

U
408.3

FM

31-60

S/S Mar 72

Reference

FM 31-60

reference **DEPARTMENT OF THE ARMY FIELD MANUAL**

RIVER-CROSSING OPERATIONS

THE ARMY LIBRARY

WASHINGTON, D. C.



**HEADQUARTERS, DEPARTMENT OF THE ARMY
NOVEMBER 1966**

TAGO 6153A

~~SECRET~~



FIELD MANUAL }
No. 31-60

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 November 1966

RIVER-CROSSING OPERATIONS

	Paragraphs	Page
CHAPTER 1. GENERAL		
Section I. Introduction	1-3	2
II. Definitions and basic considerations	4-6	3
III. Types of river-crossing operations	7, 8	4
CHAPTER 2. INTELLIGENCE	9, 10	6
3. CONCEPT AND PLANNING GUIDANCE		
Section I. Concept of river-crossing operations	11-27	7
II. Considerations of enemy defense	28-30	12
III. Planning of river-crossing operations	31-35	13
IV. Crossing means	36-43	15
V. Crossing sites	44-50	18
VI. Supporting units and operations	51, 52	21
VII. Command and control	53, 54	22
CHAPTER 4. OPERATION PLANNING CONSIDERATIONS		
Section I. Fire support	55-61	25
II. Crossing echelons	62-65	26
III. Movement planning and control	66-78	30
IV. Communications	79-81	34
V. Chemical agents and illumination	82, 83	36
VI. Security	84-89	36
VII. Combat cover and deception	90-96	38
VIII. Training and rehearsals	97, 98	42
CHAPTER 5. COMBAT SERVICE SUPPORT PLANNING AND EXECUTION		
Section I. Basic considerations and supply planning	99, 100	43
II. Medical support	101, 102	44
III. Prisoners of war and civil affairs	103, 104	45
CHAPTER 6. SPECIAL CONSIDERATIONS		
Section I. Special conditions	105-108	46
II. Other tactical operations	109-111	47
APPENDIX A. REFERENCES		49
B. CROSSING EQUIPMENT		52
C. EXAMPLE TRAINING PROGRAM		71
D. EXAMPLE ANNEXES TO DIVISION PLANS AND THE PLANNING SEQUENCE		73
E. DEVELOPING A CROSSING PLAN		77
INDEX		91

* This manual supersedes FM 31-60, 18 July 1962, including C 1, 27 January 1964.

CHAPTER 1

GENERAL

Section I. INTRODUCTION

1. Purpose

This manual sets forth military doctrine and techniques for planning and executing tactical river-crossing operations. A list of supplemental references appears in appendix A.

2. Scope

a. The doctrine and techniques described in this manual apply primarily to those river-crossing operations where the crossing force or its assault element must plan for a phased buildup of strength on the far bank, and must have considerable support from higher echelons to overcome the obstacle.

b. In certain offensive operations, such as a movement to contact, units will cross rivers in situations where plans for a phased buildup are not required and major support is not needed to cross the obstacle. In these situations, there is a high probability that the crossing force can move the bulk of its combat power to the far bank without significant interference from either the enemy or the obstacle. When this condition exists, only selected elements of doctrine or techniques in this manual may be applicable.

c. Although the doctrine promulgated herein has general application to all levels of command, it applies especially to the crossing of a corps or division.

d. This manual is applicable to all forms of warfare. When required, modifying guidance for nuclear, chemical and biological warfare is included. Guidance for internal defense operations is integrated and also discussed in chapter 6.

e. Appendix B contains data on crossing equipment.

f. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Changes should be keyed to the specific page, paragraph and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to U.S. Army Combat Developments Command, Institute of Combined Arms and Support, Fort Leavenworth, Kans 66027.

3. Operational Environment

a. River-crossing operations may be required in any environment and under any level of nuclear, chemical, or biological weapon usage which permits ground maneuver.

b. Under conditions of active nuclear, chemical, or biological warfare the crossing of a river generally requires forces and tactics designed to capitalize on the effects of friendly fires. Crossing forces exploit friendly fires to secure crossings before the enemy can react.

c. A crossing operation normally is conducted by a division as part of a corps operation. The division usually requires higher echelon support such as crossing equipment, engineer troops, chemical smoke generator units, military police, army aviation, artillery, and air defense artillery units.

d. In internal defense operations, additional planning emphasis must be placed on measures to counter guerrilla tactics; to gain the support of civilians; and on independent unit operations.

e. River-crossing operations conducted when friendly air superiority does not exist, will require increased emphasis and implementation

of active and passive air defense means to include use of organic automatic and small arms

weapons, dispersion, concealment, camouflage, and night operations.

Section II. DEFINITIONS AND BASIC CONSIDERATIONS

4. Definitions

a. Bridgehead. A bridgehead is an area of ground held or to be gained on the enemy side of a river. The area should accommodate and facilitate maneuver of the forces involved without congestion, and should provide sufficient space and adequate terrain to permit defense of the crossing sites. The bridgehead should also provide a base for further operations. Details on selection of a bridgehead are in paragraph 20.

b. Crossing Force. The crossing force is the overall force involved in the crossing. This force includes the control headquarters, its assault forces, reserve forces, combat support, and combat service support elements. In a corps crossing operation, the corps is the crossing force. In a situation where a division is executing an independent river crossing, the division is the crossing force.

c. Assault Forces. The assault forces are the major subordinate elements of the crossing force involved in the assault of the river and the advance on the far bank. In a corps crossing operation, the assault divisions are the assault forces. When a division is executing an independent river-crossing operation, the assault brigades are the assault forces.

d. Crossing Front. A crossing front is the entire distance along the river in the zone of the crossing force (fig. 1).

e. Crossing Sites. Crossing sites are the locations along the river which possess the physical characteristics required for the operation of crossing equipment such as amphibious or fording vehicles, assault boats, rafts, and bridges (fig. 1). Criteria for the selection of these sites are contained in paragraphs 44 through 50.

f. Crossing areas. Crossing areas (fig. 1) are designated to facilitate controlling the flow of troops, equipment, and supplies to be moved across the river by surface means. A crossing area contains crossing sites, space for equip-

ment needed for crossing, and space for dispersal of convoys. Normally, the surrounding terrain that may be subject to the effects of enemy fires concentrated on the crossing sites is included in the crossing area. The radius of vulnerability from the largest tactical nuclear weapon that the enemy may employ is considered when determining the size of the crossing area. For additional details refer to paragraph 70.

5. Purpose of River-Crossing Operations

The purpose of a river crossing is to move the attacking force across a river obstacle as rapidly and as efficiently as possible, so that it may either continue its attack to destroy the enemy or seize objectives that will protect the crossing of the remainder of the force.

