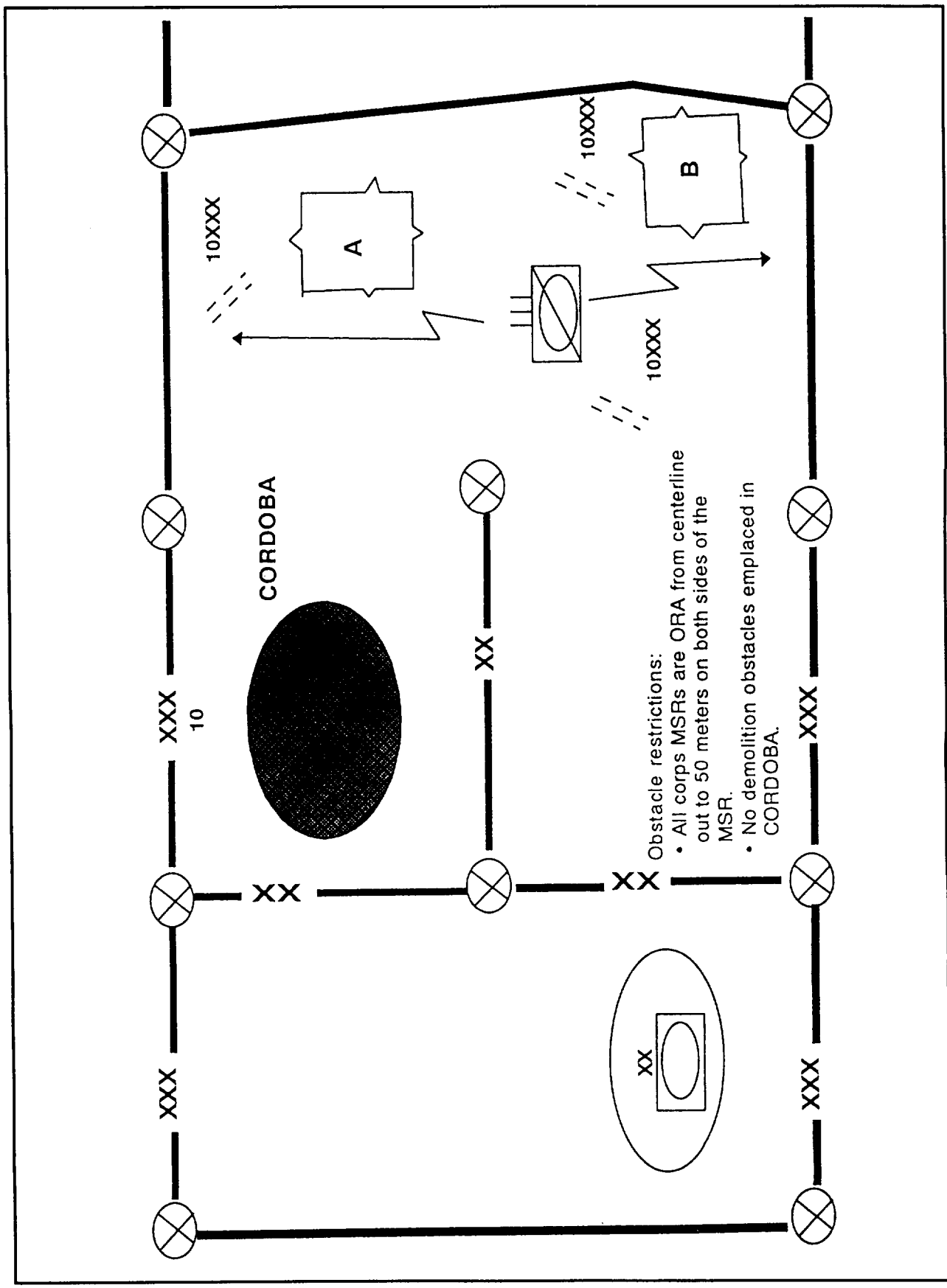


Figure A-3. Obstacle overlay

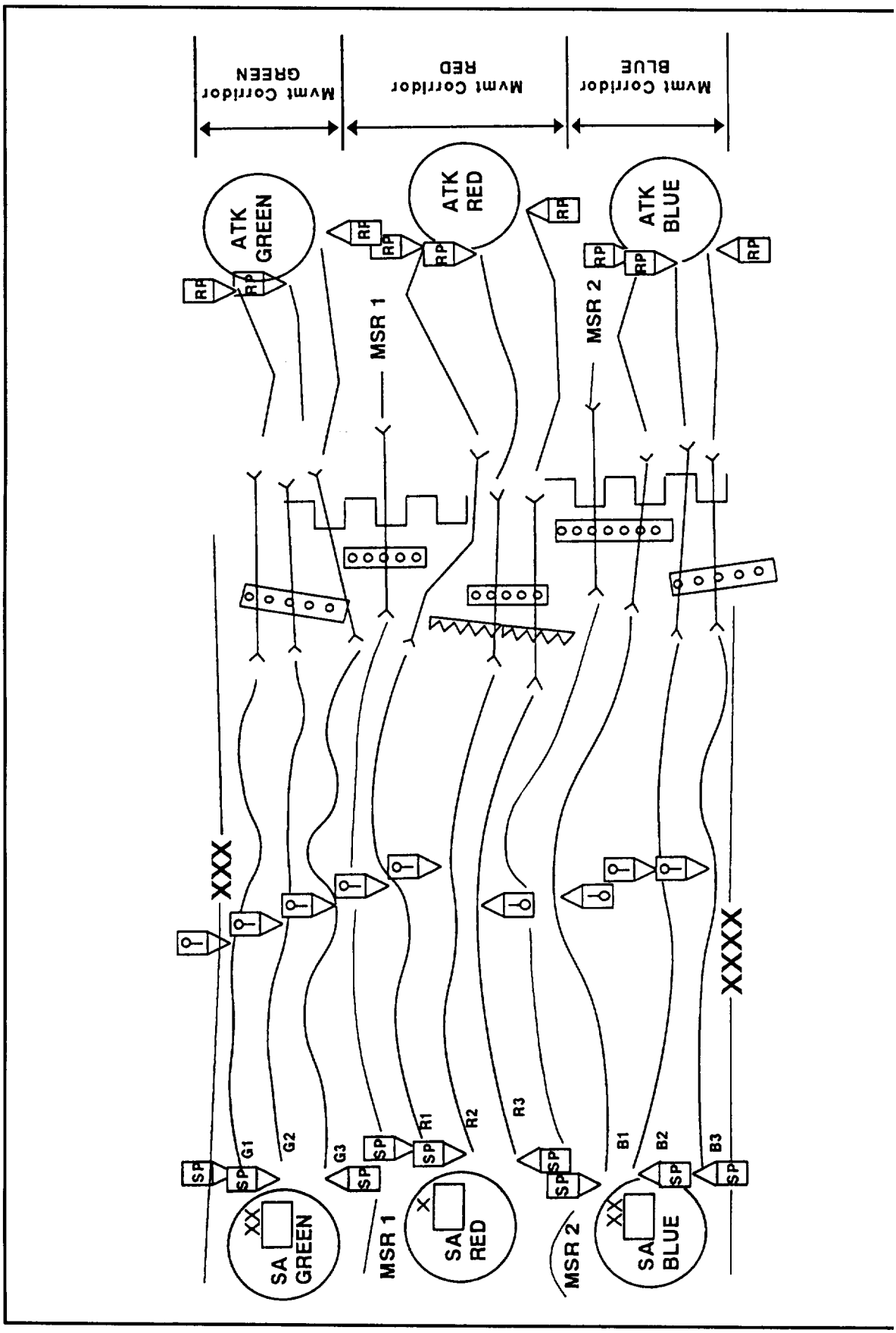


Figure A-4. Large-scale breach lane overlay

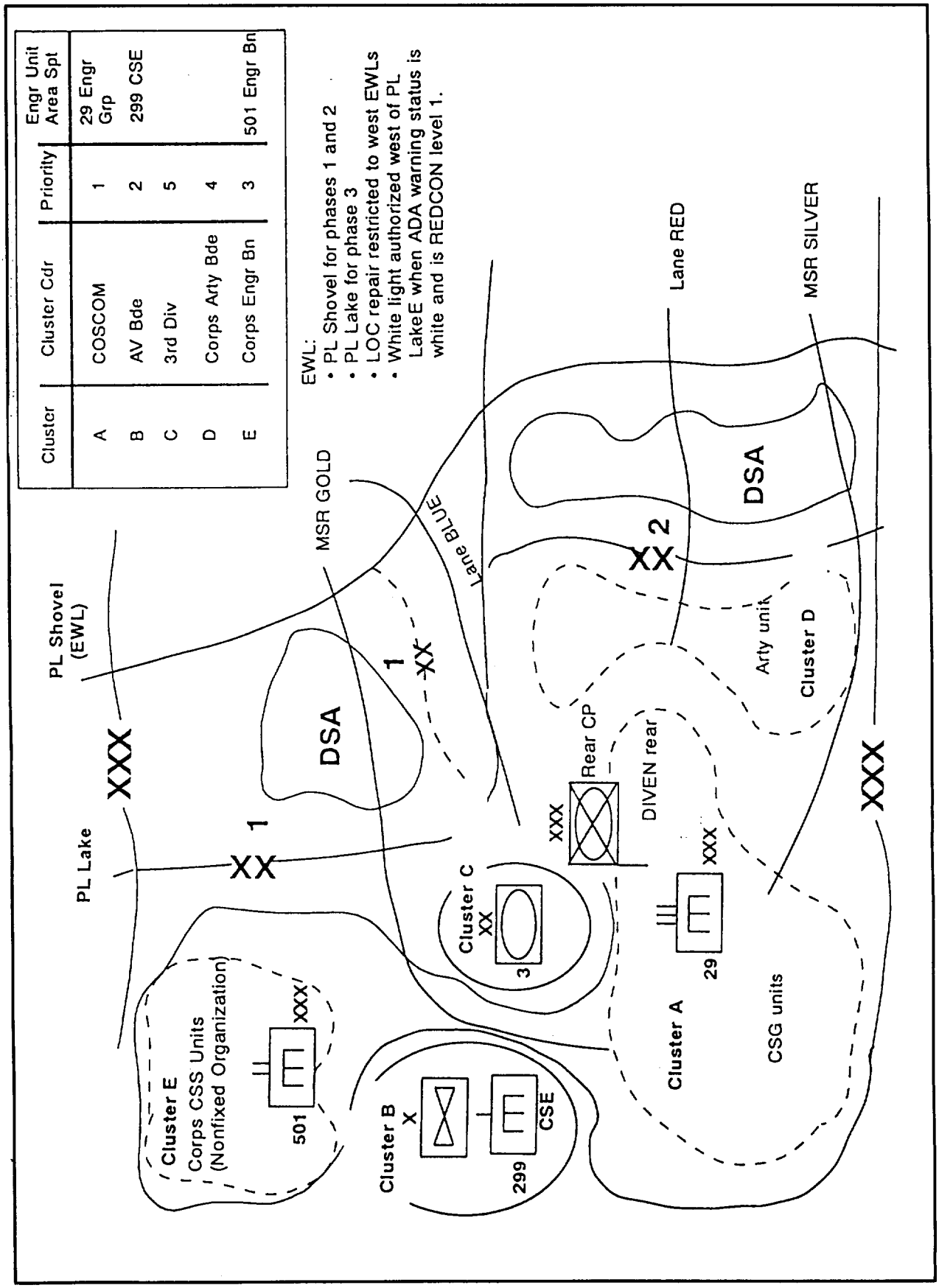


Figure A-5. Engineer rear-area operations

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(Message reference number)

Annex _____ (Topographic Operations) to OPORD _____

References:

a. List those standard maps that are required for an understanding of this annex.

b. List those documents which provide the guidance required for the necessary planning functions that are relevant to this annex.

1. SITUATION.

a. MC&G Requirements. List the MC&G products that are required to support the OPORD. Show desired area coverage and quantitative requirements using an appendix if necessary or by portraying them graphically using standard index bases.

b. Available Products. Provide a general statement regarding the availability and adequacy of the MC&G data and related material required to support the OPORD.

c. Capabilities. List those topographic engineer forces that are assigned or attached. Show the latest arrival date (LAD) for each topographic engineer unit that is contained in the time-phased force deployment data (TPFDD). If this is of sufficient length, use an appendix for recording detailed transportation requirements and procedures. Reference the appendix. Take notice that the format for the appendix should follow local procedures.

d. Supporting Capabilities. List those topographic engineer forces that are not assigned or attached but which will be required to provide topographic support needed to implement this plan, including units not deployed. Specify the type of command relationship desired for each unit plus the type and duration of support required.

2. MISSION. Restate the corps OPORD mission statement.

3. EXECUTION.

a. Concept of Topographic Operations.

(1) General. Describe how the command will provide the topographic support necessary to meet the commander's overall mission requirement. Include--

- Time phasing of operations.
- Nature and purpose of topographic operations to be conducted.
- Joint or multinational topographic support.
- Support from the DMA.

Figure A-6. Topographic annex

- Support provided by agreements, coordination, and cooperation necessary for the successful implementation of the OPORD. Describe the scope and extent of foreign/host-nation support that is available to enhance topographic operations in support of the OPORD.

(2) Deployment. Summarize the requirements for deploying topographic engineer forces and depot activities from their normal peacetime locations. Include the area of operations, emphasizing careful time planning of this deployment.

(3) Employment. Describe in general terms how deployed topographic engineer forces are to be employed to conduct topographic operations.

b. Tasks. Explain detailed responsibilities of commanders, staffs, and topographic units. In separate numbered subparagraphs, list the topographic tasks assigned to each element of the command and for those units that provide support to the OPORD. Each task should be spelled out in a concise statement, including a mission to be performed in terms of further planning or execution of the overall plan. These task assignments should be sufficiently detailed to ensure that all elements essential to the concept of the operations are described properly. Ensure that responsibilities are assigned to establish, validate, and submit MC&G requirements and to task topographic engineer units supporting the OPORD. State responsibilities for defining and adjusting command stockage levels at map supply points. Specify map and data storage and distribution responsibilities for pick-up and storage.

c. Coordinating Instructions. The final subparagraph, lettered appropriately, should be in separately numbered subparagraphs. List those instructions that apply to the entire command or to two or more elements of it that are necessary for proper coordination of the MC&G supped. Specify points of contact (POCs) within the command who can authorize the release of war reserve stocks held or who can resolve command MC&G problems. State whether a push or pull system will be employed. Specify any restrictions or quantity of the special products which may be required. Also, explain the command's system for setting priority and for allocating resources to deal with demands on limited resources. Describe how notification of forces and agencies will be carried out and how notification will be time-sequenced. Provide the conditions under which contacts with host-nation agencies are authorized and identify those POCs.

4. ADMINISTRATION AND LOGISTICS.

a. Supply and Storage.

