CHAPTER 1
INTRODUCTION

Section I. GENERAL

1–1. Purpose
This manual is a guide for the battalion commander, his staff, company commanders, platoon leaders, platoon sergeants, and squad leaders in the organization and employment of the engineer battalion organic to the airborne division.

1–2. Scope
a. This manual covers the organization, mission, capabilities, employment, and operations of the airborne division engineer battalion. Since its mission, employment, and operations, in other than airborne operations, are similar to those of other divisional engineer battalions, this manual should be used in conjunction with FM 5–135 for complete coverage of other type operations. Appendix B provides information on landing areas.

b. The discussions of missions, organization, personnel, and equipment are based on the latest issues of tables of organization and equipment (TOEs) available at the time of writing. All references to TOEs list only the basic numbers. Department of the Army Pam 310–3 should be consulted for latest letter suffixes to the basic numbers.

c. Unless otherwise specified the material presented herein is applicable without modification to both limited and general war, either nuclear or nonnuclear, and to cold war and internal defense operations.

1–3. Recommended Changes
Users of this manual are encouraged to submit recommended changes or comments to improve it. Comments should be keyed to the specific page, paragraph, and line of the text in which change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to the Commanding Officer, U.S. Army Combat Developments Command Engineer Agency, Fort Belvior, Va. 22060.

Section II. THE AIRBORNE DIVISION

1–4. Mission
The primary mission of the airborne division is the destruction of enemy military forces and the seizure or domination of critical land areas, their populations, and resources. In addition to its basic mission the division may be employed in internal defense operations.

1–5. Organization
The airborne division (fig. 1–1) consists of a relatively fixed command, staff, combat support, and combat service support structure to which are assigned a number of maneuver battalions (airborne infantry). The division commander, in organizing the division for combat, groups appropriate elements of the division under its three brigade and other control headquarters in types and numbers appropriate to each control unit's specific mission.

1–6. Capabilities and Limitations
a. The organization of the airborne division provides a capability for—
(1) Airborne operations alone or as part of a joint force, including assault by parachute or airlanding.

(2) Ground operations in difficult terrain.

(3) Operations in enemy rear areas for limited periods of time.

(4) Combat as part of a larger force in a non-airborne or non-airlanded operation.

(5) Rapid strategic deployment by air.

(6) Operations under austere maintenance and supply support.

b. The airborne division has the following limitations:

1-7. Organization

The airborne division engineer battalion (TOE 5-25) consists of a headquarters and headquarters company and three identical combat engineer companies.

1-8. Mission

The primary mission of the airborne division engineer battalion is to increase the combat effectiveness of the airborne division by providing combat support. The battalion may also...
undertake and carry out airborne infantry combat missions and/or support internal defense operations when required.

1–9. Equipment

All items of equipment of the battalion are listed in the applicable TOEs. Major items are treated in greater detail in the discussion of the elements of the battalion. All equipment is capable of being delivered by parachute or from landed medium transport or assault aircraft.

1–10. Mobility

The airborne division engineer battalion is 95 percent mobile in organic transportation and 100 percent air transportable in medium transport or assault aircraft. Army aircraft organic to the airborne division provide some degree of mobility throughout the division's area of influence and may be used by the battalion on a mission basis whenever they can expedite the accomplishment of the mission (FM 1–100).

1–11. Assignment

The airborne division engineer battalion is organic to the airborne division, TOE 57.

1–12. Capabilities

Capabilities of the airborne division engineer battalion include—

a. Engineer staff planning for the division.

b. Supervision of organic and attached engineer troops.

c. Limited construction, repair and maintenance of roads, bridges, fords, and culverts: bridging for passage of short gaps when necessary equipment is delivered to the battalion or otherwise obtainable.

d. Support of hasty and deliberate stream-crossings when reinforced by engineer bridge units.

e. Emplacement and removal of obstacles, including mines (high explosive and chemical) and boobytraps.

f. Preparing and executing demolitions; planning for the employment of atomic demolition munitions (ADM).

g. Performing engineer reconnaissance and producing engineer intelligence for the division.

h. General construction, including limited construction of assault landing strips and limited repair of captured enemy runways.

i. Providing personnel and equipment for purification of water and operation of water points.

j. Assisting in the assault of fortified positions and assault demolitions of obstacles.

k. Technical assistance to other troops of the division in the construction of obstacles, fortifications, emplacements, camouflage, deception devices, and other engineer matters. Construction of these facilities when required.

l. Engaging in airborne infantry combat-type missions when required.

m. Exploiting locally available sources of materials for construction, fortification, and camouflage.

n. Performing organizational maintenance for engineer, ordnance, and signal equipment organic to the battalion.

o. Performing missions in support of cold war and internal defense operations, especially in the field of military civic action. These missions may require augmentation from the TOE 5–500-series.

p. The battalion has only a limited active air defense (AD) capability. Organic weapons (rifles and machineguns) can provide some protection against low-flying aircraft attacking battalion elements. Employment of such weapons in an AD role should be restricted to retaliatory (self-defense) fires. For slow attack speeds, the techniques contained in chapter 10, FM 23–65, should be used. For fast aircraft, all weapons deliver maximum rate of fire well in front of the attacking aircraft and cause it to fly through the highest possible volume of fire. Employment of organic weapons in an AD role is governed by unit SOP.

1–13. Methods of Operation

a. One or more engineer companies may be attached to or placed in direct support of an
airborne infantry brigade for the airborne assault. The remaining companies are kept under battalion control. Companies attached to brigades revert to battalion control as soon as practicable after the assault, to insure maximum flexibility and economy of effort.

b. Equipment and personnel of headquarters and headquarters company and supporting nondivisional units are employed to reinforce the line companies as required. These elements may be attached to or placed in support of the line companies.

c. Improvement or construction of landing areas (drop, extraction, and landing zones) in the objective area during the assault phase of airborne and airmobile operations is a responsibility of the battalion. The battalion may be reinforced by elements of the airborne light equipment company for construction and maintenance of landing zones or other tasks requiring considerable earthmoving. Reinforcement may be by other types of nondivisional engineer units capable of being airlanded or airdropped. Of special significance are engineer KA and KB teams from the TOE 5-500-series which are airborne-qualified teams capable of supervising and advising, especially indigenous forces, in engineering tasks and projects.

Note. The proposed engineer combat battalion (airborne), TOE 5-195T (tentative), will be ideally suited to reinforce the airborne division engineer battalion, especially for landing zone construction.

d. In internal defense operations, elements of the airborne division engineer battalion may be assigned to political subdivisions such as regions, provinces, districts, or villages on an area or task basis.

1-14. Communications

a. Radio Nets. The airborne division engineer battalion operates stations in division nets and establishes internal battalion nets as required. Figures 1–2 and 1–3 show the radio net configurations normally found in the airborne engineer battalion.

(1) Division nets. The battalion normally operates stations in five division nets as follows:

(a) Division command net, SSB-voice. The battalion communication sec-
*Note: Used to extend the range of FM net as required.

Figure 1-2. Typical battalion radio net.
BATTALION COMMAND NET, FM VOICE

DIV WNG BCST NET, AM VOICE

Figure 1-3. Typical company radio net.

There has the capability of operating a relay station in this net to extend its range. Subordinate combat engineer companies normally enter this net; however, they may enter the command net of a supported unit when required.

(b) Company command net, FM-voice.

Each combat engineer company establishes its own command net.

This net is the company commander's personal means of exercising command and control. Subordinate platoons normally enter this net; however, they may enter the command net of a supported unit when required.

(c) Platoon nets, FM-voice. Each combat engineer platoon establishes its own general purposes net.
(d) Special application for assault. Whenever feasible, in the air assault, the air movement should provide for landing the vehicular-mounted radios with their users as soon as possible, so the normal nets can be established. However, parachute delivery into the airhead may require personnel to carry AN/PRC-25's from the combat engineer companies, with one individual in battalion headquarters (communications officer) responsible for parachuting near a radio suitable for entering the division command net. He then acts as a radio relay for communication between division and battalion. This application may then appear as in figure 1-4.

(e) Other nets. Engineer units operating in an internal defense environment in support of receiving state armed forces, paramilitary, and/or civilian agencies and organizations may be required to operate in the supported unit's AM/FM command and administrative radio nets for physical security as well as com-
mand and control purposes. When the communications requirement exceeds the engineer unit’s or its parent unit’s capability, assistance first will be sought from the supported organization’s parent headquarters.

b. Wire Nets. When a wire net is required, wire communications are established between elements of the battalion. Normally, distances and deployment will preclude direct, battalion installed, wire lines between battalion headquarters and subordinate combat engineer companies. The battalion headquarters and each combat engineer company should enter the division wire system at the nearest division signal center and utilize the division common user telephone system. In internal defense operations, wire nets are highly susceptible to insurgent attack and the use of wire normally will be restricted to internal use with radio as the primary means of communication between elements of the battalion. Figures 1–5 and 1–6 show typical wire nets for the battalion and companies.
Figure 1-6. Typical company wire net.
CHAPTER 2
HEADQUARTERS AND HEADQUARTERS COMPANY

Section I. ORGANIZATION AND CAPABILITIES

2-1. Organization

Headquarters and headquarters company of the airborne division engineer battalion is organized under TOE 5–26 and consists of two elements; a battalion headquarters and a headquarters company (fig. 2–1).

a. Battalion Headquarters. The battalion headquarters consists of—
   (1) Battalion commander (also division engineer).
   (2) Executive officer.
   (3) Assistant division engineer.
   (4) S1.
   (5) S2.
   (6) S3.
   (7) S4.
   (8) Engineer equipment officer.
   (9) Surgeon.
   (10) Chaplain.
   (11) Communications officer.
   (12) Sergeant major.

b. Headquarters Company. Headquarters company consists of a company headquarters, an equipment platoon, and personnel to man the following battalion headquarters sections:
   (1) Administration.
   (2) Operations.
   (3) Intelligence.
   (4) Supply.
   (5) Division engineer.
   (6) Communications.
   (7) Maintenance.
   (8) Medical.

2-2. Duties and Functions

a. The duties of the battalion commander and his staff and the functions of the staff sections are as discussed in FM 5–1, FM 33–1, FM 41–10, FM 101–5, AR 600–20, AR 611–101, AR 611–112, and AR 611–201.

b. The equipment platoon furnishes equipment and operators to the engineer companies as required.