6. Major Problems in River-Crossing Operations

a. In a river-crossing operation there is a risk of defeat in detail. Keeping this risk within acceptable limits while accomplishing the mission is the fundamental problem in a river crossing. The degree of risk is measured by the difference between the capability of friendly forces to project combat power on the far bank and the enemy's capability of concentrating against this force.

b. Other potential problem areas that are of special concern in river-crossing operations are—

- (1) Special equipment and specially trained personnel are required to assist the passage of the unit across the defiles established by the bridges; signal units and equipment to provide sufficient communications for movement control and for combat use on both sides of the river; and special combat deception units and equipment.

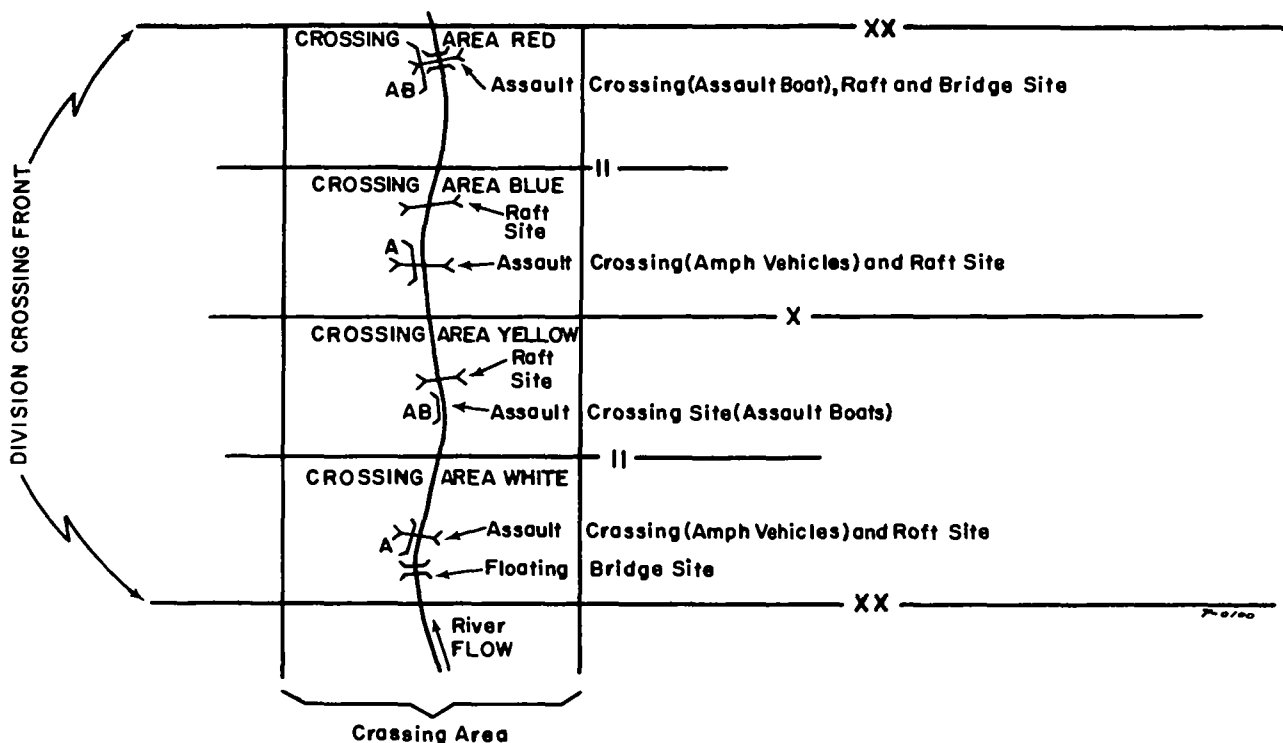


Figure 1. Schematic sketch of a division in a river crossing.

(2) Difficulties of movement regulation and control may exist due to restriction on traffic, communication, land area available, and the involvement of additional units. Each of these factors has an impact on the others. The space problem becomes difficult during buildup when maintaining an acceptable vulnerability level to probable enemy nuclear, chemical, and biological strikes. The traffic problem is intensified by the limited number of crossing sites. Communications may become saturated. In order to prevent compromise of the actual crossing area, radio or listening silence may be

required. This generally requires a great dependence on wire communications just prior to the assault; however, once the attack is underway, the communications shift immediately to radio.

(3) The requirement for a high degree of command control to permit adjusting plans to changes in the situation.

c. The current divisions organizations provide the commander with increased organic capability for conducting river-crossing operations and to reduce problem areas indicated above. The present variety of organic crossing means provides the commander with increased flexibility in selecting courses of action to overcome the river obstacle.

Section III. TYPES OF RIVER-CROSSING OPERATIONS

7. Hasty River Crossing

A *hasty river crossing* is a planned operation conducted as a continuation of the attack. The hasty crossing is feasible when enemy defenses are weak; or when friendly nuclear or chem-

ical-biological weapons are available to disrupt enemy defenses; and when appropriately equipped forces are available to advance rapidly to the river. Increased numbers of surface and aerial vehicles organic to the type divisions provide greater capability for crossing river

obstacles and for fulfilling requirements for conducting a hasty river crossing. A hasty crossing is characterized by speed, surprise, minimum loss of momentum at the river, minimum concentration of forces, and detailed prior planning to insure that adequate crossing means are readily available when needed by assault forces. Clearance of enemy forces from the near bank is not a prerequisite. This type crossing is normally less vulnerable to nuclear or chemical-biological attack. It requires less concentration of personnel and equipment. A hasty crossing is not predicated on the seizure of bridges intact, but is employed as an alternate method of crossing rivers when the situa-

tion so dictates. Hasty river crossings are always sought (para 34).

8. Deliberate River Crossing

A *deliberate river crossing* is conducted when it is not feasible to accomplish a hasty crossing. A deliberate crossing is required when a hasty crossing is infeasible (enemy defenses are very strong or the river obstacle is severe), a hasty crossing has failed, or offensive operations are resumed at the river line. A deliberate crossing is characterized by detailed planning, deliberate buildup and preparation, delay at the river line, deception, and clearance of enemy forces from the near bank (para 35).