(1) MC&G products. Provide instructions on the MC&G supply and storage procedures and requirements. Give guidance for obtaining routine and emergency replenishment of MC&G products. Address any expected constraints on this replenishment. Include the planned locations of command and supporting MC&G storage sites and facilities. Specify the type and quantity of MC&G products to be held by the supporting command's units. Give guidance for lead times that are required for furnishing nonstandard special-purpose product support or responding to large quantity orders.

(2) Support of topographic engineer units. Specify the requirements needed for the provision of nontopographic as well as topographic logistics supports.

b. Transportation.

(1) MC&G products. Provide guidance for the movement of MC&G products from supporting supply points to the ultimate users. List, as a minimum, the time-phased transportation requirements list (TPTRL) portion of the TPFDD reflecting movement of MC&G materials. List any transportation shortfalls in the required support of topographic operations. Also, list contingency plans to fully carry out and sustain topographic operations In the event that full transportation requirements cannot be provided. An appendix may be used, if necessary, to list detailed transportation requirements and procedures.

(2) Topographic engineer units. Provide guidance for integrating the topographic engineer unit's transportation requirements into the command's movement order.

Figure A-6. Topographic annex (continued)

c. MC&G Support. Provide instructions for obtaining planned support. Itemize the division of responsibilities between organic units and supporting topographic engineer units to ensure that actions to procure and stock MC&G products are complementary. Identify POCs for emergency procurement. Normally, access to the DMA support is only available through the theater/JTF command.

d. Reports. Specify how reports are to be formatted as well as what time limits, methods, and classification apply to their submission. Enter this in the appendix. Follow local procedures for format.

5. COMMAND AND SIGNAL.

a. Priorities, Delineate the priority of MC&G support to supported units and the priority of production for MC&G products.

b. Command Relationships. Include primary and alternate locations of all major topographic engineer units and supporting DMA organizations. Specify the C2 relationships between the command and its attached or supporting MC&G units and organizations if this has not previously been addressed.

c. Command and Control. Provide a statement describing the scope and types of any special signal support that is required for MC&G operations. With the exception of survey units, most topographic units have few communications capabilities. Thus, explicit tasks are assigned to ensure that these units are effectively supported by the command's assets. This is especially critical in the case of distribution platoons operating map supply points. Refer to the signal annex of the OPORD.

/s/
Corps Commander

OFFICIAL:

Corps Engineer

Appendices:

1 - MC&G Requirements List
2 - MC&G Transportation Requirements (optional) (not shown)
3 - MC&G Reports (optional) (not shown)

Figure A-6. Topographic annex (continued)

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(Message reference number)

Appendix 1 to Topographic Annex to HQ OPLAN (Number)

MC&G Requirements List

Required items 1/	Coverage Required 2/	Coverage Available /3	Quantity /4
1. Standard Aerospace Products			
2. Standard Hydrographic Products			
3. Standard Topographic Products			
4. Standard Air Target Materials			
5. Survey Requirements			
6. Standard Multiuse Data Bases			

1/ Generalized description such as a map series, scale, or digital data. Stock number of a specific item is not required.

2/ Area to be covered described by geographic coordinates, political boundaries (identified by geopolitical codes), and recognizable geographic area Attach a graphic or list in a tab to the appendix.

3/ Attach as a graphic or list related to coverage required or source for special-purpose products in a tab to the appendix.

4/ Number of copies of each sheet, chart, or item needed to support the OPLAN. Attach a list by stock number in a tab to the appendix.

Figure A-6. Topographic annex (continued)

The types of products and services needed to carry out unit missions and the quantity and frequency of the support desired, are listed. As a minimum, maps and charts required for operational support must be identified.

To calculate the quantity of maps required for a particular OPORD, plot the geographical areas covered by the unit's areas of operations and interest on copies of appropriate indexes from the DMA or on a theater/JTF map catalog. A small-scale map of the general area may be used to plot and correlate the area to the index. Factors to be considered in setting up areas of operations and interest are given in FM 100-5. Areas of operations are designated by the next higher level of command. An alternative method is listing the stock numbers for all the sheets required. Usually, a combination of both methods is done since each has specific advantages.

The next step is to determine the size and type of units to be employed, since this defines the quantity of products required to support the OPORD. The theater/JTF commanders usually publish supplements to Army Regulation (AR) 115-11 which contain a list of generic units and the quantities of MC&G products each is authorized to order. If a supplement has not been published, the tables found in FM 101-10-1/2, Section IV, Topography, provide the necessary guidance. The quantity per sheet is then the sum of authorization for all subordinate units. The quantity per sheet multiplied by the number of sheets required for the geographical area is the basic load. The term days *of supply* is meaningless for maps since the speed with which a unit moves through any given area is determined by the mission as influenced by the weather, the terrain, and the enemy situation.

Planning stocks are those maps required by commanders and staffs to plan an anticipated operation. Allowances, most of the time, are no more than 20 percent of the basic load. Command guidance should define whether or not this quantity is authorized in addition to or as *part* of the basic load.

Operational stocks are those that have been consumed, through loss or destruction during execution of the OPORD. These stocks must be replaced. Operational stock allowances are usually limited to no more than 20 percent of the basic load.

Overlap must be considered. A simple addition of authorizations for all units under a command is not the total number of maps required for any particular map sheet To figure this told correctly look at the geographic area coverage required for each unit at any level, based upon the unit's mission and employment capabilities. Questions such as “Do all divisions in a corps require coverage for the entire corps area?" need to be addressed. Entire coverage may be required for the corps aviation brigade, even though all the maps may not be in use at the same time.

ENGINEER UNIT ORDERS

The corps engineer brigade commander uses a unit order to exercise unit control over engineer units remaining under his command. At the outset of an operation, the corps engineer brigade commander uses his order to effect the necessary task organization of engineers in the corps, to assign initial missions, and to establish sustainment integration with the COSCOM and CSGs. Once the task organization is effective and during combat operations, the corps engineer brigade commander directs subsequent unit orders only to those engineers under his command. Orders, missions, and instructions to engineers supporting maneuver divisions, separate brigades, and cavalry regiments in command relationships are included as tasks to the units in the corps order. The exception is the corps engineer unit WARNORD.

The corps engineer brigade commander issues WARNORDs to all engineers in the corps to facilitate parallel planning within engineer units and division, separate brigade, and cavalry regiment engineer staffs. WARNORDs to engineers supporting maneuver units are for planning only and are not executive.

CORPS ENGINEER UNIT 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-unit levels.

There is no prescribed format for the WARNORD. It may be either written or oral but should include the following information:

- Heading. WARNORDs must always begin with the words "Warning Order" to ensure 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 corps engineer unit WARNORD should address all engineer units in the corps.

Ž Situation. This section includes a brief description of friendly and enemy situations and critical events. It may also include probable missions for the corps and specified or implied tasks, and it may assign tentative tasks for planning only to engineer units.

Ž Attachments and Detachments. This section gives tentative and known changes to the task organization. However, it must be clear to engineers supporting maneuver units that changes in task organization are for planning and will not be effective until after an order is received from corps by the supported division, separate brigade, or cavalry regiment.

- Earliest Time of Move. This section states the earliest possible time that units must be ready to move. For units under the corps engineer brigade commander's command, actual movement times may be given, if known. The earliest time of move is critical to synchronizing sustainment operations to support future missions.

Ž Nature and Time of the Operation. This section provides recipients with as much information about the corps 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, assigning engineer tasks such as tactical/technical reconnaissance, establishing Class IV/V supply points, establishing bridge parks, and 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 units are always on order, with execution instructions coming through maneuver headquarters-generated orders.

Ž Time and Place of Orders Group. Units under the corps engineer brigade commander's command 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.

Ž Administrative/Logistical Information. This includes instructions and warning information on changes in unit logistics operations and lash-up 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.

- Acknowledgement. An acknowledgment of receipt is always required to make sure it is received by all addressees.

CORPS ENGINEER UNIT OPORD

The corps engineer brigade commander issues OPORDs to all engineer units under his command. This OPORD may initially include any engineer unit operating in the corps area as necessary to effect the task organization, assign fissions, and establish sustainment responsibility at the outset of an operation. However, once the task organization is effected, all instructions and missions to engineers supporting maneuver units are conveyed in corps orders and are addressed to the maneuver unit commanders. Figure A-7, pages A-22 through A-27, is an outline of the content of corps engineer unit OPORDs using the standard five-paragraph field order. When the order is an OPLAN instead of an OPORD, assumptions on which the plan is based are included at the end of the Situation paragraph.

CORPS ENGINEER UNIT FRAGO

The corps engineer brigade commander will frequently need to modify his OPORD through the use of FRAGOs in order to make changes in engineer operations that allow the corps to take advantage of tactical and operational opportunities. The corps engineer brigade commander issues FRAGOs only to engineer units under his command. Changes in instructions to engineers supporting maneuver units in command relationships are conveyed through input into the corps 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 corps engineer brigade commander can rarely issue FRAGOs to his subordinate commanders face-to-face. He must normally issue FRAGOs over the corps signal net. The corps engineer brigade commander may use the DBC, XO, or a member of his staff to issue the FRAGO in person to subordinate engineer commanders. This ensures that commanders understand the FRAGO and allows graphics to be provided. A FRAGO usually contains the following elements:

- Changes to Task Organization, Any changes to unit task organizations made necessary by the modification to the order.

- Situation. Includes a brief statement of current enemy and friendly situations that usually gives the reason for the FRAGO. It may also update subordinates on the current status of corps-level engineer missions.

- Concept. Gives changes to the scheme of engineer operations and the corresponding changes to subunit tasks. Must also include any changes in the corps or corps engineer brigade 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 scheme of engineer operations.

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(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 headquarters of units under corps control.
- Include all engineer headquarters of division, separate brigade, and cavalry regiment units, if the OPORD is the initial order for the operation.
- Include all theater/JTF engineer units operating in the corps area.
- List groups, battalions, companies, platoons, and detachments task-organized to headquarters 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.

- Key aspects of the terrain affecting operations.
- Key and decisive terrain in the corps area that relates to operations.
- River and trafficability data.
- Expected weather conditions and impact on operations.
- Light data and impact on engineer missions.

(2) Enemy situation.

- Macro picture of enemy forces facing the corps.
- Current disposition of enemy forces, including the location of major enemy units (known and

Figure A-7. Corps engineer brigade OPORD

plotted), strength, designation (if known), composition, and current activities.

- Enemy engineer activities and capabilities.
- Most probable enemy course of action.
- Enemy activities, capabilities, and courses of action that affect corps-level engineer operations.

b. Friendly Forces.

(1) Higher.

- Theater/JTF and corps missions and commander's intent; paraphrase theater or corps commander's intent as it applies to engineer operations.
- Brief description of the theater/JTF and corps plans; highlight those aspects that give purpose to missions.
- Theater/JTF engineer plans and priorities; where applicable, describe these as they apply to corps engineer operations.

(2) Adjacent. Highlight missions of adjacent corps and theater/JTF engineer units that impact on corps missions.

c. Attachments and Detachments.

- List attachments and detachments of organic and supporting engineers to the corps, as necessary, to clarify the task organization.
- Highlight any attachments and detachments that occur during the operation, including the time or event that triggers change.

2. MISSION.

- WHO is the corps engineer brigade organization.
- WHAT, WHEN, WHERE, and WHY is the corps mission.
- WHAT also includes any essential corps-level engineer missions.

3. EXECUTION.

Intent. The corps engineer brigade commander's intent for the operation.

- Give the corps engineer brigade commander's vision of the operation and how it supports the corps plan.
- Describe the purpose of operations (WHY).
- Describe the "end state" of corps-level operations and its link to the "end state" of the corps operation.
- Do not describe the scheme of engineer operations or subunit tasks.
- Must link engineer intent to the corps defeat mechanism.

Figure A-7. Corps engineer brigade OPORD (continued)

a. Scheme of Engineer Operations.

- Must be a clear, concise narrative of the engineer plan from beginning to successful end. Uses phases of the corps plan, organization of the defense, or battlefield framework to organize the narrative.
- Must focus on mission-essential engineer missions and corps engineer main effort only; it is not a summary of all engineer tasks, The corps engineer unit order will usually concentrate on engineer operations in the corps rear or corps-level missions in deep and close operations.
- Must clearly identify the corps engineer unit's main effort and how it shifts during the operation to support the corps plan.

(1) Obstacles.

- Supplement the narrative above, focusing specifically on the details of the coutermobility effort. Based on the nature of corps-level engineer missions, instructions may concentrate only on corps-directed obstacles and ORAs.
- Identify obstacle zones used to support corps deep, close, and rear operations. Assign zone responsibilities, priorities, and restrictions to corps-level countermobility efforts and engineer units.
- Identify and assign responsibilities for corps-directed tactical and reserve obstacles to be prepared by corps-controlled engineer units.

(2) Situational obstacles.

- Concept for the employment of situational obstacles, focusing on how they will be used to complement or augment conventional tactical obstacle efforts, including scatterable mines.
- Discussion must include details on NAIs, TAIs, decision points, and execution criteria if the scatterable mine target is corps-directed and executed by corps-controlled engineer units.
- Clearly state the headquarters maintaining the authority to use scatterable mines and any restrictions on duration (by zone).

(3) Bridging.

- Concept for employment of float and fixed bridging in the corps area.
- Discussion must include details on crossing sites, bridge parks, and bridge classification.
- Clearly state the headquarters controlling bridging in the corps area.

(4) Construction.

- Concept for horizontal and vertical construction in the corps area.
- Discussion must include details of standards of construction, environmental restrictions, locations of construction materials, and hand-off criteria.
- Clearly state use of host-nation or contract construction support, including LOGCAP.

(5) Topographic engineering.

Figure A-7. Corps engineer brigade OPORD (continued)

- Ž Topography concept.
- Ž Procedures.
- • Standard/special products.
- Ž Terrain-data management.

b. Tasks to Subordinate Units.

- • Clear, concise listing of all tasks assigned to engineer units remaining under the corps engineer brigade commander's control.
- Ž Each engineer group, batallion, and separate company headquarters remaining under the corps engineer brigade commander's control.
- Ž Tasks assigned by unit and generally listed In the order they will be executed during the operation.
- Ž Clearly distinguished "be prepared" and "on order" tasks from normal tasks.
- Ž Tasks/instructions common to two or more units are not Included.
- • All corps-level missions identified during the estimate process, if necessary

c. Coordinating Instruction.

- • Includes tasks and instructions that are common to two or more units subordinate to the corps engineer brigade organization.
- • Must include all pertinent coordinating instructions listed in the corps order.
- • Does not list SOP orders unless needed for emphasis or changed due to the mission.
- • May include reporting requirements common to two or more units if not covered in Signal paragraph.
- • May authorize direct coordination between subordinate or adjacent engineer-specific tasks.
- • Gives the time task organization is effective.
- • EWL.
- Ž Initial MOPP level.

4. SERVICE SUPPORT.

a. General Concept of Logistic Support.