2-3. Capabilities

a. Headquarters and headquarters company provides—
   (1) Staff planning of division engineer operations and supervision of organic and attached engineer troops.
   (2) Potable water for the division through the operation of up to five water points.
   (3) Engineer reconnaissance and intelligence for the engineer battalion and the division.
   (4) Unit level medical service for the battalion, to include medical care and evacuation, establishment of a battalion aid station, and furnishing aidmen to companies.
   (5) Additional construction equipment to companies.
   (6) Organizational maintenance and repair service for battalion equipment.
   (7) Radio and wire communications for the battalion.
   (8) ADM support to the division when TOE 5–500 cellular type ADM teams are attached. The S2, S3, assistant S3, assistant division engineer, and the reconnaissance officer are qualified to plan ADM missions.

b. When engaged in internal defense opera-
tions, the battalion is capable of providing all or part of the above support to RS armed and paramilitary forces and civilian agencies, as well as to its parent airborne division.

c. Members of headquarters company can engage in effective, coordinated defense of the unit's area or installation when required, including a limited capability to defend itself against hostile air attack. However, when supporting internal defense operations, security requirements will be increased and security forces may be provided from other U.S. or RS units.

d. When the battalion is committed to a combat role, headquarters and headquarters company functions as an infantry battalion headquarters and headquarters company.

2–4. Major Items of Equipment

The airborne division engineer battalion is equipped on an austere basis so that it can fulfill its airborne mission. Major items of equipment in headquarters company are—

a. Crawler tractor dozers.

b. Scoop loaders.

c. Graders.

d. Dump and cargo trucks.

e. Air compressors and pneumatic tool sets.

f. Trailer-mounted water purification sets.

g. Pneumatic reconnaissance boats.

2–5. Mobility

Headquarters and headquarters company is 90 percent mobile in organic transportation and 100 percent air transportable in medium transport or assault aircraft.
Section II. METHODS OF OPERATION

2-6. Battalion Headquarters

The battalion commander organizes and locates his headquarters in a manner best suited for carrying out his command and staff functions.

a. Location. In addition to other considerations, the headquarters is located to facilitate communication with the division command post, subordinate units, the support command, and any supporting engineer units.

b. Layout. The battalion command post (CP) is laid out to facilitate security, dispersion, concealment, movement to and from the area, and movement within the area. An alternate CP may be established. The assistant division engineer (ADE) is usually located at the division main CP.

2-7. Headquarters Company

Normally, elements of headquarters company are attached to the combat engineer companies for specific tasks. Examples of such attachment are construction equipment with operators, medical aidmen, and reconnaissance teams. The remainder of headquarters company is located at battalion headquarters.

2-8. Supply

a. Responsibility. With the possible exception of operations in an internal defense environment, the battalion commander is responsible for the supply of the engineer battalion only and for the production of potable water for the division.

(1) Ground operations. Normal supply procedures are followed in the airborne division engineer battalion, except in the first stages of an airborne assault (FM 57-10).

(2) Airborne assault. The quantity and types of engineer supplies and equipment to be brought into the airhead are limited by the number and types of aircraft to be used. There will seldom be sufficient airlift to bring in all the desired engineer items. Therefore, maximum use must be made of supplies and equipment locally available. The intelligence effort is specifically directed toward development of sources of supply in the objective area. Some considerations in delivery of supplies and equipment for engineer use in an airborne operation are—

(a) Prepackaging of barrier and construction materials.
(b) Delivery of materials direct to jobsites or to landing zone nearest using unit.
(c) Use of Army aviation when available, particularly helicopters, for delivery from drop or landing zone to jobsite.
(d) Use, in the airborne assault, of individual parachutists to carry explosives for demolitions, or other materials and small equipment necessary to accomplish the mission.

(3) Internal defense operations. On occasion, in cold war and internal defense situations, the engineer battalion, airborne division, may be called upon to provide engineer support to forces of an RS, or to augment other existing U.S. forces within a foreign country. Requirements for engineer supplies and equipment, and the production of potable water, especially for civilians, may be magnified; therefore, normal supply procedures may be modified. When possible, maximum use must be made of supplies and equipment locally available. The battalion, may be augmented by teams from the 5-500-series TOE to provide additional capabilities, especially well-drilling, water purification, and water transport teams, required in supporting internal defense or cold war operations.

c. Water. The variable nature of an airborne operation requires that water processing and purification equipment be capable of very rapid displacement and that alternate water points be selected prior to the operation. The equipment may be delivered to the water point by
parachute or any available prime mover capable of pulling the trailer. Water production procedures are as set forth in TM 5-700.

d. Class IV and V Supplies. Certain class IV and V supplies, such as tactical bridging, mines, explosives, and field fortification materials, when delivered by parachute or airlanded, should be in prepackaged composite loads. These loads should be capable of delivery to worksites, either directly, or by helicopter or vehicle from the drop zone or airlanding facility. An example of a prepackaged composite load of field fortification materials is a load consisting of all mines, pickets, and wire (on bobbins if required) for a 100-meter length of standard minefield.

2-9. Equipment Record Procedures

Equipment record procedures for the control of operation and maintenance of all equipment will be in accordance with TM 38–750.
CHAPTER 3
COMBAT ENGINEER COMPANY

3—1. Organization

The combat engineer company is the basic operating component of the divisional engineer battalion. It is organized under TOE 5-27 and consists of a company headquarters and three identical engineer platoons. Each platoon has a platoon headquarters and three identical engineer squads (fig. 3–1).

3—2. Mission

The combat engineer company is equipped and trained to carry out its mission of increasing the combat effectiveness of major subordinate combat formations of the division by means of general and special engineer work. It performs the tactical engineer staff planning, supervision, and execution of the engineer combat support mission at brigade or equivalent size task force. It also undertakes and carries out combat missions when required.

3—3. Capabilities

The combat engineer company has the following capabilities:

a. Supervision of organic and attached engineer troops.

b. Performing combat engineer tasks, including limited repair and maintenance of roads, bridges, ferries, fords, and culverts. When augmented with the necessary equipment and operators, it can execute more complex tasks such as the construction of roads and airlanding facilities.

c. Assisting in the emplacement and removal of obstacles, including mines (high explosive and chemical) and boobytraps.

Figure 3–1. Organization chart, combat engineer company.
d. Preparing and executing demolitions, including preparation of emplacement sites for ADM, when reinforced by equipment and operators from headquarters company.

e. Assisting supported troops in the construction and emplacement of fortifications, camouflage, and deceptive devices.

f. Assisting in the assault of fortified positions.

g. Conducting engineer reconnaissance.

h. Providing technical advice to supported units on engineer matters.

i. Engaging in airborne infantry combat missions when required.

j. Providing engineer support to U.S. and receiving state forces engaged in internal defense of cold war operations.

k. Perform CBR decontamination on a priority basis.

l. The company has only a limited active air defense capability (para 1–12p).

3–4. Mobility

The combat engineer company is 100 percent mobile in organic transportation. It is 100 percent air transportable in medium transport or assault aircraft and is air droppable.

3–5. Equipment

a. The combat engineer company is very lightly equipped. Major items in company headquarters are three 3-man, pneumatic reconnaissance boats; one trailer-mounted pioneer electric tool set; one 2½-ton dump truck; five ¾-ton cargo trucks; and two portable, gasoline-engine-driven drills.

b. Each platoon has in platoon headquarters one 2½-ton dump truck; one portable, gasoline-engine-driven drill; a platoon pioneer set; and a platoon carpenter set.

c. Each squad has a ¾-ton cargo truck, a ½-ton platform truck, a chain saw, a demolition set, a squad pioneer set, and a squad carpenter set.

3–6. Employment

a. The engineer company with organic equipment is designed to provide combat engineer support to a brigade or brigade-size task force. It is reinforced with general or special engineer equipment and operators from the headquarters company when necessary to increase the effectiveness of its support.

b. In the airborne assault the company usually is attached to the supported unit. Where the tactical situation permits effective battalion control of the company, it is placed in direct support of the supported unit. One reinforced engineer company normally supports each committed brigade or similar size task force.

c. Each platoon is capable of performing pioneer and demolitions combat engineer support. The platoons are the principal working components of the company and generally operate with it. However, a platoon can also operate independently to provide the engineer support normally required by a battalion task force when it is furnished equipment support by the battalion. In internal defense and cold war operations, platoons operating independently may be augmented by teams from the TOE 5–500-series to provide a greater capability to perform road maintenance, water purification, and military civic action functions. The platoon leader of the supporting engineer platoon is the engineer staff officer for the supported unit. The squad is the basic operating unit of the platoon. It consists of specialists in combat construction and demolitions, and engineer soldiers who are trained in combat engineer tasks. Because of its limited capability, the squad usually functions as a working component of the platoon. There are times, however, when it may be given an independent mission.
CHAPTER 4

BATTALION OPERATIONS

Section I. GENERAL

4-1. Employment

a. The airborne engineer battalion is a self-contained unit designed to provide engineer combat support in the airhead and in the forward portion of the battle area. It has the ability to overcome a variety of obstacles incident to the movement of the division, and hence contributes to the mobility of the division and its capability to maneuver in offensive action. In defense, retrograde, or denial operations, it has the capability to impede the progress of enemy ground operations by blocking critical avenues of approach.

b. The airborne engineer battalion operates as part of division troops and deploys its companies in support of the brigades and combat maneuver elements of the division. The headquarters company contains a limited amount of engineer construction equipment with operators to supplement the engineer companies for specific tasks.

c. The combat engineer companies normally are associated with particular brigades to increase operational efficiency. The company performs the unit engineer functions of tactical engineer staff planning and execution of the engineer missions in this role. Continuous liaison is maintained by the company to the brigade for this purpose.

d. Attached or supporting engineer units should be kept under battalion control when possible. Platoons may be placed in support of battalions or task forces for specific missions.

e. Attachment of engineer teams to combat elements is necessary for accomplishment of specific tasks requiring close command control. In the offensive this may consist of assault breaching or demolition tasks. In defense or retrograde the execution of barrier demolitions and the employment of ADM may require attachment for completion of the specific mission. In the airborne assault attachment is the normal procedure.

f. Airborne engineer troops engage in limited combat incident to accomplishment of their engineer missions. The nature of airborne operations is such that they will engage in combat more frequently than other types of divisional engineer units. Disengagement of engineer elements from the enemy is made by other combat elements to enable the engineers to continue their normal mission. When the situation requires deliberate commitment of the engineer battalion in an infantry mission, the battalion is committed by the division commander who, when possible, preserves unit integrity.

g. When task organizations are committed on separate missions, the engineer battalion provides an appropriate engineer element to accompany the force.

h. When the requirement for engineer support within the division exceeds the capability of the organic engineer battalion, additional engineer support is provided by the next higher echelon of command.