CHAPTER 2

INTELLIGENCE

9. General

In order to develop sound river-crossing plans, the commander needs timely, detailed, and accurate intelligence. All available information and intelligence sources should be exploited and emphasis placed on acquiring detailed information on the enemy situation and on the river. Small enemy forces that would not pose a significant threat in a normal offensive operation may be capable of delaying or disrupting river-crossing operations. Assault forces are especially vulnerable while crossing and when landing on the far bank. The commander of an assault force should have detailed knowledge of any enemy force that can employ direct fire weapons on crossing sites to be used. The location and composition of enemy reserves is important because of the initial vulnerability of assault forces to counterattack, particularly by armor. Planners need detailed information on the river in order to develop sound plans for allocation of crossing means, selection of crossing sites, and construction and operation of surface crossing means. Appendix D contains an outline of an intelligence annex.

10. Specific

In preparation for a river-crossing operation, intelligence should be produced on the following:

a. Enemy capabilities of opposing the crossing and advance on the far bank, to include—disposition, composition, strength, tactics, nuclear, chemical, and biological warfare capabilities; availability and effectiveness of air support, and the courses of action that the enemy is capable of adopting during the establishment of a bridgehead.

b. River characteristics to include: width and depth; character of the current and velocity,

cross currents, undertow, and tidal flow; condition of the banks including soil composition, height, and slope; condition of the river bed, including gradients and directions of flow; flood and ice conditions; general fordability by troops and vehicles; and location and characteristics of crossing sites, including fords.

c. Location and characteristics of natural and man-made obstacles and possible effects on movement of both foot troops and equipment.

d. Key terrain; areas for assembly and dispersal; cover and concealment near the crossing sites; fields of fire; ground avenues of approach to the river and to objectives on the far bank; low altitude routes of approach to crossing sites and assembly areas; helicopter and airplane landing areas; positions for supporting weapons, observation posts, and combat service support installations; road nets and approaches, to include width, surface, and capacity of roads; rail nets to and from crossing sites; road and rail routes beyond the projected bridgehead. FM 30-10 contains details on terrain intelligence and FM 5-36 contains details on route reconnaissance.

e. Weather, including effects of precipitation on soil trafficability and river conditions; visibility; effects of wind and precipitation on use of smoke and incendiaries; and factors that may effect employment of nuclear fires, chemical and biological agents, radiological fallout, and air operations.

f. Local resources in the area, to include information on available structural steel, sand, gravel, boats, barges, ferries, aerial tramways, timber, lumber, and local labor.

g. Intelligence concerning the local civilian population which might effect the crossing operation, to include information necessary to support psychological operations.

CHAPTER 3

CONCEPT AND PLANNING GUIDANCE

Section I. CONCEPT OF RIVER-CROSSING OPERATIONS

11. General

This chapter describes the concept of river-crossing operations, and provides guidance on planning and execution.

12. Broad Aspects of Operations

A river-crossing operation includes—

- a. Final preparation for crossing.
- b. Advance to the river in a hasty crossing.
- c. Assault of the river.
- d. Advance on the enemy side of the river.
- e. Establishment of the bridgehead.
- f. Protection of the bridgehead against counterattack.

13. Attack on a Broad or Narrow Front

An attack on a broad front is preferred over an attack on a narrow front. It permits a more rapid crossing of the entire force and reduces the overall vulnerability of the attacking force to enemy counteraction with mass casualty or mass destruction means. An attack on a broad front will require the defender to delay committing his reserves until he evaluates the situation in all areas and determines which crossings are the most serious threats to his defense. If the enemy delays too long committing his reserves, the attacking force will develop enough strength on the far bank to repel his counterattack. An attack is made on a narrow front only when the enemy situation is favorable or when conditions of terrain dictate. When access routes to the river are severely limited, an attack on a narrow front may be required.

14. Advance to the River

a. In a hasty river crossing, assault forces push forward rapidly to keep the enemy off balance, cross the river where the opposition appears weakest, and cross before the enemy can establish strong defenses. A rapid advance to the river may permit seizure of bridges before the enemy can destroy them. Although success of a hasty crossing is not predicated on the seizure of bridges intact, a crossing force should be prepared to take maximum advantage of any bridges seized.

b. In a deliberate crossing, the attack starts at the river line. Prior to the attack, assault elements may be located well away from the near bank in positions providing protection from enemy observation and direct fire weapons.

15. Line of Departure

A line of departure (LD) normally is used to coordinate the assault of the river obstacle. In a deliberate crossing, the LD is the near edge of the river, but in a hasty crossing the LD may be some distance from the river. The LD for a hasty crossing should be designated on easily identified terrain from which rapid uninterrupted movement to the river can be accomplished.

16. Assault of the River

a. In all river-crossing operations, the assault forces move as rapidly as possible across the obstacle. Once the assault of the river is started, the attack is pressed and its momentum sustained. Every effort is made to maintain a continuous flow of personnel, equipment,

and supplies across the river obstacle without delays or congestion on either side of the river.

b. When the enemy has a nuclear, chemical, or biological capability, it is usually desirable to make subsequent crossings to the flanks of the initial crossing area in order to maintain adequate dispersion on the far bank. When the initial assault crossings are reinforced by reserve units, dispersion may be maintained by expanding the bridgehead to the flanks.

c. When friendly guerrilla forces are available to support river-crossing operations, such support may include the interdiction of approaches to crossing sites, attacks on enemy reserves, destruction of enemy command post and communications facilities. They may also direct friendly artillery fires. FM 31-21 provides details on use of guerrilla forces.

17. Time of Crossing

Whether a crossing is made in daylight or darkness depends on the need for concealment, state of training of troops, nature of the terrain, characteristics of the water obstacle, enemy dispositions and capabilities (such as use of nuclear, chemical, and biological weapons, minefields on the far bank, and ability to make air and tank attacks), and the need for speed. Surprise is difficult to obtain in a daylight crossing; however, weather conditions permitting, smoke may be used to conceal the actual crossing and to provide deception (para 53 and 54).

18. Advance on the Far Bank

a. Once the assault forces land on the far bank, they advance as rapidly as possible toward their objectives. Units do not attempt extensive reorganization on reaching the far bank, but move rapidly away from the river. As the attack progresses, reorganization is continuous until the units are organized and deployed in the formation necessary to continue the attack. Commanders avoid dissipation of forces to achieve minor tactical success. Leading elements of the assault forces normally clear crossing sites and provide local security until relieved. The relieving units may be elements of the assault force or other elements designated by the assault or crossing force

commander. Enemy forces that interfere, or can interfere, with accomplishment of the mission are contained or destroyed. The assault force bypasses or contains, with minimum means, enemy elements of insufficient strength to jeopardize the mission. Bypassed enemy forces are reported to higher headquarters or to the follow and support unit, if one has been assigned this mission.

b. Reserves remain on the near bank until sufficient space has been gained to permit avoiding unnecessary concentration on the far bank. Reserves are prepared to move to the far bank quickly to exploit success or counter enemy attacks that threaten the success of the operation.