- Ž Provide subordinates with the general concept of logistic support for units under the corps engineer brigade 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 corps engineer brigade commander's control. Must address WHO (corps battalions under division control, theater battalions, or special separate companies); HOW (area support, unit support, supply point distribution, unit distribution); WHERE (CSA and CSGs);

Figure A-7. Corps engineer brigade OPORD (continued)

and WHAT (classes of supply and critical services).

- Keep consistent with task organization and command support relationships,
- Make maximum reference to corps CSS graphics.
- List the locations of key CSS nodes as they apply to the concept for logistic support (COSCOM, CSA, CSG, ASPs/ATPs, and so forth) and planned subsequent locations, if they change during the operation.

b. Materiel and Services.

(1) Supply. For each class of supply--

- List allocation and CSRs for each unit, based on missions.
- Ž List basic loads to be maintained by unit.
- Ž List method of obtaining supplies if different from general concept. Note: Mission logistics may be different than unit (scheduled) logistics.
- Ž Address any special arrangements or plans to sustain specific mission needs (Class IV/V or Class III push to sustain engineer preparation of defenses).
- Ž Include standard map products.

(2) Transportation.

- Primary and alternate MSRs during the operation.
- Ž Allocations of division or corps haul assets.
- Use of bridge trucks for corps haul missions.

(3) Services. For each service, list the location and means of requesting and obtaining services.

c. Medical Evacuation and Hospitalization. For each type of engineer unit, indicate the primary and backup means of medical evacuation and hospitalization, including locations of health-service facilities providing support on an area or unit basis.

d. Personnel.

- Ž Method of casualty reporting.
- Method of handling EPWs and locations of EPW collection points.
- Method of receiving replacements.
- Ž Method of receiving mail, religious services, and graves registration for each type of unit under the corps engineer brigade commander's control.
- Ž Finance support of local procurement.
- Ž Legal support.
- Ž Command Information.

Figure A-7. Corps engineer brigade OPORD (continued)

- Public affairs.

e. Civil-Military Cooperation. Engineer supplies, services, or equipment provided by host nation.

f. Miscellaneous.

5. COMMAND AND SIGNAL.

a. Command.

- Location of key leaders and corps engineer brigade CPs during the operation and planned movements.
- Location and planned movements of key corps C2 nodes.
- Designated chain of command.

b. Signal.

- Identify any communication/signal peculiarities for the operation not covered in the SOP.
- May designate critical reporting requirements of subordinates, if not covered In coordinating instruction or SOP.
- Designate frequency-modulated (FM) nets subordinate to corps engineer unit command and operations and intelligence (O/I) nets. Designate net for mission and routine reports.

Acknowledge

Corps engineer brigade commander's signature (optional)
Corps engineer brigade commander's last name
Rank

OFFICAL:
(Authentication)

Annexes: Possible annexes may include but are not limited to--
- Synchronization Matrix
- Intelligence Annex
- CSS Annex
- Movement Annex

Overlays: Possible overlays may include but are not limited to--
- Decision Support Template
- Engineer Operations Overlay: includes corps maneuver graphics and engineer graphics, as necessary.
- Corps CSS Overlay.
- Corps Obstacle Plan.
- Other Operations: River-Crossing, Large-Scale Breach, and Base Camp/Base Cluster Defenses.

Distribution:

Figure A-7. Corps engineer brigade OPORD (continued)

APPENDIX B
ENGINEER ESTIMATE

The engineer estimate is an extension of the command-estimate procedure. It is a logical thought process that is conducted by the engineer staff officer concurrently with the sup ported maneuver force's tactical planning process. The engineer-estimate process—

- 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 command-estimate procedure. Like the command estimate, the engineer estimate is continuously refined. Table B-1 shows the relationship between these two estimates. A more detailed discussion of each step of the engineer estimate process is found in the following paragraphs. The command-estimate procedure provides the framework for discussion of the corresponding engineer-estimate actions.

Table B-1. Estimate of the situation and engineer estimate

Estimate of the Situation	Engineer Estimate
Mission	Mission
Facts and Assumptions	lPB/EBA
Mission Analysis	Engineer Mission Analysis
Commander's Guidance	Scheme of Engineer Operations Development
COA Development	Engineer Plan (War-Game and Refine)
COA Analysis	COA Recommendation
Decision	Final Engineer Plan
Actions and Orders	Orders

RECEIVING THE MISSION

The staff engineer quickly focuses on several essential components of the basic order and engineer annex when he receives the mission. These are—

Ž The enemy situation.

Ž The mission paragraph.

- The task organization
- The logistics paragraph.

Ž The engineer annex.

- The topographic operations annex
- The type of operation (offensive or defensive).
- The current intelligence picture.
- The terrain analysis.
- The assets available.

Ž The time available (estimate).

FACTS AND ASSUMPTIONS

Developing and refining facts and assumptions is a continuous process. The maneuver commander relies on the staff to present him with facts and assumptions on which he can base his mission analysis, restated mission and course-of-action development. Facts and assumptions pertain to the enemy as well as the friendly situation. The staff engineer uses the EBA as the framework for developing facts and assumptions.

ENGINEER BATTLEFIELD ASSESSMENT

The EBA consists of three parts (see Table B-2):

Table B-2. Engineer battlefield assessment

- Develops facts and assumptions about--
  - Enemy engineer weaknesses.
  - Critical friendly engineer capabilities and requirements.
- Mutually supports the G2/S2's IPB.

Ž Contains three components:

- Terrain analysis.
- Enemy mission and engineer capability.
- Friendly mission and engineer capability.

Ž Terrain analysis.

Ž Enemy mission and engineer capabilities.

• Friendly mission and engineer capabilities.

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 (see Table B-3), they determine what advantages or disadvantages the terrain and anticipated weather offer to both enemy and friendly forces. This process has direct impact on planning engineer operations. See Table B-4, page B-4, for examples of how the components of OCOKA may impact engineer support.

ENEMY MISSION AND ENGINEER CAPABILITIES

Threat analysis and threat integration are also major components of the IPB. Enemy mission and engineer capabilities are subcomponents of the threat analysis and threat 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 G2/S2's order of battle and 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.

Table B-3. EBA terrain analysis

• Analysis of the terrain's impact on the battle using the OCOKA framework
- Observation and fields of fire.
- Cover and concealment.
- Obstacles.
- Key terrain.
- Avenues of approach.
• Advantages/disadvantages the terrain offers the enemy and the friendly force.
Ž Conclusions on the terrain's impact on accomplishing the mission.

Table B-4. OCOKA and sample engineer effects on planning

OCOKA	Examples of Effects on Engineer Support
Observation and Fields of Fire	Offense: Planning obscuration/location of the support force for breach operations. Defense: Obstacle distance from direct-fire systems (might also affect obstacle composition with reduced standoff). Limited fields of fire might limit certain obstacle effects (for example, fix and block).
Cover and Concealment	Offense: Planning obscuration.assault positions for breach operations. Impacts feasibility of conducting a covert breach. Defense: Tying In reinforcing obstacle to existing obstacles might require an increased counter-mobility effort.
Obstacles	Offense: Task organizing special engineer mobility assets (AVLBs and ACES). Plotting enemy countermobility effort, tying into existing obstacles. Defense: Tying In reinforcing obstacle to existing obstacles might require an increased countermobility effort.
Key Terrain	Offense: Targeting indirect-fire suppression and obscuration for breach operations. Defense: Obstacle intents tied to how valuable the key terrain is for retention.
Avenues of Approach	Offense: Capability to conduct in-stride, deliberate, and covert breaching operations. Focusing countermobility effort in a transition to a hasty defense. The need for flank protection. Defense: Focusing specific obstacle effects in a specific location in an avenue of approach. Size of avenue of approach impacts on required countermobility effort.

The staff engineer then uses the G2/S2's situation template and the enemy's capability estimate to plot the enemy's engineer effort and its location. Coordinating with the G2/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 B-5 for a quick summary on enemy mission and engineer capability analysis. In the defense, the SM engineer plots—

- The enemy's mobility capabilities and location in the enemy's formation.

B-4 Engineer Estimate

Table B-5. EBA enemy mission/engineer capability

Ž Anticipate enemy engineer operations and their impact on the battle.
Ž Consider the enemy's mission and doctrinal employment of engineers in battle.
Ž Estimate enemy engineer capability based on--
- G2/S2's order of battle.
- Threat engineer organizations.
- Manpower/equipment capabilities.
- Recent activities
Ž Plot enemy engineer effort based on--
- G2/S2's situational template.
- Doctrinal engineer employment.

- The enemy's use of scatterable mines.

Ž Enemy engineers that support the reconnaissance effort.

- HVT recommendations (bridging assets, breaching assets, and scatterable mine delivery systems).

Ž The enemy's countermobility and survivability capabilities in a transition to a defense.

In the offense, the staff engineer plots the enemy's—

Ž Tactical and protective obstacle effort.

Ž Use of scatterable mines.

- Survivability and fortification effort.

FRIENDLY MISSION AND ENGINEER 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 engineer quickly prioritizes the development of capability estimates. The staff engineer considers engineer forces task-organized to his supported unit as well as the assets that other members of the combined arms team unit have (such as mine plows) to determine the assets that are available. Assets under the control of the higher engineer headquarters and adjacent engineer units should be noted for future reference in the event a lack of assets is identified during course-of-action development. The en-

gineer analyzes the available coverage, currency and adequacy of standard topographic products and terrain-analysis data bases. If shortfalls are noted, he coordinates with the G2 to identify new production requirements for the DMA or the theater topographic engineer battalion.

Having determined the assets available and having already estimated and refined the time available with the G3/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 engineer would focus first on the total numbers of breaching equipment (AVLBs, MICLICs, ACES, engineer platoons, and combat engineer vehicles (CEVs)) and translate that into breach lanes. In the defense, the staff engineer determines the number of minefield, hull- or turret-defilade positions, and tank ditches he could construct with available resources. He uses the results of his capability estimates during the course-of-action development. See Table B-6 for an outline of this analysis.

The engineer combines his analysis of the terrain, enemy capability and friendly capability to form facts and assumptions about—

- Likely enemy engineer effort and the most probable enemy course of action.
- Potential enemy vulnerabilities.
- Critical friendly requirements.
- The impact of the factors above on the mission.

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. 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 engineer must evaluate its impact on the mission and refine the facts and assumptions as necessary.

Table B-6. EBA friendly mission/engineer capability

- Evaluate friendly engineer capability and its impact on accomplishing the mission.
- Consider the friendly mission.
- Estimate the engineer assets available based upon task organization of--
  - Maneuver forces.
  - Engineer forces.
  - Higher engineer headquarters.
  - Adjacent engineer units.
- Consider the availability of critical resources.
- Estimate the total engineer capability based on engineer planning factors.

MISSION ANALYSIS

The engineer participates in 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, 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 1b 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.
- Topographic Operations Annex.

Mission analysis has several components, with the staff engineer focusing on engineer capabilities in each of the following components:

- Specified tasks. Specified tasks are derived directly from the WARNORD, OPORD, or 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 to support an attack 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. The engineer should also examine the total force structure of the combined arms team. This will help the engineer as he participates in course-of-action development. For instance, the amount of firepower available may help to determine whether the force should conduct an instride versus a deliberate breach or which float bridging is available to support division river-crossing operations.
- Limitations (constraints and restrictions). Constraints are those specified tasks that limit freedom of action. Designated reserve obstacles, obstacle zones (with intents), and ORAs are examples of constraints the engineer must consider in his mission analysis. Restrictions are limitations placed on the commander that prohibit the command from doing something. Therefore, they impact greatly on the course-of-action development. Obstacle zones and ORAs are excellent examples of restrictions because they limit the area in which tactical obstacles can be placed.

- Risk. A commander might 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 avenue of approach while situational obstacles are to be planned on the most dangerous avenue of approach as an economy-of-force measure. The staff engineer must understand how a risk involving an engineer capability will specifically impact on combined arms operations and advise the commander accordingly.

Ž Time analysis. The staff engineer ensures that engineer operations are included in the combined arms time analysis and determines the actual total time available. He then refines his time analysis by developing a basic time-line sketch that includes such items as—

— The supported unit's OPORD.

— The 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.

Ž Essential tasks. Essential tasks are specified and implied tasks that are critical to mission success are identified as essential tasks. The 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.

Ž 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.

COMMANDER'S GUIDANCE

The staff engineer needs to receive planning guidance to tailor the schemes of engineer operations that he will develop during course-of-action 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 SOPs. Some areas in which the staff engineer might require guidance are—

- Situational obstacle planning.
- Use of digging assets (survivability versus countermobility).

Ž Use of maneuver forces in the obstacle effort.

- Risk acceptance of engineer tasks.
- Interpretations of the higher commander's intent pertaining to engineers.

SCHEME OF ENGINEER OPERATIONS

The next step of the command estimate is developing the maneuver courses of action. Course-of-action development centers on the employment of maneuver forces. However, the engineer assists in the 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 course of action. The staff engineer develops a scheme of engineer operations for each maneuver course of action. He does not develop complete plans, just a concept. It is developed using the same steps as the maneuver course of action but without the detailed force allocation. If time permits, the engineer may begin working on the details for each plan. The process is as follows (see Table B-7):

- 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 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 where and when he expects that capability to be employed and determines what will defeat it and what assets are available to ensure success.

- Identify engineer missions and allocate forces. Based upon the maneuver course of action, situation analysis, mission analysis, and commander's intent, the engineer assesses the engineer requirements. This is the most important step in developing a scheme of engineer operations.

- Develop a scheme of engineer operations. The scheme of engineer operations focuses on how the engineer efforts integrate into and support the maneuver course of action. Like the maneuver course of action, 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 where engineer priorities must change to support the maneuver.

- Balance assets available against support requirements. The staff engineer reviews his scheme of engineer operations in light of the assets he has available (using his

Table B-7. Scheme of engineer operations development

1. Analyze relative combat power.
2. Ident ify engineer missions and allocate forces/assets.
3. Develop a scheme of engineer operations.
4. Balance requirements with assets available.
5. Integrate into the maneuver course of action.

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, or requesting additional assets.

Ž Integrate into the maneuver course of action. The staff engineer prepares a statement describing the scheme of engineer operations. This statement addresses how engineer efforts support the maneuver course of action. He integrates the necessary graphics to illustrate this tentative engineer plan (for example, breach control measures and obstacle graphics and intents).

WAR-GAME AND REFINE ENGINEER PLAN

Staff analysis identifies the best course of action for recommendations to the commander. War-gaming techniques are used to analyze the courses of action. War gaming is a systematic visualization of enemy actions and reactions to each friendly course of action. The staff engineer participates in war gaming to—

Ž 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 the G2/S2 integrates enemy engineer assets and actions as he plays the enemy force.

There are three techniques for war gaming. See Table B-8.

The next step, after each course of action is independently war-gamed, is to compare the results. The goal of comparing courses of action is to analyze the advantages and disadvantages of a course of action relative to the other plans. Each course of action is compared to the others using specific evaluation criteria. These evaluation criteria may be developed by the staff or maybe directed to the staff by the commander during his planning guidance.