(1) Additional engineer support to the division may range from reinforcing the combat engineer strength to the provision of other engineer units for tasks in bridge construction, road and airfield construction, debris removal, erection of barriers, mapping, survey, camouflage, and deception.

(2) The earthmoving capability of the airborne engineer battalion is extremely limited. Projects involving more than a minimum amount of earthwork require nondivisional support. The airborne light equipment company is or-
ganized and equipped to provide this support.

(3) Nondivisional engineer units normally are placed in direct support of the division. However, engineer units are attached when the mission necessitates close command control in execution. River-crossings, barrier demolition tasks, or use of ADM are examples of such situations. All engineer combat support provided to the division is coordinated by the division engineer.

i. The airborne division engineer battalion or elements thereof may participate in internal defense or cold war operations. Such participation will support divisional elements engaged in internal defense or cold war missions, or in independent operations will support RS forces or U.S. forces already in-country. For details concerning employment of the battalion in internal defense operations see paragraphs 4–38 through 4–48.

4–2. Standing Operating Procedures

Standing Operating Procedures (SOP) reduce the number, length, and frequency of orders. They establish the regular procedure to be followed in the absence of specific instructions. An SOP is prepared for the battalion and all its operating elements. FM 5–135 contains an example SOP for a divisional engineer battalion.

4–3. Security

Each commander is responsible for the security of his unit. Security includes all measures taken by a commander to protect his unit against enemy interference, surprise, and observation. The measures adopted should be appropriate to the threat. As the threat increases, greater security measures are required to protect troops and equipment in bivouac, during movement, and at worksites. Work parties are normally responsible for furnishing their own security. Occasionally, however, they may be protected by infantry elements to free the work parties to complete the engineer mission. A detailed discussion of active and passive air defense measures is contained in FM 44–1. Security in an internal defense operational environment is discussed in paragraphs 4–38 through 4–48.

Section II. ADMINISTRATIVE MOVEMENTS

4–4. Engineer Assistance to Other Arms

a. Type of Work. The division usually needs engineer support when it moves administratively. A move may be by motor, rail, water, or air. During movements, engineer work generally consists of the following:

(1) Providing facilities and assistance during loading and unloading of divisional elements at point of departure and at destination.

(2) Maintaining roads and bridges.

(3) Preparing the new area to receive the unit. This involves providing or improving facilities.

b. Employment. Engineers provide assistance by keeping some engineers at the point of departure until the bulk of the division has moved; furnishing an engineer advance party to prepare the new area; and sending some engineers with each major echelon moving independently. During administrative movements, engineers normally remain under control of the battalion commander. In general, engineer assistance is limited to work of benefit to the division as a whole or to work for which engineers are better trained and equipped than other troops. Supported units provide their own facilities and labor as far as practicable.

4–5. Engineer Work at Departure Point

a. Type of Work. Engineers at departure points may—

(1) Construct or strengthen ramps and loading platforms.

(2) Construct or improve routes of approach.

(3) Construct or improve preloading assembly area.

(4) Provide technical assistance to troops of other arms to load and lash equipment.
b. **Loading Facilities.** Every effort is made to choose departure points that require only a minimum of new construction and improvement. In most administrative air movements terminal type facilities for loading, unloading, and intranist handling of cargo and personnel are utilized. There will be situations, however, in which loading ramps and platforms have to be built. In many cases, the engineer battalion will work in close coordination with the airborne division support command in this phase of a division administrative movement.

4-6. **Engineer Work on Roads**

a. **Engineer Reconnaissance.** Engineers make a detailed route reconnaissance before a major motor march. The engineer must be able to provide the following information:

1. Load capacities of roads and bridges, and vertical road clearance.
2. Estimate of time and effort necessary to put required routes in condition to support division loads.

b. **Engineer Work.** Engineer work consists of strengthening bridges and repairing roads prior to and during movement of the division.

4-7. **Engineer Work at Destination**

Troops should be able to move their organic and attached transportation off the road and into their bivouac areas without halting. To make this possible, engineers may have to construct temporary crossings over roadside ditches and gullies, improve secondary roads and trails, and clear new trails. Engineer work at the destination is similar to that at the departure point. Other engineer tasks at the destination include clearing obstacles and traps, area improvement, assisting in the construction of CP’s and shelters, repair of existing facilities, operation of water points, construction or repair of roads and bridges within the division area, and detection and marking or clearing of minefields.

4-8. **Traffic Circulation**

a. When assigned an area of responsibility, the airborne division establishes a division highway traffic headquarters to plan, schedule, route, and direct all highway traffic to conform to military requirements. This headquarters, composed of transportation, engineer, military police, signal, and other specialists as required, attempts to maintain a constant and orderly flow of traffic to realize the full potential of the road net in the division area.

b. The airborne division engineer battalion provides representation/liaison with the traffic headquarters and assists in its mission. This assistance applies generally to all moves and not to administrative moves only. Assistance is provided by—

1. Conducting road and bridge reconnaissance.
2. Making recommendations concerning the routes to be utilized as tactical routes and main supply routes based on the load carrying capacity of the road net and the availability of engineer troops to maintain the road net.
3. Preparing and posting road signs and markers.

c. The traffic headquarters is the general staff responsibility of the division G4. Control of movements is a function of the division transportation officer who coordinates with the provost marshal on traffic control, and supervises the division traffic headquarters.

4-9. **Battalion Movement**

During administrative movements the airborne division engineer battalion, less those units assigned support tasks, usually moves as a unit forming an integral part of the division. For all movements the battalion loads its own equipment. Properly prepared administrative movement tables provide the unit with a known system of moving by any mode of transportation. The movement tables are prepared for motor, rail, water, or air movement and are based on pertinent technical data contained in military publications pertaining to each individual piece of equipment and data in FM 101-10, TM 57-210, SB 5-110, and FM 5-35. In the airborne division engineer battalion, emphasis is placed on movement by air, and the battalion must have complete and current movement data available at all times. In addition to transportation by use of cargo aircraft, the use of Army helicopters should be antici-
Section III. TACTICAL MOVEMENTS

4–10. Introduction

The airborne division makes tactical movements by foot, motor, or air. The mission of the unit, proximity to hostile forces, terrain, types of enemy resistance expected, and activity of hostile air forces are factors that will determine the organization and composition of the column in a tactical movement. All units should have tactical movement tables prepared as a part of their SOP's. See paragraphs 4–38 through 4–48 for discussion of tactical movements in internal defense and cold war operations.

4–11. Motor Movement

During a tactical motor movement the airborne division engineer battalion may move in one trip only by augmentation of its organic transportation. Detailed loading plans should be prepared in advance for each vehicle of the battalion. Vehicles organic to the squad of the combat engineer company are insufficient to transport the squad's personnel and equipment. Some of its equipment must be loaded on the platoon headquarters' vehicles.

Section IV. AIRBORNE OPERATIONS

4–13. Introduction

a. The airborne division engineer battalion is capable of entry into a combat area by either airlanded or parachute means. It is designed to perform combat engineer tasks in an assault role in support of an airborne division. The length of time that the battalion can sustain itself is contingent upon the logistical support provided, the weather, the terrain, the enemy situation, and the extent of engineer effort required for the operation.

b. The division engineer recommends disposition of available engineer troops for all phases of the airborne operation based on the scheme of maneuver as announced by the division commander. The division engineer recommends appropriate changes in disposition as the situation develops and the need arises.

c. If the division engineer determines that the engineer tasks required exceed the capabilities of the battalion, he immediately provides the division commander with information as to the additional engineer forces needed to accomplish the mission. The division commander may request reinforcement. In this case, nondivisional engineer units are placed in support of or attached to the battalion.

d. Because of the intermingling of friendly and enemy forces during the early stages of an airborne assault, the airborne division engineer battalion may be required to engage in ground combat operations for sustained periods more often than engineers in other combat situations. Limitations on the strength of maneuver units in the objective area may further require commitment of the engineer battalion as a fighting reserve. Preparation and training for an airborne assault should emphasize these requirements.
4—14. Planning

In planning for an airborne operation, in addition to the orders and plans issued to the battalion, the division engineer is responsible to the division commander for certain elements of the division plan and concept of operation.

a. Terrain Intelligence. The battalion S2 will assist the division engineer in planning and preparation of terrain studies and site analyses to support division operations. Support normally may be obtained from an engineer terrain team or engineer intelligence staffs at corps, field army, or theater level.

(1) A terrain analysis, designed for airborne operations, may be prepared for distribution to major tactical commanders designated by the G2. It will include data on the following:
   
   (a) Landing zones, drop zones, extraction zones, and airfields.
   
   (b) Roads, bridges, fords, ferries, and culverts.
   
   (c) Weather and climate.
   
   (d) Cross-country movement conditions, including data on trafficability and rivers and streams.
   
   (e) Water sources.
   
   (f) Obstacles and fortifications.
   
   (g) Tactical considerations including cover, concealment, observation, fields of fire, key terrain, and avenues of approach.
   
   (h) Construction material.

(2) Special engineering site plans should be prepared by the battlefield commander and staff.

b. The Selection of Landing Zones and Airlanding Facilities. Sites selected for landing zones and airlanding facilities must be tactically suitable; they must, after improvement if necessary, satisfy the criteria for the aircraft employed; and the construction effort to effect the improvement must be within the capability of the available engineer troops and equipment. Seldom will a site ideally meet all the requirements and some compromise of one or more will be necessary. It is essential, therefore, that site selection be closely coordinated by the tactical commander, the commander of the unit furnishing the aircraft, and the division engineer (TM 5–330).

c. The Engineer Plan of Operation. The success of the engineer portion of an airborne operation is dependent upon well coordinated missions and proper disposition of available engineer troops and equipment. The division air-movement table must be reviewed by the engineer to insure coordinated movement of the engineer battalion into the airhead.

d. Water Supply. Units participating in the assault should carry with them the maximum amounts possible of water in individual canteens and unit water containers. The amount of time necessary to make water points operational can be minimized by careful study of maps and aerial photographs and by delivery of water purification equipment and operators as close as possible to the selected sites.

e. Division Operations Order. Besides making the above recommendations to the division commander and his staff, the engineer, under general staff supervision of the G3, is also responsible for preparing the following annexes to the division operations order, based on the division commander’s concept of operation:

   (1) Barrier annex. For the unit engineer’s responsibilities for barrier planning and for drafting the barrier annex, refer to FM 5–135 and FM 81–10.