19. Buildup on the Far Bank

Throughout a river-crossing operation, it is essential that the crossing force be capable of defeating or blocking anticipated enemy reaction, including counterattacks, on the far bank. Plans must provide for a rate of crossing and buildup on the far bank that exceeds the rate at which the enemy can concentrate against the force. It is also essential that the attack keep moving. Reserve troops are employed to maintain the impetus of the attack. Bridges, rafts, amphibious and fording vehicles, and aircraft are used to place troops, equipment and supplies on the far bank at the earliest opportunity. Supporting weapons are crossed promptly to increase the firepower and air defense capability in the bridgehead and to provide greater range coverage. The corps reserve crosses behind the reserve of assaulting divisions.

20. Selection of a Bridgehead

a. The headquarters having overall control of the operation, usually the corps, designates the limits of the bridgehead. A corps bridgehead should provide enough space on the far bank of the river for the combat elements of the corps, including the reserve, plus combat support and essential combat service support elements. There should be enough space and adequate defensible terrain for the corps commander to redispense his forces for defense, if required, or for continuation of the attack.

Provision of flank security for the bridgehead is facilitated by tying the ends of the bridgehead line to the river obstacle. The flanks of the bridgehead line should include defensible terrain if available. When the bridgehead is secured, the river-crossing operation is completed.

b. In a situation where a division is executing an independent river-crossing operation, the size of the bridgehead depends on the division mission. If the division is assigned a mission to cross the river and prepared to continue the attack, the bridgehead need only provide sufficient space for the division plus its normal support elements. If the division is assigned a mission to cross the river and prepared to assist passage of another unit, then enough space must be secured on the far bank to accommodate the crossing unit and the unit making the passage.

c. Although normally used, a bridgehead line is not required. Terrain objectives which would secure or assist in securing the bridgehead may

be designated in lieu of a bridgehead line or in conjunction with a line.

21. Phasing for a River Crossing

a. The technique of phasing is used as an aid in planning and controlling a river-crossing operation. There is no standard number of phases in a river crossing. Normally river crossings are planned as one-, two-, or three-phase operations. The number of phases planned is based on the mission; evaluation of all pertinent elements of the situation confronting the attacking force; specific consideration is given to the severity of the river obstacle, the capability of the assault forces, the distance and terrain between the river and the bridgehead line, and the ability of the enemy force including hostile air to interfere with the crossing and the advance on the far bank.

b. Phasing facilitates planning for an adequate rate of buildup on the far bank while providing for the effects of the enemy and

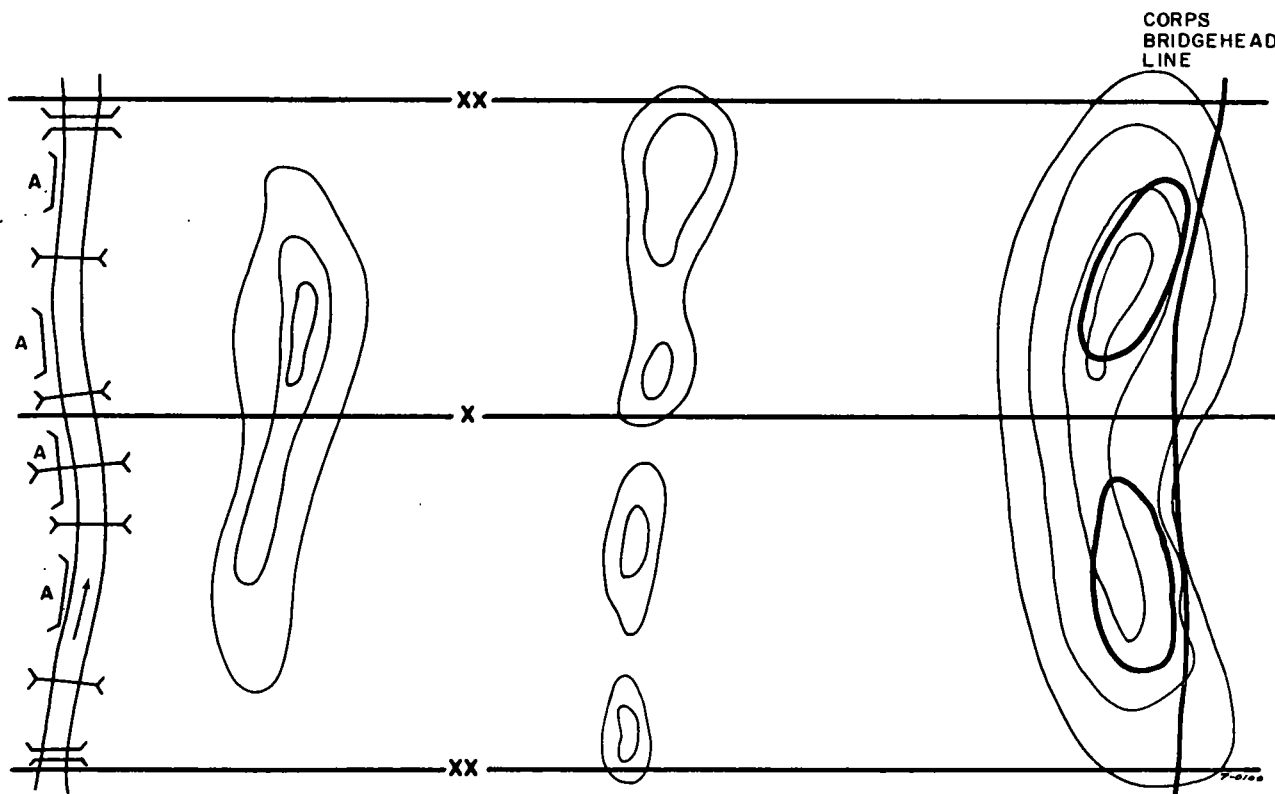


Figure 2. Schematic sketch of one-phase crossing.

weather on the capability of friendly forces to cross the obstacle and to advance.

c. Airmobile or airborne assaults may be conducted in any or all phases of a river-crossing operation in conjunction with a ground assault, if the situation permits the use of aircraft over enemy held areas.

d. The selection of intermediate objectives should accomplish for the division, brigade, and subordinate echelons the elimination of the river obstacle from further consideration in accomplishing their mission.

22. One-Phase Crossing

Under extremely favorable circumstances it may be possible to cross a river and secure all of the bridgehead in a single sustained attack. This type crossing may be feasible when the enemy is not capable of significantly delaying the advance of forces making the initial crossings or disrupting subsequent operations.