The staff engineer compares courses of action 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 COURSE OF ACTION

The objective of the comparison is to make a unified recommendation to the commander on which course of action is best. The engineer may have to give greater consideration to a course of action which he can least support if it looks like it is the best selection from the other staff's perspectives. He must be prepared to inform the maneuver commander where he must accept risk or where he will need additional assets to avoid that risk. The staff engineer must also be prepared to inform the maneuver commander where those assets maybe obtained and what influence the maneuver may have to exert to get them. This is where knowledge of higher and adjacent unit's engineer assets becomes important.

Table B-8. War-gaming techniques

Avenue in Depth This technique concentrates on one avenue of approach 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 effort.
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 engagement area.

Based on the staff's recommendations, the commander makes a decision on which course of action to adopt for final planning. He may select a specific course of action, modify a course of action, or combine part of several courses of action. 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 multiplier a together.

FINALIZE THE ENGINEER PLAN AND ISSUE THE ORDER

The staff engineer focuses his planning efforts on the scheme of engineer operations for the selected maneuver course of action. The engineer determines the C2 necessary to accomplish the engineer missions (see Chapter 2 for additional information). The scheme of engineer operations is fine-tuned baaed on the wargaming process, the commander's guidance, and situation updates. As the engineer falls 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 A). As part of the combined arms staff, the engineer also participates in the OPORD briefing to the assembled group. As with the other primary staff officers, the 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 briefings 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 fielding questions.

APPENDIX C
CORPS ENGINEER REPORTS

Timely accurate, and focused engineer information flow is critical to the mission success of corps, divisions, separate brigades, and cavalry regiments. This appendix provides information concerning standardized engineer reports developed by North Atlantic Treaty Organization (NATO) working groups and provides a sample corps engineer report template. Both pieces of information may be used by corps engineer units to develop specific engineer reporting formats for use in SOPs, training exercises, and combat operations.

NATO STANDARDIZATION AGREEMENT REPORT FORMATS

Engineer report formats have been developed by NATO engineer working groups. They are in use at the brigade through corps level. These formats may be applicable to all engineer units operating in a corps area. Refer to NATO Standardization Agreement (STANAG) 2096 for specific line-by-line formats. STANAGs are available upon request from the Naval Publications and Forms Center, 700 Robbins Avenue, Building 4, Section D, Philadelphia, Pennsylvania 19111-5094. Developed STANAG engineer report formats include:

E201 - ENGINEER RECONNAISSANCE

The E201 Engineer Reconnaissance Report is used to order the reconnaissance of mobility, countermobility, survivability and general engineering support tasks. The E201 Engineer Reconnaissance Report is also used to pass key information back to the appropriate headquarters, accompanied by copies of the specific reconnaissance reports as enclosures.

E202 - ENGINEER ANNEX

The E202 Engineer Annex is used to transmit all essential information required in the Engineer Annex of a corps, division, separate brigade, or cavalry regiment OPORD.

E203 - ENGINEER REPORT

The E203 Engineer Report (ENGREP) is used to report mobility countermobility, survivability, and general engineer support task progress and unit combat effectiveness.

E204 - ENGINEER DATA REPORT

The E204 Engineer Data Report (ENGDATAREP) is used to provide detailed information about the number of effective engineer units by type, generic equipment types in terms of availability, and committed and uncommitted major items of material.

CORPS ENGINEER REPORT TEMPLATE

The sample template depicted in Figure C-1, page C-3, provides a list of key information items that may be required by any engineer headquarters in the corps. The template is based on a five-paragraph OPORD format Not all of the listed information will be re-

quired by all units all of the time. The template is designed to be modified based on specific engineer headquarters information and mission requirements. Detailed reports in any specific area may be created by using this template. Specific formats of reports will vary based on the information sharing systems available.

ENGINEER SITUATION

As of: date-time group (DTG)
Engineer unit identification
Engineer unit location
Current task organization (two levels down)
Future task organization (As of: DTG)

ENGINEER INTELLIGENCE

Threat condition (THREATCON)/security level
Threat./NBC activity affecting engineer effort
MOPP level
Essential elements of engineer intelligence (EEEI)
- Construction materials
- Construction equipment
- Obstacle materials
- Reconnaissance data
  - Obstacles and rivers
  - MSRs

Overall intelligence assessment

ENGINEER MISSION

Command or support relationship
Priority of effort
Priority of support
Current engineer mission
Status of current engineer mission
Future engineer mission (As of: DTG)
Deep operations mission
Rear operations mission
Critical logistics affecting engineer mission
Minefield delegation authority
EWL location and parameters

CRITICAL ENGINEER OPERATIONS

Bridge and ferry operations
- Engineer unit
- Type of bridge, ferry, and minimum class load (MCL)
- Length of bridge available
- Current bridge, ferry location, and supporting unit
- Length committed
- Future bridge, ferry location, and supporting unit (As of DTG)
- Bridge park location
- Overall assessment

Breaching operations
- Engineer unit
- Current location, supporting unit, depth, and width
- Future location, supporting unit, depth, and width (As of: DTG)

Figure C-1. Sample template

Lane marking and designators
Overall assessment

Obstacle operations
Engineer unit
Obstacle zone designators, locations, and completion DTG
Obstacle belt designators, locations, intent, and completion DTG
Obstacle group designators, locations, intent, and completion DTG
Directed obstacle designators, locations, intent, and completion DTG
Reserve obstacle designators, locations, in! ent, and completion DTG
Obstacle turnover DTG/receiving unit
ORAs, locations, and effective DTG
Overall assessment
Survivability missions
Engineer unit
Center-of-mass location, supporting unit, survivability level, and completion DTG
Future location, supporting unit, and survivability level (As of: DTG)
Overall assessment
Construction missions
Engineer unit
Project type, designators, locations, supporting unit, and completion DTG
Future projects and locations (As of: DTG)
Quarry locations, type of materials, and effective DTG
Class IV supply-point locations and effective DTG
Water well-drilling locations and effective DTG
Contracting support
Overall assessment
Topographic missions
Engineer unit
Project type, designators, supporting unit, and completion DTG
Overall assessment
Fight-as-infantry missions
Engineer unit
Location, supporting unit, fire-support unit, and release DTG
Temporary equipment-park location
Overall assessment
Commander's assessment (green, amber, red, and black)
Mobility
Countermobility
Survivability
General engineering
Topographic engineering
Fight as infantry

CRITICAL ENGINEER LOGISTICS

Personnel status

Unit Type	On-hand	Committed	Available

(2 levels down)

Critical military occupational specialty (MOS) shortages
Overall assessment (green, amber, red, and black)

Figure C-1. Sample template (continued)

C-4 Corps Engineer Reports

Combat engineer equipment

Equipment Type	On-hand	Committed	Available
CEV			
AVLB bridge			
AVLB launcher			
ACE			
MICLIC			
Volcano			
Mine plow			
Mine roller			
Ribbon bridge (meters)			
MGB set			
Critical shortages			
Overall assessment			

Construction equipment

Equipment Tvpe	On-hand	Committed	Available
Dozer			
SEE			
Loader			
Grader			
Scraper			
Tractor			
Low-bed trailer			
Dump truck			
Crane			
Compaction			
Critical shortages			
Overall assessment			

Tactical equipment

Equipment Type	On-hand	Committed	Available
M113A3			
5-ton dump truck			
HMMWV			
2 1/2-ton cargo truck			
5-ton cargo truck			
Antitank weapons			
Machine guns			
Overall assessment			

Topographic equipment

Equipment Type	On-hand	Committed	Available
Terrain data processing			
Printing			
Overall assessment			

Supplies (days on hand)

Supply Type	On-hand	Assessment
Class I rations and water		
Class II consumables/expendables		

Figure C-1. Sample template (continued)

Class III fuel
Class IV construction
Class IV obstacle
Class V weapons ammunition
Class V demolitions, fuse, caps, cord, and MICLIC reload
Class V mines, fuses, antihandling devices (AHDs), and Volcano reload
Class VI sundry packs
Class VII end items
Class VIII medical
Class IX repair parts
Critical shortages
Overall assessment

Maintenance

Maintenance Level	Assessment
Organizational	
Organic DS	
D S	
G S	
Critical not-mission-capable (NMC) equipment	
Reason for NMC (parts and maintenance)	
Overall assessment	

ENGINEER COMMAND AND CONTROL

Current CP location
Future CP location (as of: DTG)

Information systems

Equipment Type	On-hand	Committed	Available
CNR			
ACUS			
ADDS			
Broadcast			
Computers			
Position and navigation			
Overall assessment			

Figure C-1. Sample template (continued)

APPENDIX D
KEY LEADER RESPONSIBILITIES

This appendix outlines key duties and responsibilities of several of the following principal leaders in the corps engineer brigade organization:

- Commander.
- DBC.
- ACE.
- XO.
- CSM.
- S1.
- S2.
- S3.
- S4.
- S5.
- Engineer LO.

The duties described are a foundation of mission-essential tasks required of engineer key leaders. The commander may modify the duties and responsibilities based on METT-T and on the structure of the corps and corps engineer organization.

Engineer leaders have functional-area responsibilities for both the corps and the corps engineer organization. Engineer functional-area responsibilities are listed below as corps staff and unit responsibilities. Overall staff responsibilities are listed by staff area in FM 101-5.

COMMANDER

CORPS STAFF RESPONSIBILITIES

The commander—

- Serves as the corps engineer, the corps commander's principal advisor on engineer operations.
- Controls and staff supervises all engineer forces operating in the corps area.
- Formulates concepts for engineer support to meet the corps commander's intent.
- Makes recommendations to the corps commander concerning engineer priorities and acceptable risks.
- Provides functional control of all engineer forces working in the corps area through input into corps orders.
- Makes recommendations to the corps commander concerning the task organization of engineer forces to support the corps commander's intent.
- Serves as the principal advisor for integrating specified and implied engineer tasks into the corps plan.

UNIT RESPONSIBILITIES

The corps engineer brigade commander—

- Ž Commands all engineer forces that are organic to the corps and not task-organized in a command relationship below corps level.
- Commands all units—engineer or otherwise—assigned, attached, or OPCON to the corps engineer organization.
- Assigns specific missions to subordinate units through engineer organization OPORDs.
- Ž Analyzes unit performance, anticipates changes, and issues the necessary FRAGOs to subordinate units.
- While exercising his engineer command and corps staff responsibilities, must have the necessary equipment to travel and communicate with both his subordinate units and the corps commander and staff.

DBC

CORPS STAFF RESPONSIBILITIES

The DBC—

- Maintains preparedness to perform the functions of the corps engineer.
- Ž Focuses on priorities set by the corps engineer.

UNIT RESPONSIBILITIES

The DBC—

- Ž Controls the brigade CP.
- Serves as second in command (2IC) of the corps engineer organization.
- Ž Requires the same type vehicle and communications capabilities as the commander.

ACE

The ACE is the corps engineer's primary POC on functional matters with corps plans and current operations cells at the corps main Cl? He performs his functional responsibilities on behalf of the corps engineer. The ACE—

- Ž Serves as the OIC of the corps main CP engineer section.
- Ž Tracks all mobility, survivability, and general engineering aspects of simultaneous deep, close, and rear operations through close coordination with the corps assault TAC, and rear CP engineers and the corps engineer brigade CP.
- Assists the corps main CP current-operations element and synchronizes engineer support to the current simultaneous deep, close, and rear fights.
- Coordinates closely with the G2, the G3, the corps main CP plans element, and the corps engineer brigade CP to ensure engineer integration into future operations.
- Develops the scheme of engineer operations for future simultaneous deep, close, and rear operations, looking forward approximately 96 hours.
- Allocates engineer resources for simultaneous deep, close, and rear operations;

recommends the engineer task organization.

Ž Synchronizes and integrates engineers into the corps plan and unit-level corps scheme of engineer operations.

• Synchronizes the unity of effort between adjacent maneuver divisions, separate brigades, and cavalry regiments.

Ž Prepares engineer input into the corps basic order and engineer annex.

• Processes engineer requirements identified by the corps assault, TAC, and rear CPs; resolves conflicts and integrates into future plans.

Ž Coordinates engineer functions with adjacent corps; subordinate divisions, separate brigades, and cavalry regiments; and higher engineer headquarters staff engineers. Also maintains a data base to facilitate the transfer of information.

Ž Receives, posts, and analyzes combat intelligence, focusing on its impact on future plans.

• Interfaces with the theater/JTF engineer on corps engineer plans, the status of corps engineer missions, and the identification of corps engineer requirements.

XO

The unit responsibilities of the XO are to—

Ž Synchronize and direct the engineer brigade staff.

• Supervise the development of corps engineer brigade orders to subordinate units.

Ž Focus the staff on future operations and requirements, looking forward approximately 48 hours.

• Synchronize all unit CSS operations in the engineer organization.

• Maintain responsibility for the duties of the XO, as outlined in FM 101-5.

• Serve as the OIC of the corps engineer brigade TOC.

CSM

CORPS STAFF RESPONSIBILITIES

The CSM—

• Performs functions as tasked by the corps engineer.

• Serves as an engineer LO to higher, adjacent, or subordinate units, when required.

• Serves as an integrator or expediter in any functional area, as dictated by the corps engineer, when required.

UNIT RESPONSIBILITIES

The CSM—

Ž Is responsible for the duties outlined in FM 101-5.

- Is the commander's primary representative on matters of soldier morale and welfare.

The range of the CSM's soldier morale and welfare responsibilities, coupled with special missions he will be tasked with, require him to operate from the FLOT to the corps support area. The CSM must be equipped with a vehicle and communications system that will allow him to travel and communicate long distances in varied terrain.

S1

CORPS STAFF RESPONSIBILITIES

The S1—

- Assists the ACE in the development of engineer plans and orders.
- Serves as the primary interface with the G1, the corps AG, and personnel and finance groups.
- Provides input to the engineer CSS portions of the basic corps plan and engineer annex.

UNIT RESPONSIBILITIES

The Sl—

- Maintains responsibility for all duties of the personnel officer, as outlined in FM 101-5.
- Develops the personnel portion of the engineer CSS plan for inclusion in the engineer unit OPORD.
- Coordinates engineer CSS functions at the corps engineer brigade CP.
- Provides detailed engineer CSS input to the corps main CP engineer section for inclusion in division plans.

S2

CORPS STAFF RESPONSIBILITIES

The S2—

- Serves as the corps's expert on threat engineer operations.
- Supports the ACE as he coordinates with the G2 to analyze and determine the impact of intelligence from all sources.
- Supports the ACE as he provides the G2 with threat engineer information for inelusion into corps plans.
- Supports the ACE as he provides engineer-specific input to the corps IPB.

UNIT RESPONSIBILITIES

The S2—

- Maintains responsibility for all duties of the intelligence officer, as outlined in FM 101-5.
- Updates the corps engineer brigade commander continually on the general threat situation, threat engineer capability, intent, and actions.
- Serves as a shift officer at the corps engineer brigade CP.
- Provides the corps engineer brigade S3 with detailed enemy information for inclusion into engineer organization plans and orders.