   (2) Engineer annex. Refer to FM 5–135 and FM 101–5.

4—15. Marshalling

a. Preparation. After orders have been issued to the engineer battalion, the companies which will be attached to brigades usually join those brigades in specified marshalling areas and prepare for the operation with the supported unit. The remainder of the battalion is marshalled in one or more areas with other division troops. Combat service support is provided by a theater army logistical command (TALOG) agency. Units are briefed in sufficient time to allow rigging of equipment and movement of personnel and equipment to departure airfields. Procedures for expedient assembly line rigging are covered in TC 10–4. TC 10–1 describes the fabrication and use of various field expedients that may be required
to assist in the rigging and outloading of air-drop equipment. FM 57–10 outlines the detailed steps of the preparation for an airborne operation. Detailed rigging procedures for various items of equipment are contained in the TM 10–500-series.

b. Movement to Loading Sites. Elements of the battalion are provided with schedules for the movement of personnel, supplies, and equipment to loading sites based on the time required for loading and the scheduled times of takeoff. The TALOG agency provides ground transportation as required.

c. Loading.

(1) Units are responsible for loading and lashing their accompanying supplies and equipment. Troop carrier personnel provide technical assistance.

(2) Heavy drop loads are prepared in the vicinity of loading sites in order to reduce the requirement for transportation support.

(3) Aircraft loads are based, insofar as practicable, on the ground tactical plan.

(4) The Air Force is responsible for providing loading aids at the aircraft loading sites, and tiedown devices to secure the airdrop equipment aboard the aircraft.

4–16. Airborne Assault

a. Air-Movement. The engineer battalion accompanies the airborne division into the airhead area and is delivered in accordance with the division air-movement table by airdrop or airlanding.

b. Reorganization. Immediately upon arrival in a landing zone or drop zone, elements of the battalion assemble in predesignated areas. Those units with preassigned tasks move directly to their worksites. Engineer reconnaissance is initiated and is continued throughout the operation. Close coordination with infantry elements must be maintained to assure that the areas of engineer work have been secured. Battalion headquarters and headquarters company moves to a preselected area and establishes its command post.

c. Command Posts.

(1) Organization. As soon as possible after the initial airborne assault, the battalion and its companies establish operational command posts and communications nets. The organization of a command post is the responsibility of the unit commander. It is accomplished in a manner which best suits the needs of the unit and is based on the capabilities of the headquarters itself.

(2) Alternate command posts. Active nuclear warfare requires the establishment of alternate command posts to assure continuous operation. The division engineer may designate the liaison officer of the assistant division engineer as the nucleus of an engineer staff section at the alternate division command post. The limited number of personnel assigned to the airborne division engineer battalion headquarters may preclude the establishment of a alternate command post. A less efficient but feasible solution is to designate the physical location of an alternate division command post. This location serves as a rallying point for survivors and permits rapid reconstitution of the battalion headquarters following a nuclear attack. The unit SOP should provide as much guidance as possible on this subject.

d. Supplies and Equipment. Where the coordinated air-movement plan allows delivery of supplies and equipment directly on the worksite, the engineers' problems have been reduced. Where this cannot be done the original plan must provide for delivery of engineer supplies and equipment on the landing zone or drop zone nearest the worksite. Upon delivery, the supplies and equipment are collected by the engineer troops and moved to the worksite. Where supplies are to be used at more than one worksite they may be moved to a location which permits ready access by the using units.

e. Delivery Methods. Supplies and equipment may be delivered by a variety of means. Airland and normal airdrop by parachute are the
most familiar and widely used. Several new methods have recently been developed and successfully employed.

1. **Ground proximity extraction system (GPES).** In this USAF method, loads are rigged on reinforced pallets and placed on rails in the cargo compartment of the aircraft. A line from the load terminates in a hook attached to a boom trailing out the rear cargo door. As the aircraft makes a low-level pass over the extraction zone the hook engages a steel cable stretched across the extraction zone and the cargo is snatched out of the cargo hold. Nylon straps extend from each end of the cable and are wrapped around hydraulically-dampened drums placed on each side of the extraction zone. The drums pay out the nylon straps slowing the load to a stop.

2. **Low altitude parachute extraction system (LAPES).** This is a USAF method of pulling the cargo out of the opened rear of an aircraft by deploying a parachute as the aircraft flies across the extraction zone at low altitude and low speed. The extraction parachute, attached to a reinforced pallet, is 15 feet in diameter for loads up to 8,000 pounds. The parachute is deployed at a designated point in advance of the release point and remains open behind the aircraft. The pilot, in radio contact with a combat control team on the ground, releases the pallet on signal.

3. **Heavy equipment parachute system (HEPS).** This USAF method is the same as LAPES but for heavier loads, up to 17,000 pounds, using a parachute 35 feet in diameter.

4. **Parachute low altitude delivery system (PLADS).** In this USAF system, loads of up to 2,000 pounds are extracted from the cargo compartment and lowered to the ground from an altitude of 200 feet. The extraction parachute is initially deployed in a “reefed” (partially opened) condition, about 1,000 feet from the drop zone.

At the precise moment of drop, an electric “reefer cutter” fully opens the chute which then extracts the load. Upon extraction the load swings to a vertical position and almost immediately lands. Its landing is cushioned by the parachute. This is a highly accurate method of delivery and it has the capability of night and bad weather drops.

### 4–17. Subsequent Operations

After complete reorganization and communications have been established, accompanying supplies delivered and recovered, and initial engineer projects started, the engineer battalion enters into a normal engineer support role for the airborne division. Additional missions are assigned to the battalion by the division commander, and are then assigned as projects to the subordinate units of the battalion. The major engineer effort is usually directed toward improvement of landing areas, roads and bridges, and toward execution of barrier and blocking operations. Attached engineer companies revert to battalion control as soon as possible, but may remain in direct support of the brigades to which they were attached for the airborne assault. Subsequent operations of the division may include continued defense of the airhead to include delaying actions, withdrawal, or offensive operations to include exploitation and further airborne assaults.

### 4–18. Exploitation

a. After the division airhead line is established, the assault may be exploited by the division by one or more of the following:

1. Improving the area for development as an advance airbase, naval base, port, storage area, or missile site, and providing for its security.

2. Launching large-scale ground operations from the area. The division's lack of armor and limited ground mobility reduce its capability for this type of operation unless it is augmented.

3. Seizing or denying the enemy use of
critical terrain, road and rail nets, waterways, signal communications facilities, and natural resources, and protecting potential allies.

(4) Destruction of capture of enemy forces, missile sites, and airfields.

(5) Seizing terrain or other objectives inaccessible to other types of ground troops.

(6) The capture and utilization of manufacturing areas, resources, or governmental control facilities and agencies as directed.

b. The exploitation missions are normally determined during the planning stages of an airborne operation, and the engineer support required for them is planned accordingly. It will usually be necessary to have additional engineer support introduced into the airhead to augment the airborne division engineer battalion, or to permit relief of the divisional battalion from airhead tasks to work in support of exploitation operations. Typical engineer support units are the airborne engineer light equipment company delivered by parachute or airlanded, an engineer bridge company, or elements of a combat engineer battalion (Army) delivered by airlanding.

c. Other exploitation operations which may require engineer support are raids against targets of opportunity, blocking enemy reinforcement or withdrawal, reinforcing other units which have been operating independently, advancing successively to secure critical areas ahead of or to the flanks of friendly armored or other mobile forces, and blocking or counterattacking enemy penetrations of other ground forces. These operations can be performed by employing normal ground transportation, Air Force or Army transport aircraft, or by parachute operations from the established airhead. Engineer support for those operations may be in direct support or by attachment to the infantry elements conducting the operation. The ability of the airborne division to conduct operations from the objective area will depend upon:

(1) The enemy situation.

(2) The division's own capability with particular emphasis on the buildup of supplies and personnel which can be introduced into the airhead.

(3) The number and status of airlanding facilities. The construction or improvement of airlanding facilities is a determining factor, and the engineer will require additional support from other engineer units, particularly the airborne engineer light equipment company or the engineer combat battalion, airborne. Advance elements from these units may accompany the engineer battalion in the initial airborne assault with additional personnel and equipment delivered as a planned portion of the air-movement of engineer troops and equipment for the division.

4–19. Withdrawal

Withdrawal from an objective area may be forced by the enemy or may be made voluntarily. Advance planning is imperative, as the nature of the area of operations and the limitations of transport aircraft introduce complicating factors not present in other ground actions. Supplies and materials which cannot be evacuated are destroyed. The engineer battalion supports the airborne division in this type of operation by—

a. Construction of obstacles to prevent any enemy advance which would interfere with the withdrawal.

b. Preparing or maintaining airlanding facilities to accommodate the necessary aircraft for the withdrawal.

c. Providing adequate road nets and bridging for the units moving to the departure facilities.

d. Assisting in the destruction of equipment not capable of being withdrawn.

e. Engaging in limited ground combat operations.
4–20. Introduction

When the infantry units move from the drop or landing zones to their initial objectives or to the prescribed airhead line positions, the movement to contact and the attack are initiated. Engineers may be used in the advance guard and in the flank and rear security forces as well as in the main body.

4–21. Specific Engineer Duties

a. During the movement to contact, speed is essential. Maximum use of existing road nets and avenues of approach is emphasized. Early seizure of critical terrain is also important. Engineers assist the troops protecting the flanks by creating obstacles in roads and other possible avenues of approach to the flanks including contamination of obstacles with chemical landmines or agents and by the use of flame mines and flame expedients. Nuclear fires, including atomic demolition munitions (ADM) which is an engineer responsibility, may be employed to provide added security by blocking enemy avenues of approach. To provide this ADM capability, the engineer battalion must be augmented by TOE, 5–500 ADM teams. Other duties in the movement to contact include conducting reconnaissance; opening and improving roads, trails, and bridges for troop movement, supply, and evacuation; reducing obstacles; assisting in the passage of defiles and minefields; and constructing bypasses.

b. Engineer reconnaissance during the movement to contact normally is performed by reconnaissance teams from headquarters company. Routes of advance are thoroughly examined for serviceability, type, condition, location of critical points, alternate routes, mines, and condition and types of bridges.

c. Liaison.