23. Two-Phase Crossing (One Intermediate Objective)

a. When either corps or division considers it necessary to plan for temporarily halting the advance on the far bank only once before completing seizure of the bridgehead, a two-phase crossing is planned. Corps might plan for a temporary halt to insure that sufficient time is available for a limited buildup, for reorganization of the assault divisions, or to permit a coordinated attack by the assault divisions to complete seizure of the bridgehead. Division might consider planning a halt for similar reasons, except that at division level, the requirement would be for a coordinated attack by the assault brigades.

b. In a two-phase crossing, only one intermediate objective area is designated. Whether this area is designated by corps or division, the criteria for selection of the area are the same. The area should provide sufficient space on the far bank to permit the division commander to buildup and reorganize his forces for continuing the attack. There should be enough space for the assaulting brigades, the reserve, and essential combat support and combat service

support elements. When selecting this area, consideration should be given to inclusion of good defensible terrain well forward, in case a temporary defense of the area is required. Enemy ground observation of the crossing sites is normally eliminated.

c. The *first phase* of a two-phase crossing includes the assault crossing of the river and the securing of the intermediate objective area. The *second phase* includes any necessary tactical and logistical buildup followed by a coordinated attack to secure the assigned portion of the bridgehead.

24. Three-Phase Crossing (Two Intermediate Objectives)

a. If either corps or division considers it necessary for the assault brigades to halt on the far bank for reorganization or limited buildup prior to securing enough space for the division to cross and reorganize, a three-phase crossing is planned. In a three-phase crossing, two intermediate objective areas are secured before the final assault to secure the bridgehead.

b. The *first phase* of a three-phase crossing includes the assault crossing of the river and the securing of the intermediate objective area which permits the commanders of the assault brigades to reorganize their forces as necessary. The *second phase* includes the required buildup, followed by the attack to secure the intermediate objective area permitting the division commander to cross and reorganize his forces. The *third and final phase* includes the limited buildup and the coordinated attack to seize the assigned portion of the bridgehead.

c. The first intermediate objective area should provide sufficient space within a division zone to permit the assault brigade commanders to reorganize their brigades prior to continuing the attack. Also, there is the requirement for good defensible terrain well forward to facilitate any necessary defense of the area. This objective area normally eliminates direct fire on crossing sites and enemy resistance in the immediate area of the crossing sites. The second intermediate area should meet the requirements described in paragraph 23b.

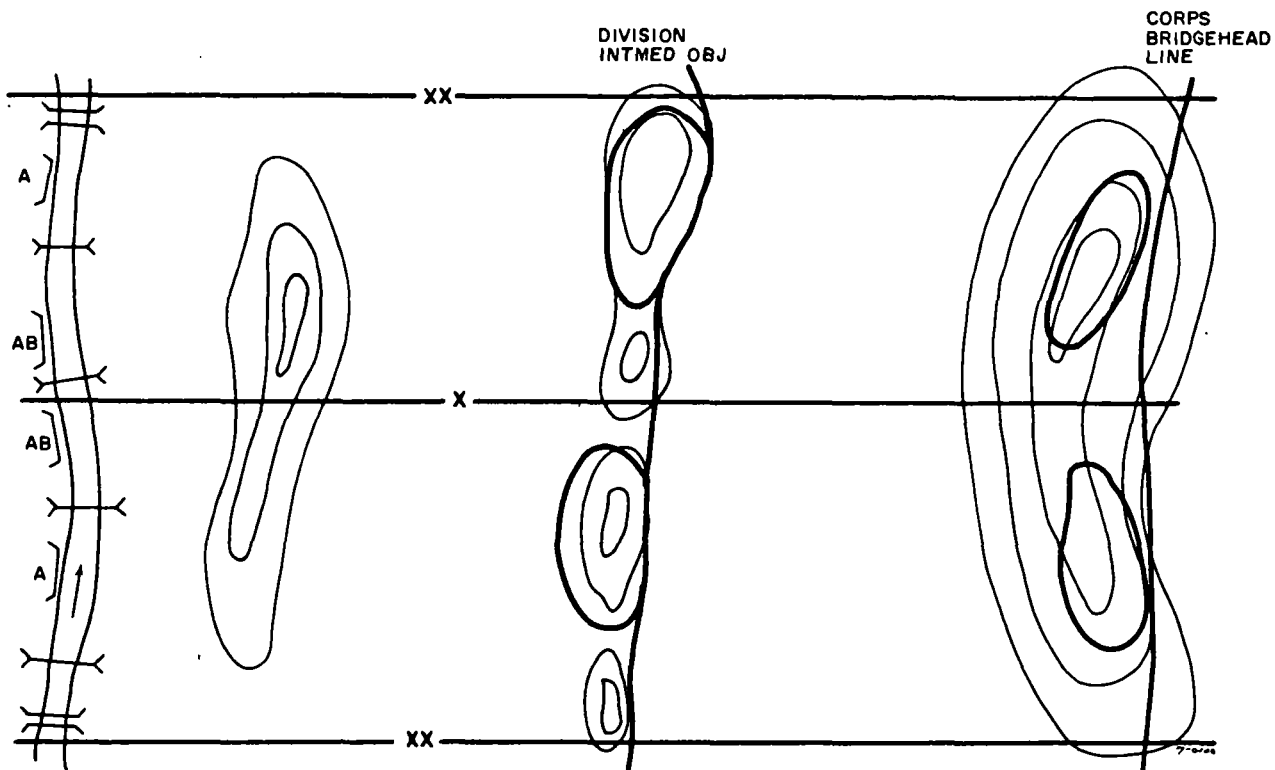


Figure 3. Schematic sketch of two-phase crossing.