S3

CORPS STAFF RESPONSIBILITIES

The S3 assists the ACE and corps TAC and rear CP engineers in their functions, when necessary.

UNIT RESPONSIBILITIES

The S3—

- Maintains responsibility for all functions of the operations officer, as outlined in FM 101-5.
- Ž Serves as the OIC of the corps engineer brigade TOC operations cell.
- Ž Coordinates the execution of the subordinate brigade engineer units conducting close and rear operations.
- Receives, analyzes, and posts combat intelligence that affects engineer operations in the current close fight.
- Ž Receives, analyzes, and posts current and corps engineer brigade subordinate units' status.
- Passes engineer requirements and reports from forward corps engineer brigade subordinate units to the corps main CP engineer section.
- Monitors NBC activities of the corps and corps engineer brigade units.
- Exchanges current close operations information with the corps assault or TAC CP engineer section.

In many instances, the corps engineer brigade S3 is required to occupy forward positions during river-crossing, large-scale breaching, and other special operations. The S3 must be equipped with a vehicle and a communications system that are mobile, survivable, and capable of long-range communications with the corps engineer brigade commander, subordinate units, and the ACE.

S4

CORPS STAFF RESPONSIBILITIES

The S4-

- Ž Assists the corps rear CP engineer in providing engineer staff expertise to the corps rear commander to assist in planning, executing, and synchronizing corps rear operations, when necessary.
- Ž Provides advice and assistance to the G4, the COSCOM, and other maneuver S4s in planning required engineer logistics support.

UNIT RESPONSIBILITIES

The S4—

- Ž Serves as the OIC of the CSS cell in the corps engineer brigade TOC.
- Executes corps engineer brigade subordinate current rear-area engineer operations according to the corps's scheme of engineer operations.
- Provides engineer recommendations and resource requirements for base-cluster defenses.

- Identifies engineer support requirements for force sustainment, terrain management, movement control, and force protection to the corps rear CP engineer.
- Provides detailed engineer CSS input to the corps rear CP engineer for inclusion in corps plans.
- Coordinates unit and mission CSS issues with the G4 and COSCOM for corps engineer brigade subordinate units working in the corps rear area.

Ž Maintains responsibility for all duties of the logistics officer, as outlined in FM 101-5.

- Integrates engineer CSS activities into the corps CSS system.

Ž Provides detailed engineer CSS input to the corps rear CP engineer for inclusion in engineer unit orders.

- Synchronizes the execution of all logistics functions for engineer units operating in the corps's AO.

S5

CORPS STAFF RESPONSIBILITIES

The S5—

- Assists the corps rear CP engineer in providing assistance in planning, executing, and synchronizing corps civil-rnilitary and host-nation operations.

Ž Provides advice and assistance to the G4, G5, civil-affairs brigade, and other maneuver S5s in planning required engineer support to civil-military activities.

UNIT RESPONSIBILITIES

The S5—

Ž Maintains responsibility for all duties of the civil-military operations ofilcer, as outlined in FM 101-5.

- Identifies engineer support requirements for host-nation and civil-affairs support.

Ž Assesses engineer requirements for EPW and refugee facilities and egress routes.

ENGINEER LO

The engineer LO represents his commander at the headquarters of another unit and coordinates and promotes cooperation between the units. A commander should assign LO duties to someone dedicated full time to that position, not make it an additional duty. An engineer commander who sends a poorly qualified or poorly equipped LO hurts hirnself and his unit and makes a poor impression on the headquarters to which the LO is assigned. When selecting an engineer LO, the commander must ensure that the candidate has the following qualifications:

- Rank and experience appropriate for the headquarters to which he is assigned. The LO should possess tactical engineer skills in areas such as battlefield assessments, breach and obstacle planning, and so forth.

- Ability to communicate effectively both orally and in writing. It is especially critical that the LO possess strong staff briefing skills.

Ž Detailed knowledge of the parent unit's SOP, OPLANs, and OPORDs.

Ž Knowledge of the coalition force's language when working with a multinational unit. If knowledge of a foreign language is required but not available, the parent unit ensures an interpreter is provided.

- Attributes such as a proper uniform and sharp personal appearance enhance effective liaison activities.

PARENT ENGINEER UNIT RESPONSIBILITIES

After an LO is selected, the parent unit headquarters provides appropriate briefings and support.

- The G3/S3 or his duty officer thoroughly briefs the LO about the current situation in the unit and the commander's intent, including details of the concept of operations. This briefing includes unit locations, front-line trace, engineer planning factors, combat readiness factors (such as personnel strength and logistics considerations), and a map with overlays.

Ž The G3/S3 briefs the LO about the current status and missions of the assigned unit. After this briefing, each staff section informs the LO about their specific liaison and information requirements. For example, the S2 may require detailed terrain information. These briefings ensure that the LO clearly understands his mission and responsibilities.

ENGINEER LIAISON OFFICER RESPONSIBILITIES

To perform successfully, an engineer LO must complete the following tasks:

Ž The LO places all acquired information in a battle book which he can carry easily and use to file information needed or obtained at the duty site. The LO uses the battle book when conducting briefings.

- The LO ensures that arrangements for communications and transportation meet mission requirements. He checks assigned radios, signal operating instructions (S0I), and challenge words and passwords, and he ensures that rations are provided. The LO obtains required specialized equipment, security clearances, and credentials for identification into the higher headquarters' TOC.

- If conducting liaison with coalition units, the LO ensures that language or interpreter requirements are met.

- After arriving at the assigned unit, the LO reports to the commander or his representative (G3/S3 or chief of staff) and is prepared to brief the parent unit's situation. He visits each staff section, provides information requested, and obtains information needed by the parent engineer unit.

- Because the LO provides a vital link to the parent unit he continually advises the TOC duty officer the secretary of the general staff, or the chief of staff of his whereabouts.

- Throughout the tour, the LO keeps informed of the situation at the parent unit and makes that information available to the commander and staff of the

assigned unit. He accomplishes this task without interfering with operations at the assigned unit. He keeps an accurate record of all communications in a staff journal. He reports on those matters within the scope of the mission and informs the assigned commander of information sent to the parent unit.

- A major LO function is to promote harmonious relations between the parent engineer unit and the assigned unit. As the parent unit's representative, the LO's actions significantly affect the higher headquarter's perception of his unit's engineer support.

- The LO immediately informs the parent unit any time he is unable to perform his responsibilities at the assigned unit.

- After completing his mission, the LO presents an out brief to the commander or G3/S3.

- Upon return to the parent unit, the LO briefs the engineer commander or his representative regarding all information received during the visit. This includes detailed information concerning the higher headquarters' mission, unit locations, future operations, commander's intent, mission requirement, and requests for information. The LO clearly and accurately briefs all staff sections regarding detailed information received during the visit, and transmits information required by higher headquarters to each staff area of responsibility.

- The LO keeps abreast of the current situation and stays prepared to respond to future liaison requirements.

ASSIGNED UNIT RESPONSIBILITIES

After the engineer LO arrives at the duty site, the assigned unit provides the following briefs and support:

- The staff briefs the LO about their current operations. They provide the LNO with rations, fuel, maintenance (if possible), communications equipment, and work and sleep areas.

- Like the LO, the assigned unit's staff fosters and promotes harmonious working relationships.

APPENDIX E
JOINT ENGINEER CAPABILITIES

FORCE-PROJECTION OPERATIONS

Army corps engineer commanders and their staffs operate jointly with Air Force, Navy and Marine Corps engineer forces during force-projection operations. It is critical that Army corps engineer forces fully understand a joint component's engineer capabilities so that they can integrate them into corps operational planning along with planning for Army corps engineer support to other joint headquarters. This appendix provides a brief description of the types of joint engineer units, their capabilities, and interoperability considerations. During all joint force-projection operations, the corps engineer ensures that adequate Army communications, logistics, and LO support are provided for supporting the Army engineer component to the joint engineer force. If shortfalls occur with availability of standard map products and map data, requirements are coordinated with joint topographic agencies, such as the Topographic Engineering Center (TEC) and the DMA Periodic joint engineer meetings assist in blending the joint engineer force towards accomplishing the numerous engineer missions required during force-projection operations.

US AIR FORCE ENGINEER SUPPORT

The US Air Force is challenged by a variety of threats throughout the world. As a result, it must be prepared to fight battles of great scope, range, and intensity It must be prepared to counter large modern forces, as well as light forces, insurgents, and sophisticated terrorist groups wherever and whenever they threaten US interests. To meet this wid, ment of Defense Directive (DODD) 1315.6: range of threats, the worldwide air base network must be capable of supporting the projection of air power. Air Force Regulation 93-3 states that combat air operations depend on adequately developed and supported bases. Bases must have adequate facilities and civil engineering resources to launch and recover mission aircraft, support high sortie generation rates, provide essential CS functiions, and assist in defending against enemy attack.

CIVIL-ENGINEERING MISSION

The Air Force combat engineer's role is to ensure that the engineering-related aspects of air-base operations are responsive and effective. The following are basic wartime missions of Air Force engineers, as described in Depart-

- Ž Emergency repair of war damage (ineludes rapid runway repair (RRR), facility repair, and utility repair).
- • Force bed down of Air Force units and weapons systems.
- Ž Operations and maintenance of Air Force facilities and installations.

Ž Crash rescue and fire suppression.

- Construction management
- Supply of material and equipment to perform the engineering mission.

To accomplish these missions, Air Force engineers are organized into three basic types of units with complementary wartime missions--RED HORSE units, Prime BEEF units, and Prime Readiness in Base Support (Prime RIBS) units, An engineering and services (E&S) force module combines Prime BEEF and Prime RIBS capabilities to support a flying squadron.

RED HORSE UNITS

RED HORSE civil-engineering squadrons are wartime-structured units that provide a heavier engineering capability than the civil engineering base Prime BEEF and Prime RIBS units. The RED HORSE squadrons have a regional responsibility; they are not tied to a specific weapons system and are not responsible for base operations and maintenance. They are mobile, rapidly deployable, and largely self-sufficient for limited periods of time. They perform the wartime tasks of major force bed down, heavy damage repair, bare base develop ment, and heavy engineering operations. Due to their mission, they possess greater combat capability than the civil-engineering base units. RED HORSE was formed specifically to meet wartime needs. Its composition is based on wartime requirements; it is not assigned to an air base to perform peacetime operations and maintenance tasking. Its primary mission in peacetime is to train for wartime, and its squadrons represent the strongest combat engineer capability in the Air Force. As the lead joint engineer resource in any force-projection situation it is the most capable Air Force engineering unit when it comes to the initial wartime requirements affecting the launch, recovery and operation of Air Force combat aircraft It is the engineer unit used by the theater or JTF commander when incoming force flow is disrupted, resupply is interrupted, or launch and recovery activities at critical locations are stopped due to major airfield damage. RED HORSE squadrons are packaged to be available early in the time-phased deployment data flow, and they are dedicated to up-front engineer missions. They are assigned to employment locations that are critical to the success of the air war. Dividing responsibilities between Air Force engineering assets (RED HORSE, Prime BEEF, and Prime RIBS) is not attempted. RED HORSE units can perform all the engineering missions of the civil-engineering units with the exception of crash rescue and major fire suppression. The presence of Prime BEEF forces at an employment location does not exclude the employment of RED HORSE units

RED HORSE units are theater Air Force assets with a regional responsibility They report through theater or regional command channels, C2 of these units remains within numbered Air Force channels or a higher level if a numbered Air Force is not present (such as under the Air Force forces (AFFOR) commander of a JTF). A joint contingency wartime construction-management organization can also task RED HORSE units through the numbered Air Force for construction support If two or more RED HORSE squadrons are in a region, an Air Force civil-engineering group will be formed with the numbered Air Force staff engineer serving as the group commander. Vehicles, heavy equipment and RRR sets capable of Supporting full RED HORSE squadrons are pre-positioned in projected TOs to mitigate any delays in receiving strategic heavy lift In addition to theater pre-positioned sets, RED HORSE squadrons maintain home mobility sets of similar equipment that are easily deployed and maintained. They form three types of RED HORSE (RH) deployment echelons with vehicle and equipment sets at strategic locations. They are maintained in a ready-to-go condition

RH-1 Echelon

Critical to RED HORSE employment is the advance deployment of the RH- 1 echelon. This element, tied to the appropriate theater air component commander, would deploy with the headquarters, prepare for the reception of follow-on RED HORSE elements, and prepare the advance plans for project execution This echelon consists of a 16-person team that is deployable within 12 hours on a C-141. The team performs advanced airfield surveys, including evaluation of airfield pavements, the water supply utility systems, and existing facilities. It prepares a bed-down plan for the orderly establishment of an operator base at a force-projection location. The team also compiles facility and material requirements necessary to accomplish the force bed-down plan and accomplishes the site layout for later RH-2 force bed down.

RH-2 Echelon

The RH-2 echelon is a 93-person team with heavy equipment capable of deploying within 48 hours. The team performs land clearing, site stabilization, area drainage earthwork, and erection of relocatable structures essential for force bed down at an undeveloped location. The echelon performs RRR using organic equipment and repair materials (AM-2 mat, crushed stone, and so forth) that are pre-positioned or supplied by the support headquarters. The team also repairs bomb-damaged facilities and systems; installs, expands, and repairs essential utility systems; and provides initial civil-engineering support, including drilling and developing water wells for deploying forces.

RH-3 Echelon

The RH-3 echelon is a 295-person squadron with heavy equipment capable of deploying within 6 days. The squadron accomplishes heavy repair of bomb-damaged facilities and utility systems. The echelon erects temporary relocatable facility substitutes and installs or expands essential utility systems, including airfield lighting, to support force bed down. The squadron operates mineral product plants (batch plants, crusher, and block plant), if required, when plant equipment is supplied from contingency or host stocks. The echelon performs explosive demolition operations as required and performs RRR using echelon-organic equipment. The squadron is able to repair two large and three small bomb craters in a 4-hour period, Standard engineering capabilities provided by RED HORSE squadrons include--

- Airfield lighting,
- Concrete operations,
- Explosive demolition operations.
- Aircraft arresting systems,
- Material testing.
- Quarry operations.
- RRR.
- Revetment construction.
- Water well drilling.
- Mobile facility asset siting, erection, and installation.
- Fuel systems.
- Facility hardening.
- Expedient pavement expansion.
- Utility-system repair.
- Force bed down.
- Heavy earthwork.
- Road construction.

- Power generation.
- Restoring chemically protected facilities.
- Engineering design.
- Base denial operations using fire, explosives, component removal, equipment sabotage, and mechanical destruction.
- Disaster relief and preparedness.

Ž Defensive operations.

Ž C2 over the following:

– Full-squadron deployment to one location.

–Full-squadron deployment with phased arrival to one location.

– Squadron deployment to multiple locations (split unit).

– In-transit operations during deployment.

– Work party and convoy operations.

RED HORSE squadrons accomplish major airfield construction and repair work in forward locations requiring an organic logistics capability, including vehicle maintenance, food service, supply, and logistics plans. A 60-day war readiness spares kit (WRSK) keeps these units operational until normal supply channels open.