(1) Liaison between supporting and supported units must be maintained during the attack to assure cooperation and coordination between all units participating in the operation.

(2) The assistant division engineer is the chief liaison agent between the airborne engineer battalion and division headquarters. Liaison functions between the supporting engineer companies and the brigades are usually performed by the company executive officer or other agent designated by the company commander.

4–22. Control of Engineer Effort

a. Disposition of Engineer Troops. In addition to the normal association of an engineer company in support of a particular brigade, consideration must be given to the engineer tasks to be accomplished in each objective area to determine the final disposition. The engineer unit may be placed in direct support of, or attached to the supported unit, and may be given work to accomplish on an area or task basis, or a combination of both.

b. Responsibility for Control. The division engineer maintains contact with supporting and attached elements to assure that maximum value is obtained from the engineer effort expended. The supporting engineer unit commander retains control and command of the engineer elements, but must suit his plans and troop employment to the plans of the supported unit or units.

c. Liaison.

(1) Liaison between supporting and supported units must be maintained during the attack to assure cooperation and coordination between all units participating in the operation.

(2) Liaison functions between the supporting engineer companies and the brigades are usually performed by the company executive officer or other agent designated by the company commander.

4–23. Engineer Duties in the Attack

Typical engineer duties in the attack include—

a. Conducting reconnaissance.

b. Assisting in the preparation of traffic circulation plans.

c. Assisting forward movement of infantry and supporting arms by repairing roads, constructing expedient bridges, and removing obstacles.

d. Assisting in locating, marking, and removing mines, to include chemical mines.

e. Assisting in flank security through the use of demolitions (including ADM's), minefields, to include chemical and flame, and other obstacles.

f. Constructing pioneer or hasty Army airfields for divisional aircraft.
g. Constructing or improving airlanding facilities, drop zones, and extraction zones for assault type cargo aircraft.

h. Performing other duties such as the operation of water points.

4–24. Engineer Reconnaissance

a. Engineer reconnaissance during the movement to contact is performed initially by the reconnaissance teams from battalion headquarters and by reconnaissance elements from the engineer units supporting the infantry. These teams provide the division and the brigades with early reliable information concerning the terrain over which the unit is to advance.

b. Engineer reconnaissance during the movement to contact should include information on—
   (1) Serviceability and types of roads.
   (2) Location of critical points.
   (3) Alternate routes.
   (4) Mines, to include chemical and flame.
   (5) Bridges and river-crossing sites.
   (6) Suitable sites for landing zones, drop zones, and extraction zones.
   (7) Locally available construction equipment and materials.
   (8) Water sources.
   (9) Estimates of engineer effort required.
   (10) Recommended traffic circulation.
   (11) Obstacles to include radiological contamination.

4–25. Pioneer Work Done By Other Arms

Because there are seldom enough engineer troops available to do all the pioneer work necessary to assist the advance of the infantry and supporting arms, the other troops do as much of this work as possible to help themselves. All troops are trained in the installation and removal of mines. Infantry troops do much of their own pioneer work, assisted by technicians from the supporting engineer companies.

4–26. Introduction

a. After assault objectives have been seized in an airborne operation, the airborne force normally suspends offensive operations temporarily to secure and organize the objectives. The period of time involved will vary depending upon the mission assigned to the airborne division, the size and composition of the force, enemy reaction, and the type of operation contemplated.

b. Defense of the airhead generally consists of a variation of the area defense. The defense envisions organizing and occupying strong-points on dominant terrain along the airhead line to cover main routes of approach into the airhead; covering unoccupied terrain between defended localities and natural obstacles by fire, mines (to include chemical and flame), and other artificial obstacles; employing appropriate passive air defense measures to avoid air attack with provisions to actively engage attacking aircraft in self defense; continuous and intensified reconnaissance and surveillance during the hours of darkness; formation of a reserve and establishing priorities for designation of new or additional reserves. Organized defensive forces are employed to blunt and stop enemy attacks; mobile reserves are deployed to reinforce or block in threatened areas; and counterattack forces are employed in spoiling attacks, or in attacks to destroy the enemy forces or eject them from the airhead. The shape of the airhead affords the airborne division interior lines of communication, facilitating shifting of troops and commitment of reserves. Reserves are held in positions of readiness prepared to counterattack, to occupy defense positions, or to execute blocking missions. Positions are prepared in depth within the capabilities of the airborne unit. The airhead defensive line must provide adequate space for maneuver, for protection of critical installations, and for airlanding or air-evacuation operations (FM 57–10).

4–27. Engineer Functions in the Defense

Defensive positions are usually laid out and constructed by the troops which are to occupy them. Engineers may be used to prepare alter-
nate or supplementary positions and to perform such duties as—

a. Repairing, maintaining, and improving roads for mobile reserves and counterattack forces, access to defensive positions, and supply and evacuation, and recommending traffic circulation plans.

b. Preparation of and assisting in implementation of the barrier plans.

c. Assisting in the construction of command posts, observation posts, and obstacles of all types.

d. Providing engineer intelligence.

e. Providing technical assistance in camouflage.

f. Engaging in limited ground combat.

g. Improving and maintaining airlanding and air delivery facilities.

h. Conducting reconnaissance.

i. Operating water points.

4—28. Barrier Plan

Because of its lack of tanks and other armor protected vehicles, the airborne division is extremely vulnerable to armor attack. Among other measures rapid erection of obstacles reduces this vulnerability.

a. Barrier plans are developed concurrently with other tactical plans and are planned and executed by all echelons of command. However, only corps and higher commanders have the authority to employ barriers on an extensive scale. This authority may be delegated to division and comparable commanders. The division engineer prepares terrain and barrier studies for G2, and advises G3 on the means and extent of augmenting natural obstacles. He plans and supervises the technical aspects of barrier employment and prepares the barrier annex to the operation plan or order, under the direction of the division G3. Division barrier and obstacle planning usually is supplemented by detailed planning of tactical obstacles at brigade level.

b. Construction of obstacles for close-in defense and security is the responsibility of the unit commander. These obstacles may be integrated into the barrier plan of the division or higher command. Normally each unit constructs that part of a barrier system which lies within its area of responsibility.

c. The airborne division engineer battalion furnishes assistance to other division elements in the form of technical advice, supervision, and construction effort. It is responsible for siting and constructing individual obstacles (in addition to those in its own area of responsibility) when one or more of the following conditions exists:

1. Special skills and equipment are required.
2. Exposed flanks or rear require protection.
3. The command as a whole will benefit.
4. The obstacles must be prepared before the arrival of the troops who are to occupy the area.
5. The obstacles lie outside the area of responsibility of any particular unit.

d. To ease the logistic burden inherent in airborne operations maximum use must be made of locally available materials for obstacle construction. Atomic demolition munitions may be used to create obstacles. Minefields, within the logistic capability, are used in likely routes of armored approach. For details on barriers see FM 31–10.

4—29. Defense Against Nuclear and Chemical, Biological, and Radiological (CBR) Attack

a. Normal defensive measures are employed with emphasis on individual protective measures and unit radiation exposure control. (For details see FM 21–40 and FM 3–12.) Particular stress is placed on the importance of deep foxholes and the provision of overhead cover. The airborne division engineer battalion conducts the following tasks in defensive planning for nuclear or CBR attack:

1. For the division.
   a. Surveys area for suitable shelters and assists in planning and constructing protective facilities for key installations.
   b. Selects alternate water points.
   c. Selects and prepares an alternate
bridge site or bypass for each bridge required.

(2) For the battalion.
(a) Disperses unit personnel, equipment, and supplies consistent with operational practicability.
(b) Organizes unit first aid, rescue, and evacuation teams.
(c) Prepares a CBR defense SOP based on that of the division.

b. In the event of a nuclear detonation or a CBR attack, the airborne division engineer battalion accomplishes the following:

(1) For the division.
(a) Decontamination of essential areas or of exit routes required for evacuation to safe areas.
(b) Construction and posting of signs for unsafe areas.
(c) Firefighting missions.
(d) Clearance of debris from essential routes and airlanding facilities.
(e) Production of maximum amount of potable water.
(f) Such other engineer tasks as are required.

(2) For the battalion.
(a) First aid, rescue, and evacuation.
(b) Operation of personnel and equipment decontamination stations.

4–30. Defense Against Airborne Attack, Guerrilla Action, and Infiltration

The airborne division engineer battalion establishes, within its area of operation, an observation and warning system and local security adequate for defense against enemy airborne, guerrilla, and infiltration tactics. The battalion may be called upon to construct obstacles for the division which would act as a deterrent to the use of such enemy tactics.

Section VII. DENIAL OPERATIONS

4–31. Introduction

A denial operation is designed to prevent or hinder the enemy's use of or benefit from an area, personnel, facilities, or material. It may include destruction, removal, contamination, or erection of obstructions. Denial operations are basically strategic in concept. Staff responsibilities for denial operations plans are the same as for barrier plans (para 4–28). In the division, denial operations are incorporated normally in the barrier plan. All troops participate in denial operations, particularly in the removal or destruction of organic equipment and supplies, procedures for which normally are included in unit SOP's. Large scale demolitions, and denial targets that are technical in character, usually are assigned to the divisional engineer battalion.

4–32. Denial By Destruction

All possible methods of destruction are used. The most common are fire, flooding or drenching, mechanical (breaking with a sledge hammer), chemical and radiological contamination, and explosives including ADM and projectiles (small arms, artillery, and bombs). So that destruction may be executed at the desired time, personnel to destroy each item are designated in advance; supplies necessary for the destruction are obtained and stored at convenient locations; the circumstances under which destruction is to take place are definitely prescribed; and, if orders for destruction are to be issued, the means of transmission are provided. According to the Rules of Land Warfare of the Geneva Convention, medical supplies will not be destroyed intentionally but other supplies which cannot be evacuated are destroyed.

4–33. Denial By Removal

Evacuation of material is as much a part of denial operations as destruction. All possible military supplies and equipment are evacuated. Evacuation is started early and conducted in accordance with prepared priority lists. Every available means of transportation is used to capacity.

4–34. Atomic Demolition Munitions

When augmented with ADM teams from the TOE 5–500-series, the airborne division engineer battalion may use atomic demolition munitions.
tions in denial operations. With ADM, it is possible to destroy targets which otherwise would be difficult or impossible to destroy. Denial targets suitable for the employment of ADM are airfields, defiles, underground installations, and tunnels. For details on the employment of ADM, see FM 5–26.