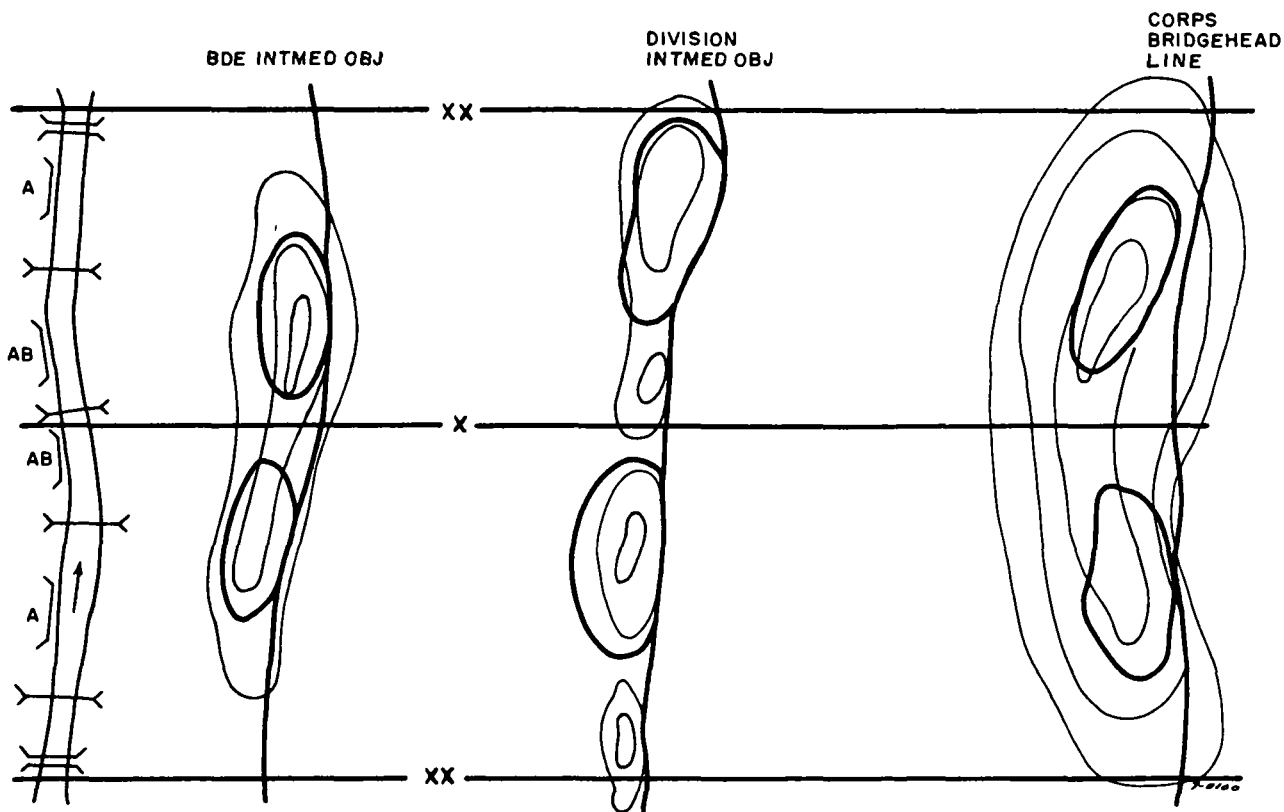


Figure 4. Schematic sketch of three-phase crossing.

25. Phasing During the Execution of the Crossing

Although the plans for a river crossing may provide for a delay between attacks in successive phases, this time interval may not be evident during execution of the plan. If, during conduct of the crossing, elements of the force can be moved to the far bank at a rate faster than originally planned, or if enemy resistance is less than expected, halts to accomplish reorganization or buildup may not be necessary. Plans can and should be modified as the operation proceeds in order to exploit opportunities that develop. Emphasis is placed on gaining sufficient advantage and momentum in the conduct of the operation to commit an exploitation force at the earliest possible time.

26. Airborne and Airmobile Forces

Airborne and airmobile forces can perform a variety of missions, that contribute to the speed and success of a river-crossing operation. Appropriate missions include: reconnaissance of crossing sites; securing bridges or fording sites intact ahead of advancing ground forces; securing terrain objectives which dominate the

crossing sites, prevent the movement of enemy reserve, or assist in securing the bridgehead; reinforcing units on the far bank; reducing enemy defenses along the river line; conducting feints and demonstrations; and counter-attacking enemy penetrations. Details concerning airborne operations are covered in FM 57-10 and FM 61-100; details on airmobile operations, in FM 57-35.

27. Follow and Support Units

Follow and support units can be used effectively in a river crossing to facilitate a rapid advance by the assault forces. Follow and support units may be assigned the tasks of providing local security of crossing sites and crossing areas, mopping up, destroying bypassed or contained enemy forces, and blocking the movement of enemy reinforcements into the area. A division may provide a follow and support unit from its own resources or one may be provided by corps. In any case, an element assigned a follow and support mission is a committed force and is no longer a reserve unit. Designation and responsibilities of follow and support units must be specified in orders.

Section II. CONSIDERATIONS OF ENEMY DEFENSE

28. General

Planning for a river-crossing operation must consider the enemy's defensive dispositions and capabilities. These factors influence the type crossing, the crossing areas selected, the types and quantities of crossing means required, the extent of the bridgehead, and the scheme of maneuver.

29. Methods of Defense

The defender may hold a river generally as follows. He may—

a. Use the river as a major obstacle in connection with an area defense organized in depth along and in rear of the river. In this method, security forces are frequently employed in front of the river to delay and disorganize the attacker as he approaches.

b. Defend the river with light security forces and hold the bulk of his forces in the rear.

When the attack develops, the defender counterattacks with maximum strength.

c. Defend in strength in front of the river line.

d. Use air strikes, nuclear, chemical, or non-nuclear fires extensively with any of the above.

e. Use insurgents, employing guerrilla warfare methods. Insurgents may not defend a river line by deliberate methods, but may use method *b* above keeping forces on the friendly near bank. The insurgents may then wait until the friendly forces are astride the river, or the bulk of these forces are deployed across the river, and then attack the follow-up or rear echelons, defeating them in detail.

30. Problems of the Defender

a. Since the defender does not have the initiative, his plans to meet the river crossings at every conceivable point may be complicated by—

- (1) An inability to organize positions in depth.
- (2) Extended frontages with insufficient communication and control facilities.
- (3) Inadequate information as to the attacker's capabilities.
- (4) The attacker's use of surprise, crossing under cover of darkness, without preparatory fires.
- (5) Possible neutralization of one or more prepared positions permitting a relatively unopposed crossing by the attacker.
- (6) Being subjected to an airborne/airmobile attack. To meet this type crossing, the defender must place emphasis on defending key localities; on integrating air defense artillery into the defense plan; on maintaining mobile reserves; and on employing extensive target acquisition means. The defender must also prepare to counter the extensive use of amphibious vehicles by the attacker. Defense against amphibious vehicles includes mine fields and other obstacles at likely points of ingress and egress along the river; the employment of floating mines in the river; the location of antitank weapons well forward; and the attack of troop concentrations with nuclear and nonnuclear fires delivered by air and ground delivery means.

b. When the attack develops, the defender determines where the principal threat exists. An early and accurate determination is the most difficult problem of the defense. The principal threat may vary as the operation progresses. The defender inflicts maximum damage on enemy forces by the use of air-

craft and indirect fire weapons prior to the attack, and seeks to destroy the attacking forces while they are astride the river or ejects the attacker before he firmly establishes himself on the near bank.