PRIME BEEF UNITS

All Prime BEEF forces are CS forces that are generally configured as squadrons and teams. Their mission is to provide CS to the air combat forces which are, or may become, a part of a theater, command, or task force formed for combat operations. These civil-engineering base units are organic at essentially all major CONUS and overseas Air Force bases in order to provide peacetime real-property maintenance capability. This capability is totally integrated into the peacetime force structure and provides the operational commander with the flexibility of employing weapons systems without depending on others. A similar organic civil-engineering capability in the form of Prime BEEF CS forces will accompany deploying flying squadrons when they go to war. These deploying flying units. will have the organic Prime BEEF CS engineering support capable of performing those engineering wartime tasks necessary for sortie generation. Specfic Prime BEEF CS units will be linked to specific flying units. Prime BEEF CS units concentrate primarily in supporting aircraft weapons systems and combat operations. There are two basic Prime BEEF mobile force classifications: large CS squadrons and small specialty CS teams. Prime BEEF CS units have no organic heavy equipment--only toolboxes and small team kits (such as power tools). They require base operating support and most deploy in 50- or 100-person team increments.

Large-Scale Prime BEEF CS squadrons

The large CS squadrons provide basic skills to establish base civil engineer (BCE) operations or in accomplish the most critical wartime tasks at locations where additional assistance is required or where none exists. Eight types of large-scale CS squadrons are available in four separate and distinct sizes (200-, 150-100-, and 50-person). These types of squadrons are active duty, Air National Guard (ANG), or Air Force Reserve. They are capable of deploying on a 22- to 28-hour notice to sup port aircraft operations at main operating bases (MOBs), collocated operating bases (COBs), standby bases (SBs), forward operating locations (FOLs), aerial ports of debarkation (APODs), and bare bases (BBs). These squadrons can fully support AM-2 matting, fiberglass matting and concrete slab RRR methods. These squadrons can support a bed-down population of 2,200 to 2,500 personnel. Combi-

nations of the eight types of CS squadrons are used to support theater requirements.

Small Specialty Prime BEEF CS Teams

Small specialty CS teams are comprised of certain skills and numbers, such as fire fighters, construction management, and staff augmentation necessary to fill known requirements Nine types of teams are available, ranging in size from 3 to 48 persons from all components. The size and composition of all Prime BEEF mobile teams is based on METT-T.

PRIME RIBS UNITS

Prime RIBS units are worldwide combat morale, welfare, recreation, and services (MWRS) forces organized and trained for wartime sup port. The Prime RIBS program organizes forces capable of deploying on a 22- to 28-hour notice to support global or major regional conflict operations on MOBS, COBS, FOLs, APODs, aerial ports of embarkation (APOEs), and BBs or to support essential MWRS missions at critical CONUS bases. Each Prime RIBS element is capable of providing initial food service, billeting, recreation programs, and mortuary-operations support for a population of up to 1,200 people. It can also support an independent or dependent combat aviation squadron of 16 to 24 fighter aircraft or a significant aviation deployment less than squadron size in a major deterrent force posture. With additional augmentation, Prime RIBS units can support organizational field laundry operations, personnel fitness programs, and tactical field exchange resale operations.

ENGINEERING AND SERVICES FORCE MODULE

An E&S force module is married to deploying aircraft to the greatest extent possible. The overall objective is to have Prime BEEF CS and Prime RIBS squadrons and teams inextricably bonded to a deploying flying squadron. When a specific Prime BEEF or Prime RIBS CS squadron or team is tied to the home station or other deploying aircraft, that CS squadron or team will be tasked to accompany its flying squadron to the wartime location--regardless of the degree of wartime host-nation support in theater. If a CS squadron or team is not tied to the home station or other deploying aircraft and assured host-nation support is available, the CS squadron or team may be reapportioned to some other wartime location. The basic E&S module consists of 282 people from a 200-person Prime BEEF CS engineering force package, a 48-person Prime BEEF CS fire-fighter force package, and a 34-person Prime RIBS CS force package.

ARMY-AIR FORCE JOINT ENGINEER CONSIDERATIONS

During force-projection operations, the initial US Air Force engineering capability available in theater will most probably be Air Force RED HORSE elements establishing APODs. Prime BEEF and Prime RIBS units will also be quickly deployed to force-projection theater locations to operate at major air bases. The corps engineer and his staff should consider the following when coordinating joint engineer plans and operations with the Air Force:

- Request the latest engineer intelligence data from deployed or deploying RED HORSE elements to assist in identifying force-projection TA engineer requirements (including soils data, availability of construction materials, and host-nation construction support) and enemy engineer capabilities.
- Establish engineer staff links between the AFFOR and ARFOR engineer staff sections through the JTF or theater engineer staff and headquarters.
- Provide necessary Army engineer LO support.
- Develop the joint task-organization relationships that enhance RED HORSE and Prime BEEF capabilities following

deployment of Army corps engineer units.

- Assess the need for RED HORSE airfield maintenance and repair support following arrival of Army construction units in theater.

Ž Determine if Prime BEEF units need augmentation from Army construction units, especially in the area of RRR.

US NAVY ENGINEER SUPPORT

The Naval Construction Force (NCF) is a generic term applied to that group of deployable naval units that has the capability to construct maintain, and/or operate shore, inshore, and deep-ocean facilities in support of US Navy and Marine Corps and, when directed, other agencies of the US government, including the US Army and unified commanders. The NCF is frequently referred to as the *Seabees.* It is composed of both active and reserve component units.

Air-transportable, task-organized NCF units are available for deployment upon 48-hours notice. Priority construction projects can be initiated days prior to the arrival of maritime prepositioning force (MPF) shipping. Additionally local contractual acquisition of heavy engineer equipment can augment air-transported NCF assets in a secure environment The NCF provides-

Ž Responsive military advanced base-construction support, including operational, logistics, underwater, ship-to-shore, shore, and deep-ocean facilities construction, maintenance, and operation.

- Military construction support of Marine Air-Ground Task Force (MAGTF) operations.

- Defensive and limited offensive operations against overt or clandestine enemy attacks directed toward unit personnel, convoys, camps, and facilities under construction.

- Amphibious assault and ship-to-shore construction support operations.

- Battle-damage repair operations.

Ž Disaster control and recovery operations.

- Civic-action employment.

NAVAL BASE CONSTRUCTION

The construction of naval bases maybe considered as falling into two areas: those within the country of conflict and those off the shores of the country in which combat is underway In-country bases include logistics terminal facilities; coastal, inshore, and riverine warfare opcrating bases; communications facilities; ashore fleet air units; and other fleet support facilities in the immediate conflict area. Naval air units ashore, such as search-and-rescue, antisubmarine warfare, carrier on-board delivery, electronic countermeasures, coastal and riverine patrol, communication, and tactical squadrons have significant construction implications. Naval offshore bases are required to support antisubmarine warfare, mine warfare, reconnaissance, communications, underway replenishment, and logistics support to forward-deployed Naval and Marine forces.

SUPPORT TO THE US MARINE CORPS

The MAGTF is the major combat organization supported by the NCF. It normally consists of a MAGTF command element, a ground combat element, an aviation combat element, and a

CSS element. OPCON is the only command or support relationship appropriate and authorized when employing NCF units within the MAGTF. The MAGTF commander may place NCF units under the OPCON of a subordinate element commander (such as a ground combat element) for missions such as RRR or civil-action team support required to assist stability operations. NCF units employed under the OPCON of the MAGTF element commander will be tasked according to MAGTF construction priorities.

The normal MAGTF/NCF associations established to support MAGTF operations are general guidelines; the actual NCF organizational relationship with the MAGTF is METT-T dependent. These associations are-

- Ž A marine expeditionary force (MEF) with a naval construction regiment (NCR) within 30 days.
- A marine expeditionary brigade (MEB) with an NMCB within 6 days.
- Ž A marine expeditionary unit (MEU) with an NMCB detachment (air detachment, civic-action teams, and other details and detachments as directed by the fleet CINC) within 48 hours.

The MAGTF's general engineering requirements will normally determine the scope of NCF employment during any operation. NCF units focus on general engineering tasks and are limited by training and equipment in combat and CS capabilities. Prior to assigning a mission to an NCF unit a thorough analysis should be conducted to determine if all aspects of the assignment fall within the NCF's capabilities. NCF units should receive specific tasks or types of tasks on an area or GS basis. The NCF is a construction organization. It has organic defensive capability, but does not possess the offensive combat capability of Marine Corps engineer units. The construction capabilities provided to the MAGTF by NCF units are extensive. They include the following:

- Constructing of ASPs, expeditionary bulk-liquid storage facilities, battle-damage repair (including RRR), expeditionary shelters for operations, communications, maintenance, warehousing, and personnel support structures.
- Erecting of combat-zone hospitals.
- Improving or constructing ports.
- Ž Security fencing.
- Ž Well drilling.
- Ž Expanding and upgrading unimproved roadway systems.
- Ž Developing aviation support facilities and other forward operating bases in support of Marine aviation employment through extensive use of expeditionary airfield matting, pre-engineered and expeditionary shelters, and other semipermanent and permanent construction support.
- Ž Hardening POL and ammunition storage facilities against natural and enemy threats.
- Installing permanent (nonstandard) bridges in relief of tactical, fixed-panel bridging assets.

In executing assigned projects, NCF units maintain a significant self-defense capability for their construction sites and can be employed as part of a perimeter defense force. All Seabee units are equipped with small arms, and the larger units (NMCBs) have organic indirect-fire weapons systems (60-millimeter mortars). Their weapons are identical to those in the Marine Corps inventory. A Marine advisor is resident to the NMCB staff and NMCB personel receive semiannual training on military skills and tactics.

AMPHIBIOUS OPERATIONS

All component NCF organizations maybe employed during amphibious operations. NCF forces are normally placed OPCON to the Commander, Amphibious Task Force (CATF). They perform construction tasks that assist in the ship-in-shore movement of personnel, equipment and supplies. NCF units OPCON to the MAGTF commander maybe located in both the assault echelon (AE) and the assault follow-on echelon (AFOE). The priority given to construction tasks assigned to NCF units will determine the echelon in which the NCF will be employed. Additional NCF units may be assigned to the CATF and employed within the amphibious objective area (AOA) in a fleet support or other role. Examples of tasks requiring immediate priority include well drilling and establishing or upgrading forward operating bases for fixed-wing aircraft.

SUPPORT TO THE MARITIME PRE-POSITIONING FORCE

The MPF is a task organization of units under one commander formed for the purpose of introducing an MEB and its associated equipment and supplies into a secure area. The MPF is composed of a command element a maritime pre-positioning ships squadron, an MEB, and a naval support element (NSE). As part of their primary mission, NCF units construct and repair MPF logistics terminal facilities. Specific areas of emphasis include beaches, ports, the arrival airfield, and railheads.

Beaches

Unlike amphibious operations, logistics considerations drive beach selection for MPF operations. NCF units can rapidly perform the following tasks:

- Upgrade beach egress and road networks to staging and marshaling areas and other inland destinations.
- Construct expedient survivability structures (earthen berms) for bulk liquids and Class V ammunition storage.

Ports

NCF units can evaluate port capabilities (surface and subsurface) amd upgrade facilities to support the MPF operation.

Arrival Airfield

NCF enhancements include—

- Analyzing soil and construction materials, to include evaluating the load-bearing capability of select fill material.
- Constructing and upgrading airfields to ensure their capability for tactical or strategic lift (C-130/C-141/B-747/C-17/C-5) aircraft.
- Increasing aircraft staging areas (maximum on ground (MOG)) sufficient for tactical and strategic aircraft requirements.
- Upgrading roadway systems.
- Constructing expedient survivability structures (such as earthen berms and revetments) for aircraft, bulk liquids, and Class V ammunition storage and hardening existing facilities.
- Arresting gear site preoparation/installation.
- Constructing and improving airfield utilities.

Rail heads

NCF tasks include—

- Damage control and repair.
- Railhead operations.

NAVAL BASE MAINTENANCE

The tasks of the NCF in support of naval base maintenance include the operation and maintenance of public works and public utilities such as water purification and distribution, power generation and distribution, and sewage collection and treatment. Once the base has been substantially constructed, the NCF proovides maintenance and repair of structures, minor construction for alterations and improvements, and maintenance and upgrade of LOC.

DISASTER RELIEF

NCF forces maintain the capability to provide disaster relief in the event of a natural disaster or hostile military action. Each NCF unit is responsible for disaster control measures to protect its own personnel equipment life-sup port areas, and work sites. They may be assigned responsibility for participation in the defense of other activities. The NCF unit makes this an effective disaster control and recovery unit (DCRU), ready to give direct assistance to any military or civilian installation or community during an emergency.

CIVIC ACTION

Civic-action projects in support of the local populace may be undertaken by NCF units as part of their normal operations.

NAVAL CONSTRUCTION FORCES

NCF units are commanded by officers of the Navy Civil Engineer Corps. Enlisted personnel are primarily from the naval occupational field 13 (construction). Occupational field 13 has builders, construction electricians, construction mechanics, engineering aids, equip ment operators, steelworkers, and utility workers.

Commander, Naval Construction Battalions

The commander, Naval Construction Battalions, US Pacific Fleet (COMCBPAC) and the Commander, Naval Construction Battalions, US Atlantic Fleet (COMCBLANT) exercise operational and administrative control of assigned NCF components. They provide policy guidance concerning leadership and discipline; administration; force-projection planning; readiness; military and technical training, unit employment deployment and scheduling; doctrine, tactics, and procedures; equipment management and logistics support.

Naval Construction Brigade

A naval construction brigade (NCB) exercises administrative and operational control of two or more NCRs operating in a specific geographic area or in support of a specific military operation. The NCB provides an initial review of plans, programs, and construction capabilities; assigns priorities and deadlines; and directs distribution of units or materials and equipment

Naval Construction Regiment

An NCR exercises administrative and operational control of two or more NMCBs operating in a specific geographic area or in support of a specific military operation. The NCR may be OPCON to an MEF The NCR develops construction execution plans; assigns construction projects to NCR units; monitors progress; performs quality control; directs redistribution of units, equipment and materials; and reviews plans and operations reports. The NCR also maintains a greater planning, estimating, and engineering capability than the battalions.

Naval Construction Force Support Unit

A naval construction force support unit (NCFSU) provides operational construction logistics support to the deployment area for an NCR of up to four NMCBs. The NCFSU controls the requisition, expedition, receipt, control, issue, and delivery of construction (Class IV) materials. It also provides maintenance support for NCF auxiliary construction and transportation equipment and performs over-

haul and specialized repair of equipment components. When required, the NCFSU provides the operation and maintenance capability for rock crushers, asphalt and concrete plants, large paving machines, and long-haul transposition.