Section VIII. RIVER-CROSSING OPERATIONS

4–35. Introduction
   a. The airborne division, or elements of the division may, when suitably equipped, conduct river-crossing operations as follows:
      (1) During the initial establishment of the airhead.
      (2) While conducting link-up with friendly forces.
      (3) While conducting aggressive reconnaissance from the objective area.
      (4) As a portion of a raid from the objective area.
      (5) While expanding the airhead as a means of providing more space for additional airlanded elements.
      (6) As a part of normal ground operations subsequent to an airborne operation.

   b. River lines and the possible requirement for river crossings during the early stages of an airborne assault must be carefully considered when the objective area and the airhead line are selected during the planning phase. Wide rivers provide excellent natural obstacles as a part of the airhead line, but may require river-crossing operations by the airborne elements in further situations.

4–36. Capabilities
   The airborne division engineer battalion has no organic stream-crossing equipment. However, personnel of the battalion have the technical training to construct standard military floating and fixed bridges. Expedient construction may be practical under certain conditions for hasty crossings of short gaps.

4–37. Conduct of River-Crossing Operations
   a. Hasty crossings of unfordable streams and small rivers may be accomplished by the airborne engineer battalion provided the bridging is delivered to the constructing unit.

   b. Deliberate river-crossings of large streams must be supported by additional troops and equipment. The airborne division engineer companies cross with the airborne brigades to provide support on the far shore. Corps or Army engineer troops furnish the necessary equipment and construction crews to accomplish the bridging mission and all near shore support. The conduct of river-crossing operations is explained in detail in FM 31–60.

Section IX. INTERNAL DEFENSE OPERATIONS

4–38. General
   a. The doctrine for employment of the airborne division engineer battalion in limited and general war, offensive and defensive operations, applies, with significant modification, to internal defense situations constituting military, para-military, political, economic, psychological, and civic actions taken by a government to defeat subversive insurgency. If the insurgency has escalated to include guerrilla warfare or mobile warfare, internal defense operations will include counterguerrilla and mobile warfare activities.
corps, or division. This may entail support of U.S. and/or RS tactical units in tactical operations, support of receiving state agencies in internal security operations, assisting receiving state forces in military civic action, assisting receiving state through advisory assistance by providing mobile training teams (MTT) to receiving state armed forces, paramilitary or civilian agencies.

c. For a general discussion of engineer units in internal defense operations, see FM 31–22. For additional guidance in internal defense operations, see FM 31–22A, FM 31–73, FM 100–5, and FM 100–20.

4–39. The Internal Defense Environment

a. In internal defense operations, many factors contribute to making the environment different from that of conventional or nuclear positional warfare. Among these factors are—

(1) The terrain is generally poor for operations.

(2) Forces usually are dispersed over an extremely wide area.

(3) In guerrilla warfare situations, the adversary is generally elusive, hard to identify, highly trained in the techniques of guerrilla warfare, and well motivated.

(4) Sophisticated insurgent paramilitary or armed forces, organized and equipped in battalion or larger size units, may conduct mobile warfare. See FM 100–5 for discussion of insurgent mobile warfare.

b. Winning the support of the people is a continuous requirement in internal defense operations; in this respect, the application of firepower must be highly selective and restrained when operating among a population whose material and physical well-being must be protected in order not to alienate them from the RS government.

c. Since units usually are dispersed over extremely wide areas, command supervision, to include training, maintenance, and other activities, will be much more difficult.

d. Because of the nature of the terrain and the critical need for numerous construction projects, and the nationwide lack of engineer skills, there will be an especially heavy demand for engineer unit skills and knowledge.

e. Small unit commanders frequently will be required to make decisions based on their own judgments, considering the situation at hand, rather than on specific guidance and directions received from higher headquarters. The imagination and initiative of individual engineer commanders will contribute to the effectiveness of the engineer effort in internal defense operations.

f. All engineer commanders are responsible for the security of their commands. In internal defense operations, security requirements will be considerably increased, particularly at isolated worksites and during movement to and from the worksite. Engineer units may often require protection by other tactical forces to preclude security requirements from hampering the engineer mission.

(1) In internal defense operations, all movement is subject to ambush. The organization of convoys and degree of protection required will depend on the actual or potential capabilities of the insurgents in the area through which the convoy will travel. All movements must be treated as tactical moves and appropriate actions taken. Airborne engineer units must be properly trained in counterambush techniques to insure a high probability of surviving ambushes. See FM 31–16, FM 31–22, and the FM 7-series for detailed discussion of counterambush measures.

(2) An airborne engineer unit in a static position may require perimeter protection. This can be achieved by using its own troops or by arranging for security forces from other U.S. or RS armed forces or RS paramilitary and police units. See FM 31–22 and FM 7-series for defensive measures.


In addition to supporting the parent airborne division, the engineer battalion may support
U.S. MAAG, Missions, Military Assistance Commands (MAC), U.S. and/or receiving state armed forces, RS paramilitary forces, and U.S. and/or receiving state civilian agencies. Support may entail conducting tactical operations, supporting RS agencies in internal security operations, assisting RS and U.S. forces in military civic action, assisting the RS through advisory assistance by providing MTT to RS armed and paramilitary forces or civilian agencies, or conducting these operations independently as part of the overall operation in a particular area; and, finally, participating in intelligence and psychological warfare operations. Augmentation from TOE 5–500, 33–500, and 41–500-series may be required to provide a greater capability to adequately perform all missions. For a general discussion of engineer units in internal defense operations, see FM 31–22. For additional guidance in internal defense operations, see FM 31–16, FM 31–22A, FM 31–73, FM 100–5, and FM 100–20.

4–41. Concept of Operations

The ultimate objective in preventing or combatting the insurgency is to eliminate its causes and prevent its recurrence. Airborne engineer units may support both tactical and civil elements conducting operations over vast areas. Typically, RS will be critically short of engineering skills, both within the military and the civilian structures. United States engineer skills should be applied whenever and wherever they can best augment the receiving state. Most important will be the complete integration of engineer operations into the overall operations being conducted in a particular area, such as a region, province, district, corps, or division.

4–42. Organization

The airborne division engineer battalion, when committed, usually will maintain its organizational integrity, but may be organized provisionally into task forces, depending upon the particular engineering skills and equipment required. Airborne engineer units may be attached to or placed in direct support of U.S. units other than the parent division and/or RS tactical forces when the support requirements exceed the capabilities of the other U.S. or RS tactical units' organic engineers. Direct support is desirable since it allows the airborne engineer battalion flexibility in meeting engineer support requirements throughout the operational area; however, since the supported units may often conduct several types and sizes of operations simultaneously, in widely separated locations, attachment may be the most common and desirable method of employment.

4–43. Tactical Operations

The doctrine for employment of airborne engineer units in limited and general positional warfare offensive and defensive operations applies with modification to internal defense situations. If the insurgency has escalated to include guerrilla or mobile warfare, internal defense tactical operations will include counterguerrilla and mobile warfare activities. Positional warfare tactics and techniques must be modified to fit the special requirements of the operational environment and the nature of the insurgent threat. When supporting tactical operations against insurgent forces, the airborne division engineer battalion must take advantage of its superior flexibility and mobility.

a. Since airborne engineer units often will be supporting tactical forces in isolated locations, they may be required to assist in the static defense of the village, outpost, camp, or similar installation in which they are quartered. Airborne engineer units may also be designated as reserves and required to provide defense of an installation while the installation's main defense force is aiding a similar installation under attack. Type tasks which airborne engineer troops may perform in support of tactical operations in internal defense are essentially the same as for conventional warfare.

b. The scope of engineer support for tactical operations will be considerably increased, particularly in underdeveloped areas of the world. Engineer units should expect and be prepared to furnish more than the "normal" amount of tactical support and assistance in such fields as water purification, route maintenance, airstrip and helipad construction, bridging, and construction of hasty fortifications. This increased scope of engineer support may require that the units be augmented by teams from the 5–500-series TOE.
c. Since the airborne engineer battalion is well suited to support heliborne operations, it may be used extensively to support other U.S. or receiving state armed forces heliborne operations on a mission basis.

d. When supporting tactical internal defense operations, the airborne engineer company, platoon, and squad may often operate independently of and/or at long distances from their parent unit; therefore, there will be an increased requirement at the lower echelons for independent decisions, initiative, and technical knowledge.

e. Resupply of engineer units may be extremely difficult for those reasons outlined in paragraph 4-39; therefore, units in support of tactical operations should be authorized a special stockage of repair parts, tools, and other expendables as accompanying supplies.

f. Additional liaison and supervisory personnel may be required when subordinate units (companies, platoons, and squads) are widely separated to insure competent support of tactical operations. In internal defense operations, the engineer company or platoon may be supporting small U.S. or RS forces in isolated areas, highly susceptible to insurgent attack. In this case, survival of the unit is paramount and all personnel may be organized into combat elements. No rear echelon is organized; those personnel normally included in the rear echelon may be organized into combat elements to provide CP security, defensive fire support (to include indirect fire), or they may form all or part of the installation reserves. Engineer units operating in this manner may be provided additional crew-served weapons such as the M60 LMG, 60mm mortar, 81mm mortar, and 3.5-inch rocket launcher.

4-44. Advisory Assistance

a. The airborne division engineer battalion may be required to provide advisory assistance to include furnishing specialized mobile training teams (MTT), and training counterpart armed or paramilitary forces in branch or branch immaterial subjects. These operations may include extending USAID, USIS, and other U.S. civilian programs in the receiving state.

b. The wide range of skills and experience found in engineer units also provides a source of trained personnel which may be used to advise and train civilian governmental personnel. Engineer units may be required to provide part or full-time engineer advisors to civilian agencies at the province, district, city, or village levels.