c. The defender disposes artillery in depth and masses fires on critical crossing points and on the attacker's rear areas. Artillery elements may be disposed on the attacker's side of the river in support of security forces. In such cases, the defender must insure that the security force artillery is withdrawn before the bridges are destroyed. Tactical air support may be used extensively to disrupt the attacker's assault regardless of the conditions of the crossing sites. Air and water craft may be employed to evacuate security forces including artillery and vehicles after bridges are destroyed. The defender makes provisions to shift his artillery to support his counterattacking force. This requires emphasis on the maintenance of probable routes for displacement of all counterattack elements, traffic control, and preparation of fire support plans and positions for possible counterattack areas. Nuclear and chemical fires are placed where they can disrupt the attacker's assault, destroy his crossing means, and support counterattacks.

d. The defender disposes armored and mechanized forces in reserve at locations which permit their timely intervention in defended areas or probable crossing sites. The defender's reserves are located to facilitate counterattack before the attacker has developed superior combat power on the defender's side of the river.

e. The defender may employ airmobile forces as a mobile counterattack force. The defender's aircraft can overfly the river obstacle and be employed with advantage in a variety of defensive situations which capitalize upon rapidity of movement and tactical surprise.

Section III. PLANNING OF RIVER-CROSSING OPERATIONS

31. General

Preliminary planning for a river crossing begins at corps and higher echelons of command. Warning orders are used to alert subordinate echelons. Necessary intelligence and other pertinent information is disseminated

with the warning orders or soon after, to permit timely preparation of plans. Logistical requirements are placed on higher headquarters and requirements for support of other services or special troop units are coordinated with appropriate headquarters. It is desirable that

plans are completed well in advance of the actual crossing. Time is needed for distribution and study of the plans; to insure that crossing means and other support provided by higher to lower echelons is available when and where required; to permit preparation of the supporting plans in the detail required; and to permit rehearsal of the operation, if feasible.

32. Sequence of Operation Planning

Planning for a river-crossing operation is basically the same as for any other operation; however, because of the river obstacle, certain aspects of planning are emphasized. Planning is developed from the bridgehead line back toward the river line. These aspects and the sequence are generally applicable at corps, division, brigade, battalion, or company level. In internal defense and guerrilla warfare operational environments, independent units must anticipate vastly shortened planning time and reduce many of the actions outlined herein. Appendix E contains a sample operation order and crossing plan. Corps and division planning responsibilities are in appendix D.

a. Selection of bridgehead and selection of terrain objectives as considered necessary.

b. Selection of intermediate objective areas and terrain objectives as considered necessary.

c. Determination of requirements for and allocation of—

- (1) Assault forces.
- (2) Crossing means and crossing sites.
- (3) Army aviation, engineer, military police, chemical, and similar units.
- (4) Fire support.
- (5) Air defense support.
- (6) Special communications support.
- (7) Other combat service support.

d. Development of crossing plan, including operational times for rafts and bridges.

e. Development of air and surface movement plans.

f. Development of a training program.

g. Development, coordination, and integration of combat deception plans.

33. Planning Guidance

a. Planning is accomplished to insure that sufficient crossing means are available to the assault units for either a hasty or a deliberate crossing.

b. Over-concentration within the crossing area is avoided (para 66 through 78).

c. Planning must provide for early deployment of air defense artillery units to limit the effectiveness of enemy offensive air efforts to a level permitting freedom of action to friendly forces of all types. Consideration is given to night operations, extensive use of smoke, or timing the crossing to coincide with weather conditions which prohibit or reduce enemy air operations.

d. In internal defense and guerrilla warfare situations, combat support elements must be prepared to fire to the rear and flanks.

e. The enemy can be expected to attack the bridgehead as early as possible, usually by armored attacks aimed at the crossing sites. To counter this threat, antitank weapons are carried with the advance elements of the assault and air support is provided where possible. In this regard, positive plans and actions are necessary to speed an armor offensive capability to the far bank by fording or rafting as soon as the situation will permit.

f. Psychological operations plans provide themes and media to be employed against the enemy and the civilian population. Psychological operations means can also be used to support deception operations.

34. Hasty River Crossing

a. *Planning.* To support the concept of the hasty river crossing, plans should provide crossing means, fire support, and other necessary support to subordinate commanders. Plans should provide for rapid movement through the crossing area, rapid employment on the far bank, early commitment of suitable air defense artillery units for crossing site defense, and early commitment of an exploiting force. Plans should also allow subordinate commanders sufficient freedom to exploit success. The use of special weapons or airmobile units may be included to assist in the capture of bridges in-

tact. Special forces units and friendly guerrillas may assist in securing bridges or crossing sites for short periods of time. Plans should reflect the possibility that in a hasty river crossing all assault forces may not reach the river simultaneously. This can be done by decentralizing control of crossing means and allowing subordinate commanders to determine specific crossing times for their assault elements. Alternate plans should be prepared to take advantage of any bridges captured intact or other foreseeable changes in the situation. Alternate plans should be prepared for a deliberate river crossing, in case the hasty crossing fails or is determined to be infeasible.

b. *Execution.* Following the rupture of the enemy's defenses on the near bank, the approach to the river is made on as broad a front as possible and at maximum speed. Upon securing the crossing sites, raft and bridge construction is begun without delay. A damaged bridge can often be made usable by installing prefabricated

bridging. Considerations involved in raft and bridge construction are discussed in paragraph 54. The bulk of the assault units pass immediately through the crossing sites leaving minimum forces to secure them. The security elements of the assault force defending the crossing sites should be relieved early by successive elements. The hasty crossing should result in the rapid seizure of sufficient area to insure that the crossing sites are relatively secure from enemy ground action and direct fire.

35. Deliberate Crossing

A deliberate crossing requires development of detailed plans to optimize the employment of all the means available to the crossing force. Plans for a deliberate crossing generally provide for more centralized control of crossing means, fire support, crossing times of assault and support elements than for a hasty crossing.

Section IV. CROSSING MEANS

36. General

All available crossing means are used to achieve maximum speed in the crossing and to reduce criticality of any one crossing means. Crossing equipment includes assault boats, fording vehicles, amphibious vehicles, rafts, footbridges, floating bridges, Army aircraft, and special craft. The use of these items for a specific operation depends on availability, the characteristics of the river, the availability of constructing or operating personnel and security considerations. Fixed bridging may be used to meet special requirements but generally is not used extensively in the early phases of an assault crossing. Plans should include the use of any local means as well as the use of standard equipment. See appendix B for additional information on crossing equipment.

37. Amphibious Vehicles

Tracked landing vehicles and armored carriers are *preferred* for transporting the assault waves. Unarmored amphibious vehicles are preferred for crossing supplies and equipment.