Naval Mobile Construction Battalion

A NMCB provides responsive military construction support to Naval, Marine Corps, and other military forces, conducts battle-damage repair operations (including RRR), constructs base facilities, and conducts defensive operations as required by METT-T The NMCBs also conduct disaster-relief operations and civic-action projects as required. The most common tasks of the NMCB are to—

- Construct, repair, improve, and maintain LOC (including bridges, road, and rail systems).
- Construct, repair, improve, and maintain fixed- and rotary-wing airfields, landing sites, airdrop sites, and airfield support structures/facilities.
- Upgrade, repair, and replace POL and bulk-liquid systems.
- Construct ASPS, water storage and distribution facilities, cantonments, defensive structures, throughput systems (air, rail, road, and water terminals), and other support facilities.

The NMCB can function as an integral unit of the NCR or it can operate independently It provides specialized, task-organized detachments up to one-half its organizational size to address specific support requirements. Eighty-five percent of each NMCB can deploy as an air echelon via aircraft (approximately 87 C-141 equivalents), with the remaining fifteen percent following via surface transportation.

NMCB Air Detachment

An air detachment (AIR DET) is a task-organized advanced element of an NMCB. It is composed of 91 personnel and 38 items of civil-engineer support equipment and limited to 250-300 STONs (14 C-141 equivalents) of air ship ment The AIR DET is used to repair immediate war damage and construct urgent projects required by maro operational plans.

NMCB Civic-Action Team (Seabee Team)

The civic-action Seabee team is a small, highly-mobile construction unit, task-organized from NMCB assets. The civic-action team provides socioeconomic community development disaster relief, and technical assistance, The team supervises nation-assistance construction projects and conducts on-the-job training and classroom instruction in third-world nations.

Amphibious Construction Battalion

An amphibious construction battalion (PHIBCB) provides engineering support to the naval beach group (NBG) during the initial assault-and-landing phase of amphibious op erations. The PHIBCB provides designated elements to the CATF, supports the NBG, and assists the landing-force support party (LFSP) or NSE in operations that do not interfere with the primary mission. There are two PHIBCBs, one each under the OPCON of the Commander in Chief, Pacific Fleet (CINCPACFLT) and Commander in Chief, Atlantic Fleet (CINCLANTFLT). They are readily organized to support specific tasks. When employed in sup port of amphibious operations, they become essential elements of the NBG, the naval component of the LFSP A PHIBCB supoorts a MAGTF landing over two beaches during the amphibious assault PHIBCBs maintain organizational command integrity.

Construction Battalion Maintenance Unit

A construction battalion maintenance unit (CBMU) maintains, operates, and repairs public works, utilities, and other facilities at an

established advance base after the departure of the NMCB units that started the construction. The unit may be attached to the NMCB to assist in completing the facilities that the CBMU will subsequently operate and maintain. When employed, CBMUs carry out their assigned functions under the command of the advanced base commander or naval component commander. Typical CBMU functions include—

- Designated public works responsibilities at a naval or marine base or other installations.
- Maintenance, repair, and minor construction for structures and grounds, including waterfront facilities, runways, taxiways, parking aprons, and helicopter pads (including matting surfaces).
- Operation and maintenance of base utilities systems, except expeditionary systems such as the Amphibious Assault Fuel System (AAFS), Tactical Airfield Fuel Distribution System (TAFDS), and water-supply support system equipment.
- Engineering services for the base as requested.

Underwater Construction Team

An underwater construction team (UCT) constructs, inspects, maintains, and repairs underwater facilities. Generally, all underwater engineering, construction and repair falls under the purview of an UCT. Each UCT is organized and equipped to be self-sufficient in underwater construction capability for the various tasks anticipated. Their outfitting includes construction and underwater weight-handling equipment underwater and terrestrial construction tools, diving equipment, safety equipment and a standard allowance of infantry gear. The UCT can deploy as an integral unit or as individual construction detachments in support of other NCF, MPF, MAGTF, or naval units. Tasks include support of underwater surveillance systems and waterfront facilities inspections.

Construction Battalion Unit

A construction battalion unit (CBU) provides engineering support of a nature that does not lend itself to accomplishment by other NCF units. The CBUs are also used to provide manpower pools in support of NMCBs and naval fleet hospitals.

ARMY-NAVY JOINT ENGINEER CONSIDERATIONS

During force-projection operations, the initial naval engineering capability available in theater will most probably be NMCB AIR DETs, and MAGTF amphibious forces. NMCBs will also be quickly deployed to force-projection theater locations to construct necessary naval facilities. The corps engineer and his staff should consider the following when coordinating joint engineer plans and operations with the Navy:

- Request the latest engineer intelligence data from deployed or deploying NMCB AIR DET elements to assist in identifying force-projection TA engineer requirements (including soils data, availability of construction materials, and host-nation construction support) and enemy engineer capabilities.
- Establish engineer staff links between the Navy forces (NAVFOR) and ARFOR engineer staff sections through the JTF or theater engineer staff and headquarters.
- Provide necessary Army engineer LO support.
- Develop the joint task-organization relationships that enhance NCR capabilities following deployment of Army corps engineer units.

- Assess the need for NMCB support following the arrival of Army construction units in theater.

Ž Determine if NMCB units need augmentation from Army construction units.

- Develop procedures for Army engineer units to be able to acquire additional Class IV construction materials from NCFSUs.

US MARINE CORPS ENGINEER SUPPORT

The Marine Corps is organized into regiments, each of which contains a division, an aircraft wing, and a force service support group (FSSG). These, in turn, each contain organic engineer support. The Marine Corps component of the theater command or JTF is normally controlled by a commander of Marine Corps Forces (MARFOR). The regiment forms MAGTFs to meet force-projection operations. Components of a MAGTF may include an MEF, an MEB, and an MEU.

MARINE AIR-GROUND TASK FORCE

The Marine regiment may form a MAGTF that is a task organization of Marine forces (division, aircraft wing, and service-support groups) under a single command and structured to accomplish a specific mission. NCF units may be placed under OPCON to the MAGTF commander, who may place NCF units under the OPCON of a subordinate element commander (such as a ground combat element) for missions such as RRR or civil-action team support required to assist stability operations. NCF units employed under the OPCON of the MAGTF element commander will be tasked according to MAGTF construction priorities. The MAGTF normally consists of command, aviation combat ground combat and CSS elements.

Command Element

The command element is the MAGTF headquarters. It is a permanent organization composed of the commander; general or executive and special staff sections; headquarters section; and requisite command, control, and coordination staff essential for effective planning and execution of operations by the other three elements of the MAGTF

Aviation Combat Element

The aviation combat element is task-organized to provide all or a portion of the functions of Marine Corps aviation in varying degrees, based on the tactical situation and the MAGTF mission, and size. These functions are air reconnaissance, antiair warfare, and control of aircraft and missiles. The aviation combat element is organized around an aviation headquarters and varies in size from a reinforced helicopter squadron to one or more Marine aircraft wings. It includes those aviation command (including air-control agencies), combat, CS, and CSS units required by the situation. Normally there is only one aviation combat element in a MAGTF.

Ground Combat Element

The ground combat element is task-organized to conduct ground operations. It is constructed around an infantry unit and varies in size from a reinforced infantry battalion to one or more reinforced Marine divisions. It also includes appropriate CS and CSS units. Normally, there is only one ground combat element in a MAGTF.

CSS Element

The CSS element is task-organized to provide the full range of CSS necessary to accomplish the MAGTF mission. This element can provide supply, maintenance, transportation, deliberate engineer, health, postal, disbursing EPW,

automated information systems, exchange, utilities, legal, and mortuary services. The CSS element varies in size from an MEU service-support group to an FSSG. Normally there is only one CSS element in the MAGTF.

MARINE EXPEDITIONARY FORCE

An MEF is the largest of the MAGTFs, normally built around a division or wing team, but it can include several divisions and aircraft wings, together with appropriate CSS organizations. The MEF is capable of conducting a wide RANGE of amphibious assault operations and sustained operations ashore. It can be tailored for a wide variety of combat missions in any geographic environment.

MARINE EXPEDITIONARY BRIGADE

An MEB is a task-organized organization normally built around a Marine regimental landing team, a provisional Marine aircraft group, and a logistics support group. It is capable of conducting amphibious assault operations of a limited scope. During potential crisis situations, an MEB may be forward-deployed afloat for an extended period in order to provide an immediate combat response.

MARINE EXPEDITIONARY UNIT

An MEU is a task organization normally built around a battalion landing team, a reinforced helicopter squadron, and a logistics-support unit. The MEU fulfills routine afloat-deployment requirements, provides an immediate reaction capability for crisis situations, and is capable of relatively limited combat.

MARINE COMBAT ENGINEER BATTALION

Each Marine division is supported by one CEB that will provide close CS and limited general engineering support for the division through task-organized combat engineer elements for ground combat operations. Each Marine infantry regiment (three per division) is supported by a combat engineer company The CEB enhances the mobility countermobility, and survivability of the Marine division through close combat engineer support and provides limited general engineering support required for the functioning of the Marine division. The CEB has the following capabilities:

Ž Mobility tasks.

- Conducts engineer reconnaissance and supports intelligence collection within the division zone.
- Plans, organizes, and coordinates the assault breaching of explosive and nonexplosive obstacles from the high-water mark inland.
- Employs assault bridge systems. When augmented, employs other standard bridge systems.
- Provides expedient repair and reinforcement of existing bridges.
- Constructs expedient, short-span bridges from local materials in support of ground combat operations.
- Provides temporary repair of existing roads and limited new construction of combat roads and trails.

Ž Countermobility tasks.

- Plans, organizes, and coordinates the construction of simple and compound explosive and nonexplosive obstacle systems.
- Plans and constructs obstacles requiring special engineer equipment or technical skills.
- Performs specialized demolition missions beyond the capability of other division units.

• Survivability tasks. Provides technical assistance and necessary equipment for

the development of temporary protective positions for personnel and equipment.

- General engineering support tasks.
  - Provides essential construction support that is temporary in nature and designed to meet minimum combat requirements.
  - Provides utility support including mobile electric power equipment and potable water for essential troop consumption, bath services, and equipment operation and maintenance requirements.
  - Constructs and improves expedient vertical takeoff and landing (VTOL) sites to support division operations.

The CEB consists of a Headquarters and Service (H&S) company, an engineer support company (ESC), and four combat engineer companies (CECs). The CEC provides close combat support of an engineering nature, as necessary, to meet the essential requirements of an infantry regiment and other division elements in combat operations. It contains a company headquarters and three combat engineer platoons. The ESC provides personnel, equipment, and appropriate task units to the CECs in support of operational requirements. It provides minimum potable water for the Marine division and electrical power for designated elements of the Marine division. The ESC is organized into a company headquarters section, an equipment platoon, a motor transport platoon, and a utilities platoon. The Marine engineer forces are currently undergoing some organizational changes. The CEB will lose its support company and one CEC to the ESB in the FSSG.

MARINE ENGINEER OPERATIONS DIVISION

Each Marine aviation wing contains a wing support group, which in turn contains wing support squadrons for both fixed- and rotary-wing aircraft These squadrons each contain an engineer operations division which provides organic engineer support to the wing only and deploys with the wing. The division will not normally assist in other engineer operations. It provides all essential aviation ground support requirements and have the capability to perform—

- Engineer reconnaissance and survey.
- Repair, improvement, and maintenance of existing road nets.
- Construction and maintenance of expedient roads and drainage systems.
- Construction and maintenance of VTOL facilities.
- Construction and maintenance of mission-essential base-camp requirements.
- Technical and equipment assistance for erection of shelters.
- Utilities support, to include essential mobile electric power, water, and hygiene support.
- Equipment and personnel required for RRR.
- Material handling equipment (including 16 cranes and 31 forklifts) to support base operations.
- Limited mine-detection capability and combat engineering services.

An engineer operations division is task-organized into seven separate branches: draft/survey, heavy equipment/material handling, utilities, electrical, reference, water-support hygiene, and construction.

MARINE ENGINEER SUPPORT BATTALION

Each FSSG has an organic ESB. The ESB is organized to plan, coordinate, and supervise the battalion's general-engineering and supply-support functions. It is structured to facilitate task organization for operations conducted by the battalion. The ESB provides GS to the MEF (to include survivability countermobility, and mobility enhancements, and EOD) and GS to the handling, storage, and distribution of bulk Class I (water) and bulk Class III supplies. The ESB is capable of—

- Conducting engineer reconnaissance.
- Constructing, improving, and maintaining airfields, encampments, and other support facilities.
- Conducting mobility enhancement operations, iton include the construction, improvement, and maintenance of LOC and MSRs.
- Providing bulk Class III fuel support, to include receipt, storage, and distribution of bulk fuel products.
- Providing utilities support, to include mobile electric power beyond supported units' capabilities and electrical power distribution within camps and support areas.
- Providing water purification and bulk Class I (water) storage and distribution.
- Providing survivability enhancements, to include construction of protective structures.
- Installing or supervising the installation of standard and nonstandard fixed-panel and floating bridging, to include planning and controlling bridging operations.
- Providing bath and laundry services.
- Providing EOD support.
- Constructing field-expedient deception devices.
- Conducting countermobility operations through the installation of obstacles, to include minefield and nonexplosive obstacles.
- Conducting mobility operations, to include breaching, reducing, and removing explosive or nonexplosive obstacles.
- Providing specialized demolition operations.

The ESB is structured into seven separate companies to facilitate task organization an H&S company a bridge company an ESC, a bulk fuel company and three engineer companies, The H&S company provides C2, administrative, and CS functions for the rest of the battalion. This company also provides extensive EOD support to the MEF with a separate EOD platoon. The ESC provides DS maintenance for specified equipment organic to the battalion; DS transportation and services to the battalion; and GS or reinforcing augmentation, as required, to the engineer companies of the battalion. This is a large company organized into five separate platoons: utilities, maintenance, motor transport, engineer equip ment, and water supply The bridge company provides technical assistance and supervision for the construction of find-panel and floating bridge equipage, Organic equipment includes nine bridge erection boats, three M4T6 sets, six floating foot bridges, and six MGB sets. The bulk fuel company provides general Class III supply support to the MEF. The engineer companies provide general engineering support of a deliberate NATURE to the MEF. It is organized into a headquarters section, an equipment platoon, and two engineer platoons.

ARMY-MARINE CORPS JOINT ENGINEER CONSIDERATIONS

During force-projection operations, the initial US Marine Corps engineering capability available in theater will most probably be Marine Division CEBs as part of MAGTF operations. ESBs will also be quickly deployed to force-projection theater locations to construct necessary Marine facilities. The corps engineer and his staff should consider the following when coordinating joint engineer plans and operations with the Marine Corps:

Ž Request the latest engineer intelligence data from deployed or deploying Marine CEB and ESB elements to assist in the identification of force-projection TA engineer requirements, including threat engineer capability, mine and obstacle data, soils data, and availability of construction materials and host-nation construction support.

- Establish engineer staff links between the MAGTF, MARFOR, and ARFOR engineer staff sections through the JTF or the theater engineer staff and headquarters.

Ž Provide necessary Army engineer LO support.

- Develop the joint task-organization relationships that enhance Marine engineer capabilities following deployment of Army corps engineer units.
- Assess the need for CEB and ESB support following the arrival of Army corps combat engineer and construction units in theater.
- Determine if ESB units need augmentation from Army construction units.