4-45. Military Civic Action

Military civic action is the use of armed and paramilitary forces on projects useful to the local population at all levels in such fields as education, training, public works, agriculture, transportation, communications, health, sanitation, and others contributing to economic and social development, which would also serve to improve the standing of the armed and paramilitary forces with the population. These operations include extending USAID, USIS, and other U.S. civilian programs in the receiving state.

a. Airborne engineer units can best support that portion of the military civic action program which requires assistance and planning in the construction of utilities, structures, and other similar facilities for use and benefit of the civil population. Engineer units are suited by their organization, equipment, and skills to undertake such tasks; however, the local civilian population must participate in the accomplishment of projects in order to gain knowledge and experience in performing similar tasks in the future. Engineer units are best utilized in support of military civic action by providing teams to advise and assist during the progress of work. Airborne engineer units are capable of supporting the many military civic action missions; however, when technical assistance and construction beyond their capabilities are required, engineer construction units must be employed. (See FM 5-162, FM 31-16, FM 31-73, FM 41-5, FM 41-10, and FM 100-200.)

b. Typical military civic action projects in which engineer units may participate are—

(1) Construction of medical, educational, governmental, religious, recreational, and community facilities.

(2) Rehabilitation and construction of public utilities such as powerplants and water production facilities.
(3) Development and rehabilitation of transportation facilities to include roads, bridges, airfields, and navigable waterways.

(4) Assistance in the development of natural resources such as timber, building material, fuels, and agriculture.

(5) See FM 31–22 and FM 31–22A for additional tasks that may be performed by engineer combat units.

4–46. Psychological Operations

Psychological operations (PSYOP) conducted as part of the overall internal defense program encompass those political, military, economic, and ideological actions planned and conducted to create in neutral or hostile groups the emotions, attitudes, or behavior to support the achievement of national objectives.

a. PSYOP conducted or supported by airborne engineer units must mesh with, and extend receiving state civilian-military information and PSYOP programs.

b. PSYOP in internal defense operations are of the utmost importance. PSYOP can be particularly useful to engineer units engaged in military civic action projects. A PSYOP campaign should be conducted before, during, and after the completion of a project. Requests for PSYOP assistance should be forwarded to higher headquarters. See FM 33–1 for detailed discussion of PSYOP.

4–47. Intelligence Operations

Intelligence plays a vital role in combating insurgency. Adequate and timely intelligence is most vital to the overall internal defense operation. U.S. military personnel, particularly engineer personnel, are in an excellent position to collect information, from close and frequent contact with the civilian populace. Conversely, U.S. personnel must be careful of loose talk and poor classified material handling procedures lest classified material become compromised. For detailed discussion, procedures, and role of intelligence in internal defense, see the FM 30-series and FM 31–22 and FM 31–22A.


Internal security operations include supporting U.S. and RS military and civil police in their responsibilities to maintain a state of lawfulness and taking actions to control human and materiel resources, and to deny insurgents access to these resources. Airborne engineer units can support internal security operations by—

a. Providing personnel for mob and riot control in accordance with current regulations.

b. Providing assistance in protecting ports, docks, power stations, waterworks, and other sensitive installations.

c. Providing assistance in establishing checkpoints and border posts.

d. Providing personnel for police-type duty.

e. Supporting border denial operations.

Section X. OTHER OPERATIONS

4–49. Link-Up

Surface link-up with an airhead is generally made by armored forces. The airborne division engineer battalion must assure adequate routes for passage of the link-up force into or through the airhead. This may involve repair of roads, construction or repair of bridges, and clearance of obstacles. If engineer effort is required beyond the limits of the division area, elements of the battalion may be required to move out of the airhead. Such an operation may require infantry support for security of worksites. Engineers may also be required to assist in flank protection for the armored units while they operate in the division area. This flank protection may include construction of barriers or denial operations. The use of atomic demolition munitions in this type of operation is a probability which must be planned for.

4–50. Amphibious Operations

a. The airborne division is not ideally suited for participation in an amphibious assault in an amphibious role without augmentation.

b. The airborne division may participate in an amphibious operation by conducting an air-
borne assault on one or more inland objectives for subsequent link-up with surface elements. Engineer considerations are the same as for similar operations already described.

4—51. Desert Operations

Successful operations in the desert will require special individual and unit equipment to augment the airborne division engineer battalion TOE. Additional water purification equipment and an increase in the amount of low ground pressure construction equipment normally will be required. Extensive open areas and long range visibility may make achievement of surprise difficult, thereby reducing the time available for assembly and initial organization. For further details see FM 31–25.

4—52. Arctic Operations

If committed in arctic operations, the airborne division engineer battalion will require reinforcement from equipment units and substitution of special vehicles. The requirements for summer and winter are quite different. For example, during winter frozen lakes may provide suitable landing facilities, while in summer construction of such facilities in tundra may require so much engineer effort as to be prohibitive. For further details see FM 31–70, FM 31–71, and FM 31–72.

4—53. Mountain and Jungle Operations

In mountain and jungle operations the airborne division engineer battalion operates as in normal airborne operations. If extensive clearance work is required for airdropping facilities, the battalion will require reinforcement from equipment units. For further details see FM 31–30.

Section XI. COMBAT OPERATIONS

4—54. Introduction

The airborne division engineer battalion or any element thereof engages in combat operations when—

a. The enemy prevents access to the unit’s jobsite.

b. The enemy attempts to drive the engineer unit from a jobsite.

c. The enemy prevents delivery of supplies.

d. Enemy action forces sustained ground combat. This may develop in several ways—

(1) The unit commander is forced into a sustained ground combat role to save the unit.

(2) Enemy action forces the unit to fight so that the higher command might accomplish its mission.

(3) The major commander must commit the engineer unit because of a desperate situation.

4—55. Sustained Combat

When it is necessary to deliberately commit the engineer battalion or any of its elements to a sustained combat role unit integrity should be maintained. The battalion accepts such a mission with a minimum of delay.

a. Responsibility. The major force commander is responsible for the decision to commit engineer units to a sustained ground combat role. He commits the engineer unit only after careful consideration of the restrictions imposed by the loss of engineer support.

b. Situations for Committing Engineer Units in a Sustained Ground Combat Role. There are a number of situations where the major force commander may commit an engineer unit to this role. Some of the more typical situations are—

(1) An overextended defensive front.

(2) A sudden enemy penetration or turning movement.

(3) An enemy airdrop or organized guerrilla activity in a rear area.

c. Type of Mission. The type of combat mission assigned an engineer unit should be based on consideration of limitations in weapons and personnel. The battalion and its companies are armed more lightly and have fewer personnel than comparable airborne infantry units; their infantry combat training is less extensive. En-
engineer units should be furnished additional fire support, heavy weapons and forward observers, and smaller frontages should be assigned to them than to infantry units.

(1) Attack type mission. This type of mission is usually limited to situations which require engineer units to engage bypassed enemy elements in order to get to critical jobsites.

(2) Defense type mission. The defense type mission is the one most commonly assigned to airborne engineer units. The major combat force commander should allow enough time for the engineer unit to prepare for the defense so that the proper support can be coordinated and the nonessential personnel and items of equipment can be moved to a rear area. When ample warning time is available to the engineer commander, he prepares his unit for combat in the same way as any other combat force commander.

4—56. Reorganization for Combat

A definite plan must be established which will enable the engineer unit to move efficiently from its normal engineer support role to a combat role. This plan, generally an annex to the unit's SOP, should be established by the battalion and each company. FM 5–135 contains a guide and example annex for reorganization for combat. The plan should provide for the following:

a. Designation of the forward and rear echelons of the command.

(1) The forward echelon. The forward echelon will consist of enough sections and units to accomplish the mission. Elements should include—

(a) Firepower and maneuvering elements—to fix and destroy or eject the enemy.

(b) Communications element—to establish communications between all echelons of the command. Wire should be used when possible.

(c) Supply element—to provide the necessary supplies for the mission.

(d) Command and control element—to direct the elements in the accomplishment of their mission.

(2) The rear echelon. The rear echelon will include all equipment not essential to the sustained ground combat mission. Nonessential vehicles and heavy equipment are moved to a rear area. Responsibility for the control of the rear area is designated in this section of the SOP.

b. Medical Evacuation. Assignment of aid men, establishment and location of aid stations, and channels of evacuation are covered in this section.

c. Coordination. This section establishes a guide for liaison and coordination between other units of the command, including adjacent combat units and fire support units.
APPENDIX A

REFERENCES

A-1. Department of the Army Pamphlets (DA Pam)
   310-series Indexes Pertaining to Administration, Training, Maintenance, and Supply.
   750–1 Preventive Maintenance Guide for Commanders.

A-2. Army Regulations (AR)
   320–5 Dictionary of United States Army Terms.
   320–50 Authorized Abbreviations and Brevity Codes.
   415–30 Troop Construction for the Air Force.
   600–20 Army Command Policy and Procedures.
   750–1 Maintenance Concepts.
   750–8 Command Maintenance Management Inspections.

A-3. Supply Bulletins (SB)
   5–110 Weight, Cubage, and Transportation Data for Engineer TOE Units.

A-4. Training Circulars (TC)
   10–1 Field Expedients for Rigging and Outloading Airdrop Equipment.
   10–4 Assembly Line Rigging.

A-5. Field Manuals (FM)
   1–100 Army Aviation.
   3–12 Operational Aspects of Radiological Defense.
   5–1 Engineer Troop Organizations and Operations.
   5–15 Field Fortifications.
   5–20 Camouflage, Basic Principles and Field Camouflage.
   5–25 Explosives and Demolitions.
   5–26 Employment of Atomic Demolition Munitions (ADM).
   5–30 Engineer Intelligence.
   5–31 Boobytraps.
   5–34 Engineer Field Data.
   5–35 Engineer’s Reference and Logistical Data.
   5–36 Route Reconnaissance and Classification.
   5–135 Engineer Battalion, Armored, Infantry, and Infantry (Mechanized) Divisions.
   7–20 Infantry, Airborne Infantry, and Mechanized Infantry Battalions.
   7–30 Infantry, Airborne Infantry, and Mechanized Infantry Brigades.
8–10 Medical Service, Theater of Operations.
9–6 Ammunition Service in the Theater of Operations.
9–30 Maintenance Battalion, Division Support Command.
20–32 Land Mine Warfare.
20–33 Combat Flame Operations.
21–26 Map Reading.
21–30 Military Symbols.
21–40 Small Unit Procedures in Chemical, Biological and Radiological (CBR) Operations.
23–65 Browning Machinegun, Cal. 50, HB M2.
29–10 Supply Management in the Field Army.
29–22 Maintenance Operations in the Field Army.
31–10 Barriers and Denial Operations.
31–16 Counterguerrilla Operations.
31–22 U.S. Army Counterinsurgency Forces.
(S) 31–22A U.S. Army Counterinsurgency Forces (U).
31–60 River-Crossing Operations.
41–10 Civil Affairs Operations.
44–1 U.S. Army Air Defense Employment.
54–2 The Division Support Command.
55–9 Transportation Services and the Transportation Brigade in the Field Army.
57–10 Army Forces in Joint Airborne Operations.
57–35 Airmobile Operations.
61–100 The Division.
100–5 Field Service Regulations—Operations.
100–10 Field Service Regulations—Administration.
(C) 100–20 Field Service Regulations—Counterinsurgency (U).
101–5 Staff Officers’ Field Manual; Staff Organization and Procedure.
101–10–1 Staff Officers’ Field Manual; Organizational, Technical, and Logistical Data Unclassified Data.

A–6. Technical Manuals (TM)
3–210 Fallout Prediction.
3–220 Chemical, Biological, and Radiological (CBR) Decontamination.
5–210 Military Floating Bridge Equipment.
5–277 Panel Bridge, Bailey Type, M2.
5–301 Staff Tables of Engineer Functional Components System.
5–303 Bills of Material and Equipment of the Engineer Functional Components System.
5–312 Military Fixed Bridges.
5–331 Management: Utilization of Engineer Construction Equipment.
5–335 Drainage Structures, Subgrades, and Base Courses.
5-366 Planning and Design for Rapid Airfield Construction in the Theater of Operations.
5-461 Engineer Handtools.
5-700 Field Water Supply.
5-725 Rigging.
9-1910 Military Explosives.
9-1375-200 Demolition Materials.
10-500-series Manuals covering the airdrop of supplies and equipment; rigging of particular items of equipment.
38-750 Army Equipment Record Procedures.
57-210 Air Movement of Troops and Equipment.
57-220 Technical Training of Parachutists.

A-7. Tables of Organization and Equipment (TOE)

57 Airborne Division.
5-25 Engineer Battalion, Airborne Division.
5-26 Headquarters and Headquarters Company, Engineer Battalion, Airborne Division.
5-27 Engineer Company, Engineer Battalion, Airborne Division.
5-54 Engineer Light Equipment Company.
5-195(T) Engineer Combat Battalion (Airborne).

A-8. Technical Bulletin

TB ENG 314 Planning and Procedures for Air Movement of Engineer Organizations in C-130 Aircraft.
APPENDIX B
ENGINEER SUPPORT LANDING AREAS

Section I. INTRODUCTION

B-1. Purpose
This appendix provides information and guidance in the planning, site selection, and engineer support required for construction of landing areas in airborne operations.

B-2. Basic Information
In an airborne operation the nature of drop and landing zones is an important consideration in formulating the landing plan and scheme of maneuver. Drop zones and landing zones must provide for an initial disposition of troops which facilitates seizure of assigned objectives. Plans for the construction and improvement of landing areas are predicated on plans for the buildup in the objective area.

B-3. Terms
a. Landing Area. This is the general area used for landing troops and materiel either by airdelivery or airlanding. This area includes one or more drop zones or landing zones.

b. Drop Zone. A drop zone is a specified area upon which airborne troops, equipment, and supplies are dropped by parachute, or on which supplies and equipment may be delivered by free fall.

c. Landing Zone. Landing zones are specified zones within an objective area used for the landing of aircraft.

d. Extraction Zone. An extraction zone is a specified site at which supplies and equipment are delivered by extraction from minimum altitude aircraft (para 4–16e).

e. Airlanding Facilities. These are the minimum essential facilities which can reasonably be constructed in an airhead to permit the continuous airlanding of aircraft. The term denotes facilities less elaborate than an airfield.

f. Airfield. An airfield is an area prepared for the accommodation, landing, and takeoff of aircraft.

B-4. Responsibilities
Construction or improvement of airlanding facilities in the objective area during the assault phase of an airborne operation is a responsibility of the airborne division engineer battalion. When construction requirements exceed its capabilities, the airborne division engineer battalion may be augmented by the attachment of elements or all of an airborne light equipment company, teams of key specialists such as soils technicians, or other engineer units as may be required for the accomplishment of the mission.

B-5. Number of Airlanding Facilities
As many widely dispersed airlanding facilities should be seized as possible.

a. The number of airlanding facilities provided in the objective area is situational and varies with—

(1) Size of the airborne force to be employed and supported.
(2) Planned buildup, including the number and type of aircraft to be accommodated.
(3) Tactical and logistical plans.
(4) Terrain in the objective area.
(5) Enemy capabilities.
(6) Engineer capabilities.
(7) Weather during the time of operations.
(8) Availability of local resources.
b. The number and type of airlanding facilities to support an airborne operation are generally as follows—

(1) One assault airlanding facility per committed brigade and one for use of the division as a whole.

(2) One medium transport airlanding facility per division.

c. The above facilities do not provide for employment of organic or attached Army aviation, alternate facilities to offset losses from enemy action, or desired additional facilities. When the situation permits, one assault airlanding facility should be provided in each battalion area.

Section II. SITE SELECTION

B–6. Initial Planning

Site selection is of paramount importance in planning airlanding facilities. Sites must be capable of rapid improvement to meet criteria imposed by aircraft characteristics normally with a limited construction capability. The airborne division engineer staff provides technical assistance in selection of specific airlanding facilities sites, based on the terrain in the area, and the construction capability of the units available for the mission. Assistance from an Engineer Terrain Intelligence Detachment, if available, should be obtained. Highways, sports fields, and other cleared areas which will require minimum clearance and leveling must be carefully considered. Initial planning should include selection of several possible sites for each airlanding facility required. Subsequent ground reconnaissance will determine which of the possible sites is the most suitable for development.

B–7. Landing Zones for Assault Aircraft

Existing airfields, certain sections of superhighways, some beaches, and open fields are suitable for the assault landing. These sites generally will require considerable improvement such as filling in craters and removing trees and other obstacles from approach zones. In addition to sufficient landing area, the landing zones should include adequate area for aircraft ground movement, loading, and unloading.

B–8. Desirable Characteristics

a. Desirable characteristics for landing zones are—

(1) Located in secure areas so that landing, offloading, and takeoff of assault aircraft does not interfere with the scheme of maneuver of the airborne force.

(2) Close proximity to dominating terrain, an adequate road net, and terrain features such as bridges and defiles, favorable for defense against armored attack.

(3) Relative freedom from antiairborne obstacles and antiaircraft defenses.

(4) A straight approach for aircraft.

(5) Ease of identification, especially during periods of low visibility.

(6) Cover and concealment in close proximity to landing areas.

(7) Suitability for improvement to an airlanding facility.

b. Desirable characteristics for airlanding facilities are—

(1) Clear approaches to landing strips.

(2) Parking and dispersal areas to accommodate the planned capacity of the facility.

(3) A road net to handle traffic to and from the facility.

(4) Proximity of suitable assembly area.

(5) Areas and other accommodations which facilitate supply and evacuation.

B–9. Criteria

Airlanding facilities for an airborne operation are constructed to certain minimum criteria which are based on aircraft characteristics. These criteria may be modified at times by operational necessity.

a. A minimum criteria airlanding facility is one which satisfies the minimum requirements of dimension and bearing capacity for a specific aircraft at a specific landing weight for a speci-
fied number of sorties. Limiting construction to minimum criteria permits early completion, and hence early use, of the facility with the least construction effort.

b. In order to exploit the air capability under combat conditions, established minimum criteria are determined by considering an acceptable takeoff and landing accident risk. Appropriate publications list aircraft performance characteristics and prescribe minimum criteria. The commander of the unit furnishing the aircraft is responsible for determining if the minimum criteria for any specific airlanding facility may be lowered and to what extent.

B—10. Tactical Considerations

a. Site selection is the initial consideration in planning airlanding facilities because of the stringent construction time limitations imposed by airborne operations. Landing strips may be required to be operational in as little as 36 hours. Factors primarily affecting construction are weather, topography, drainage, ground cover, soil conditions, availability of imported surfacing materials and local construction materials, and dispersion. Army, Air Force, and Navy elements, as appropriate, have a joint responsibility for this important phase of planning.

b. Success of the mission is, of course, the overriding consideration in site selection. There may be instances where a site with less desirable characteristics is chosen over another because of tactical considerations. However, a site which presents the engineer force with a task that it has no reasonable chance of accomplishing can defeat the operation, even though that site meets all “ground combat” tactical requirements. Frequently, the selected site will represent a compromise between tactical and technical requirements.

B—11. Technical Considerations

Among the factors the engineer considers in the selection of sites for airlanding facilities are—

a. Terrain in the objective area, with particular attention to —

(1) Airfields that can be seized intact or rehabilitated.
(2) Superhighways and other roads, beaches, or open areas of reasonably well-compacted soil.
(3) Soil characteristics, relief, and vegetation.
(4) Extent and nature of obstacles.
(5) Effects of weather on soil conditions.
(6) Condition of the road net.
(7) Existing construction materials and other resources in the objective area.
(8) Availability of surfacing materials.

b. Time limitations imposed on construction of airlanding facilities by tactical considerations.

c. Planned aerial delivery of construction equipment, based on division air-movement tables.

d. When the engineer can apply the above facts to all potential airlanding sites and evaluate each site in specific terms of engineer effort and construction-time requirements, he will greatly facilitate the effective planning of airborne operations.

Section III. ENGINEER SUPPORT

B—12. Battalion Capability

The airborne division engineer battalion has virtually no capability of improving airlanding facilities while concurrently providing other engineer support to the brigades and the division.

B—13. Construction Support

The engineer construction support required will depend upon the type and amount of work to be accomplished, the schedule of operations, and the criteria for the facilities. Support is furnished by attachment from the engineer combat battalion (airborne), the airborne light equipment company, or other engineer units with additional capabilities. Generally, one engineer combat battalion (airborne) or one airborne light equipment company is required to support airlanding facilities construction and provide additional combat support for one air-
borne division. When only the light equipment company is available, additional effort, such as a combat engineer company (Army), is required when landing mat is to be laid or when there is any sizeable amount of structural work such as culverts, bridges, or vertical construction.

**B-14. Employment**

The airborne division engineer battalion employs its units to implement the airlanding facility plan by considering the following:

- a. Number of landing zones and airlanding facilities to be cleared or constructed.
- b. Engineer augmentation available.
- c. Combat support missions for the airborne division which may reduce the airlanding facilities construction capability.
- d. An analysis of terrain in the objective area.
- e. Criteria established for the facilities.
- f. Time allotted by the tactical needs of the division.
- g. Local civilian resources.
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By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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