Ž Develop procedures for Army engineer units to be able acquire additional Class IV construction materials from ESBs.

- Coordinate requirements and support as the situation dictates (such as when Army units supporting a JTF with a large Marine contingent, including a Marine topographic platoon, are present).

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6 JUNE 1995

By Order of the Secretary of the Army:

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Glossary

1SG	first sergeant
2IC	second in command
A&O	assault and obstacle
A2C2	Army airspace command and control
AAFS	Amphibious Assault Fuel System
ABCS	Army Battle-Command System
ACE	analysis control element
ACE	armored combat earthmover
ACE	Assistant Corps Engineer
ACUS	area common user system
ADA	air defense artillery
ADC	area damage control
ADC-S	assistant division commander for support
ADDS	automated data distribution system
ADE	Assistant Division Engineer
ADP	automated data processing
AE	assault echelon
AFCS	Army facilities components system
AFCT	aircraft
AFFOR	Air Force forces
AFOE	assault follow-on echelon
AG	Adjutant General
AHD	antihandling device
AI	air interdiction
AIR DET	air detachment
AISN	Army Information Systems Network
ALOC	air lines of communication
AM	airfield matting
AMCI	Army and Marine Corps Integration
ammo	ammunition
ANG	Air National Guard
AO	area of operations
AOA	amphibious objective area
AOR	area of responsibility
APOD	aerial port of debarkation
APOE	aerial port of embarkation
AR	Army regulation
ARFOR	Army forces
ARNG	Army National Guard
arty	artillery
ASG	area support group
ASOC	air support operations center
ASP	ammunition supply point
ASR	alternate supply route

ATACMS	Army tactical cruise missile system
ATK	attack position
ATMCT	air terminal movement control team
ATP	ammunition transfer point
ATTE	assist ant theater topographic engineer
ATTN	attention
AV	aviation
AVIM	aviation intermediate maintenance
AVLB	armored vehicle launched bridge
BB	bare base
BCC	battlefield circulation control
BCE	base civil engineer
BCOC	base cluster operations center
BDA	battle damage assessment
BDAR	battle damage assessment and repair
bde	brigade
BDOC	base defense operations center
BHL	battle handover line
BMMC	Brigade Materiel Management Center
bn	battalion
BOS	battlefield operating system
br	branch
BSA	brigade support area
BSO	brigade signal officer
C2	command and control
CA	civil affairs
CAC	crossing-area commander
CAE	crossing-area engineer
CALL	Center for Army Lessons Learned
CAS	close air support
CATF	Commander, Amphibious Task Force
CATK	counterattack
CAV	cavalry
CB	construction battalion
CBMU	construction battalion maintenance unit
cbt	combat
CBU	construction battalion unit
CCF	Chinese Communist Forces
CDOCC	corps deep operations coordination cell
CDR	commander
CEB	Combat Engineer Battalion
CEC	combat engineer company
CEV	combat engineer vehicle
CFC	crossing-force commander
CFE	crossing- force engineer
CGSC	Command and General Staff College
CINC	Commander in Chief
CINCLANTFLT	Commander in Chief, Atlantic Fleet

CINCPACFLT	Commander in Chief, Pacific Fleet
Class I	A category of supply which includes meals and rations.
Class II	A category of supply which includes consumables/expendables.
Class III	A category of supply which includes petroleum, oils, and lubricants.
class IV	A category of supply which includes construction and barrier materials.
Class V	A category of supply which includes ammunition.
CISSS VI	A category of supply which includes sundry packs.
Class VII	A category of supply which includes end items.
Class VIII	A category of supply which includes medical material.
Class IX	A category of supply which includes repair parts and components.
classes of supplies	The grouping of supplies, by type, into 10 categories to facilitate supply management and planning.
CMCC	corps movement control center
cmd	command
CMMC	Corps Materiel Management Center
CNR	combat net radio
co	company
COA	course of action
COB	collocated operating base
COMCBLANT	Commander, Naval Construction Battalions, US Atlantic Fleet
COMCBPAC	Commander, Naval Construction Battalions, US Pacific Fleet
coml	commercial
COMMZ	communications zone
CONPLAN	contingency plan
const	construction
CONUS	continental United States
COR	contracting officer's representative
COSCOM	corps support command
CP	command post
CPOC	corps personnel operations center
CREST	contingency real estate support team
CS	call sign
CS	combat support
CSA	corps storage area
CSB	corps support battalion
CSC	combat support company
CSE	combat support equipment
CSG	corps support group
CSH	combat support hospital
CSM	command sergeant major
CSR	controlled supply rate
CSS	combat service support
D+	day of an operation
D-Day	commencement of operations
DA	Department of the Army
DAC	disaster assistance center
DBC	deputy brigade commander
DCG	deputy commanding general

DCRU	disaster control and recovery unit
DCS	defense communication system
den	dental activity
dep	deputy
DISCOM	division support command
div	division
DMA	Defense Mapping Agency
DMMC	Division Materiel Management Center
DOD	Department of Defense
DODD	Department of Defense Directive
DP	decision point
DPW	Directorate of Public Works
DS	direct support
DSA	division support area
DSSU	direct-support supply unit
DST	decision support template
DSU	direct-support unit
DTG	date-time group
DX	direct exchange
DXA	direct-exchange activity
E&S	engineering and services
EA	engagement area
EAC	echelons above corps
EBA	engineer battlefield assessment
EEEI	essential elements of engineer intelligence
EEMO	engineer equipment maintenance officer
EGA	enhanced graphite adapter
ENCOM	engineer command
ENGDATAREP	Engineer Data Report
engr	engineer
ENGREP	Engineer Report
ENSITREP	engineer situation report
ento	entomology
EOD	explosive ordnance disposal
EPLRS	enhanced position location reporting system
EPW	enemy prisoner of war
equip	equipment
ESB	engineer support battalion
ESC	engineer support company
evac	evacuation
EW	electronic warfare
EWL	engineer work line
FA	field artillery
F M	forward assembly area
FACE	forward aviation combat engineering
FARP	forward area rearm/refuel point
FEBA	forward edge of the battle area
fld	field

FLOT	forward line of own troops
FLS	forward landing strip
FM	field manual
FM	frequency modulated
FMFM	Fleet Marine Force manual
FMSP	Foreign Military Sales Program
FOL	forward operating location
FRAGO	fragmentary order
freq	frequency
FSB	forward support battalion
FSCOORD	fire-support coordination officer
FSSG	force service support group
fwd	forward
G1	Assistant Chief of Staff, G1 (Personnel)
G2	Assistant Chief of Staff, G2 (Intelligence)
G3	Assistant Chief of Staff, G3 (Operations and Plans)
G4	Assistant Chief of Staff, G4 (Logistics)
G5	Assistant Chief of Staff, G5 (Civil Affairs)
gp	group
grp	group
GS	general support
GSSU	general-support supply unit
GSU	general-support unit
H	start of an operation
H&S	Headquarters and Service
HEMTT	heavy expanded mobility tactical truck
HHC	headquarters and headquarters company
HHD	headquarters and headquarters detachment
hldg	holding
HMMWV	high-mobility multipurpose wheeled vehicle
HQ	headquarters
HVT	high-value target
hvy	heavy
IMETP	International Military Education and Training Program
Inc.	Incorporated
info	information
intel	intelligence
INTSUM	intelligence summary
IPB	intelligence preparation of the battlefield
ISB	intermediate staging base
ISS	information system security
J2	Intelligence Directorate
J3	Operations Directorate
J4	Logistics Directorate
JMCC	joint movement control cell
JPO	Joint Petroleum Office
JSOP	Joint Services Operations Plans
JTF	joint task force

LAD	latest arrival date
LAPES	low-altitude parachure extraction zones
LC	line of contact
LD	line of departure
LE	light equipment
LFSP	landing-force support party
LO	liaison officer
LOA	limit of advance
LOC	lines of communication
LOGCAP	logistics civil augmentation program
LOGPAC	logistics packages
LOGSTAT	logistics status report
LOS	line of sight
LOTS	logistics over the shore
LRP	logistics regulating point
LSA	life-support area
LSA	logistics support area
LSC	life-support center
lt	light
m	meter
MACOM	major Army command
MAGTF	Marine Air-Ground Task Force
maint	maintenance
MARFOR	Marine Corps forces
MASF	medical air support facility
MASH	mobile army surgical hospital
MBA	main battle area
MC&G	mapping, charting, and geodesy
MCC	movement control center
MCL	minimum class load
MCOO	modified combined obstacle overlay
MCT	movement control team
MEB	marine expeditionary brigade
med	medical
MEF	marine expeditionary force
METT-T	mission, enemy, terrain, troops, and time available
MEU	marine expeditionary unit
MGB	medium girder bridge
MI	military intelligence
MICLIC	mine-clearing line charge
MKT	mobile kitchen trailer
mm	millimeter
MOADS	Maneuver-Oriented Ammunition Distribution System
MOB	main operating base
MOG	maximum on ground
MOPMS	modular pack mine system
MOPP	mission-oriented protective posture
MOS	military occupational specialty

MOUT	military operations on urbanized terrain
MP	military police
MPF	maritime pre-positioning force
mph	miles per hour
MQS	Military Qualification Standards
MRT	movement regulating team
MSB	main support battalion
MSC	major subordinate command
MSR	main supply route
MST	maintenance support team
MTC	movement to contact
mvmt	movement
MWR	morale, welfare, and recreation
MWRS	morale, welfare, recreation, and services
NAI	named area of interest
NATO	North Atlantic Treaty Organization
NAV	navigation
NAVFOR	Navy forces
NBC	nuclear, biological, chemical
NBG	naval beach group
NCA	National Command Authority
NCB	naval construction brigade
NCF	naval construction force
NCFSU	naval construction force support unit
NCO	noncommissioned officer
NCR	naval construction regiment
NCS	net control station
NEO	noncombat ant evacuation operation
NICP	national inventory control point
NKPA	North Korean People's Army
NMC	not mission capable
NMCB	naval mobile construction battalion
no	number
NSE	Naval support element
O/I	operations and intelligence
0/0	on order
OBJ	objective
OBSTINTEL	obstacle intelligence
OCOKA	observation and field of fire, cover and concealment, obstacles, key terrain, and avenues of approach
OIC	officer in charge
00TW	operations other than war
OP	observation post
OPCOM	operational command
OPCON	operational control
OPLAN	operation plan
opns	operations
OPORD	operation order

ops	operations
OPSEC	operations security
ORA	obstacle-restricted area
org	organization
P	package
PB	panel bridge
PDO	Property Disposal Office
PDS	personnel daily summary
PEO	peace-enforcement operation
PERREP	personnel report
PERSCOM	Personnel Command
petri	petroleum
PHIBCP	amphibious construction battalion
PIR	priority intelligence requirements
PKO	peacekeeping operation
PL	phase line
plt	platoon
PM	preventive maintenance
POC	point of contact
POD	port of debarkation
POE	port of embarkation
POL	petroleum, oils, and lubricant
POS	position
PP	passage point
prep	preparation
Prime RIBS	Prime Readiness in Base Support
Prime BEEF	Prime Base Engineer Emergency Force
PS	personnel services
PSYOP	psychological operations
pt	point
pts	parts
qty	quantity
R&S	reconnaissance and surveill ante
RAOC	rear-area operations center
RB	ribbon bridge
RCEM	regional contingency engineering manager
recon	reconnaissance
REDCON	readiness condition
RED HORSE	Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineer
rep	repair
repl	replacement
RH	RED HORSE
RISTA	reconnaissance, intelligence, survei Ilance, and target acquisition
RMMC	Regiment Materiel Management Center
ROE	rules of engagement
ROK	Republic of Korea
RP	release point

RPMA	real property maintenance activities
rqr	required
RRP	replacement regulating point
RRR	rapid runway repair
RS&O	reception, staging, and onward movement
RSR	required supply rate
RTF	regeneration task force
RTOC	rear tactical operations center
/s/	signature
S&S	supply and service
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
S5	Civil Affairs Officer (US Army)
SA	staging area
sani	sanitation
SATP	Security Assistance Training Program
SB	standby base
sec	section
SEE	small emplacement excavator
SES	staff engineer section
SITREP	situation report
SJA	Staff Judge Advocate
SME	subject-matter expert
SOF	special operations forces
SOFA	Status of Forces Agreement
SOI	signal operating instructions
SOP	standing operating procedure
SOSR	suppression, obscuration, security, and reduction
SP	start point
SPCE	survey planning and coordination element
SPOTREP	spot report
apt	support
sptd	supported
STANAG	Standardization Agreement
STP	Soldier Training Publication
STON	short ton
sup	supply
TA	theater Army
TAA	tactical assembly area
TAACOM	Theater Army Area Command
TAC	tactical
TACGEN	tactical generator
TACON	tactical control
TAFDS	Tactical Airfield Fuel Distribution System
TAI	target area of interest
TAMMC	Theater Army Materiel Management Center

TAPOC	theater Army personnel operations center
TC	training circular
TCF	tactical combat force
TCMS	Theater Construction Management System
TEC	Topographic Engineering Center
THREATCON	threat condition
TLP	troop-leading procedure
TMT	transportation medium truck
TO	theater of operations
TOC	tactical operations center
TPFDD	time-phased force deployment data
TPTRL	time-phased transportation requirements list
trans	transportation
trk	truck
TSA	US Army Troop Support Agency
TTP	terminal transfer point
U&S	unified and specified
UAV	unmanned airborne vehicle
UCT	underwater construction team
UN	United Nations
US	United States
USACE (FWD)	forward-deployed USACE command
USACE	United States Army Corps of Engineers
USAES	United States Army Engineer School
USAID	United States Agency for International Development
USAR	United States Army Reserves
USGS	United States Geological Survey
UXO	unexploded ordnance
VET	veterinary
VTOL	vertical takeoff and landing
w/	with
WARNORD	warning order
WRSK	war readiness spares kit
XO	executive officer

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PREFACE

This field manual (FM) is a guide for the employment of engineer forces in support of a United States (US) Army corps. It addresses the role, organization, and command and control of corps engineers and the conduct of corps-level engineer operations.

The primary users of this FM are the corps commander and his staff, the corps engineer and his staff, engineer units subordinate to the corps engineer brigade, and theater engineer organizations at echelons above corps (EAC). Other users will be engineer organizations supporting maneuver units subordinate to the corps and sister serviced commanders and staffs, the United States Army Corps of Engineers (USACE), and government contractors.

The manual is fully compatible with the Army's operational doctrine as contained in FMs 100-5 and 100-7 and is consistent with current joint and multinational doctrine. This manual follows the format of FM 100-15 and supports the concepts and principles contained therein. It also complements FMs 5-71-100 and 5-116.

The proponent for this publication is the United States Army Engineer School (USAES). Submit changes for improvement on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) to Commandant, US Army Engineer School, ATTN: ATSE-T-PD-PM, Fort Leonard Wood, Missouri, 65473-6650.

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

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CORPS ENGINEER OPERATIONS

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