Among the many types of amphibious vehicles which may be employed are armored personnel carriers, amphibious landing vehicles, amphibious reconnaissance vehicles, amphibious artillery, amphibious trucks, and amphibious lighters. The use of amphibious vehicles in general may be limited by site conditions. Entry and landing points must have gentle gradients and firm bottoms. Stream velocity is critical for certain vehicles. Noise may be a limiting factor for the use of amphibious vehicles in the assault. For details, types and capabilities, see appendix B.

38. Aviation

a. Aircraft provide a crossing means not directly affected by the severity of the river obstacles. Their use can contribute to the speed and success of the river crossing when used with other crossing means. Dispersion of units on the near and far banks can be enhanced through the use of aircraft. Normally, sufficient aircraft quantities and types will not be available to satisfy all requirements for river-crossing operations.

b. Air Force and Army aircraft may be used

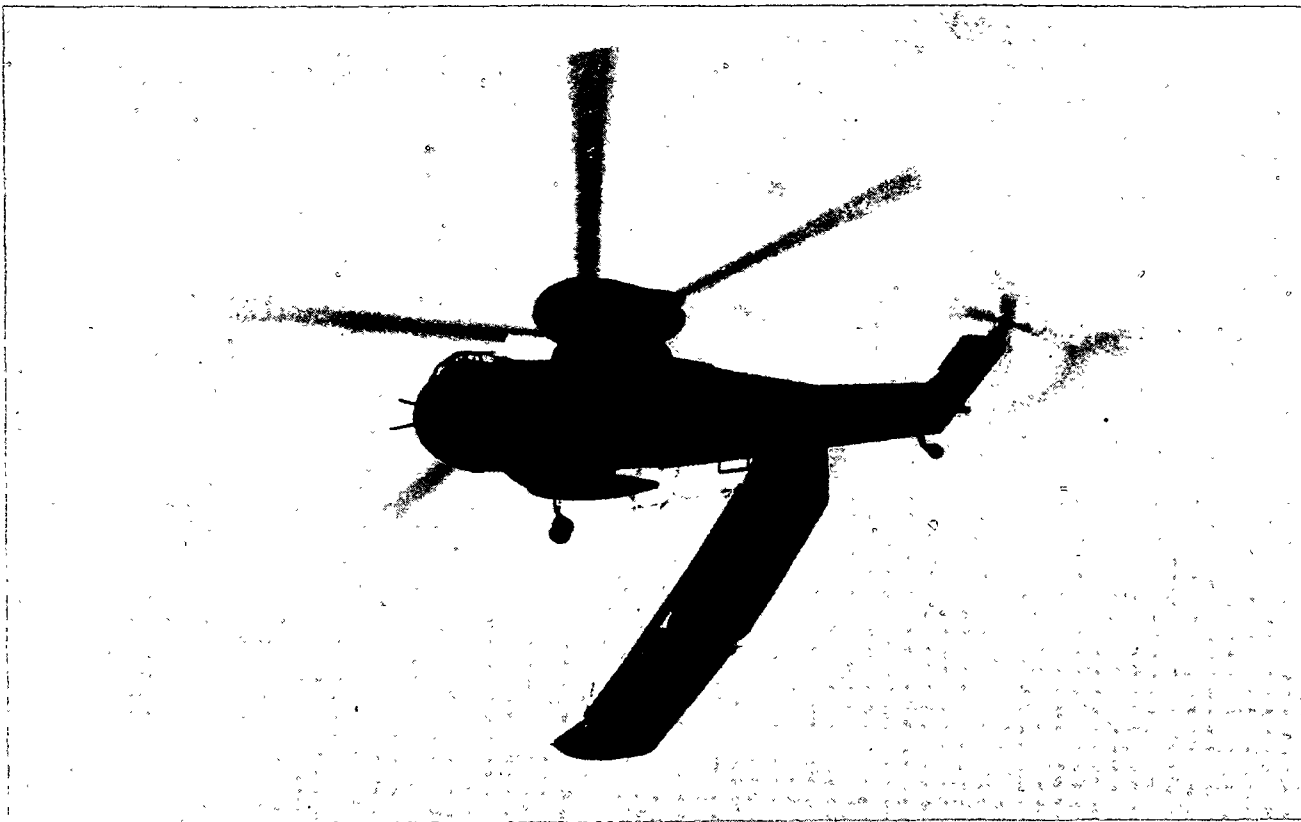


Figure 5. Helicopter lifting bridge float.

to cross troops, artillery, equipment, and supplies by airlanding or air delivery. Army aircraft will also provide support in accomplishing battlefield surveillance and reconnaissance, medical evacuation, aerial fire support, and aerial command and control. The external loading capability of helicopters provides additional flexibility in handling equipment and supplies. Preassembled parts of float bridge equipment may be air lifted into raft and bridge sites to expedite construction of these crossing means.

c. Army aircraft can also be used to establish an "aerial bridge" with loading/unloading points in the immediate vicinity of surface crossing sites. A single medium cargo helicopter operating at minimum altitude between landing sites can provide shuttle service across the river. An "aerial bridge" would be placed in operation when the tactical situation permits, normally when the advance on the far bank has eliminated enemy small arms fire and ground observation from the landing sites. Use of "aerial bridges" during the early hours of a

crossing facilitates emergency movement of personnel and cargo without disruptive changes in the crossing plan.

39. Assault Boats

a. Assault boats are used for the assault when sufficient quantities of amphibious vehicles are not available, or when the nature of the water obstacle and its approaches and exits preclude their use. The use of assault boats reduces the speed of the crossing operation and increases the period of exposure to enemy counteraction. Assault boats may also be used for silent crossings, feints, and patrols. See appendix B for details on the capabilities and use of assault boats.

b. When conditions require the use of assault boats to cross the assault waves the usual sequence is as follows:

- (1) Assault boats are sited in the attack position, or in an intermediate area between the attack position and the river.

- (2) The assault infantry moves, organized into boat teams, from assembly areas to attack positions.
- (3) At the designated time, engineer guides lead boat teams to the assault boats. Assault boats are carried by the infantry-engineer teams as near to the water's edge as conditions of cover, concealment, security, and surprise will permit.
- (4) At H-hour, the first assault waves moves to the river line, launches its boats, and crosses the river.
- (5) Sufficient assault boats are made available to accommodate the first and second waves. These two waves cross on schedule, succeeding waves cross on order. Assault boats return to the near bank when each trip is completed, continuing to operate until all units scheduled to cross by assault boats have been crossed.

40. Fording

Vehicles with built-in waterproofing, that have the ability of shallow fording, and vehicles equipped with deep water fording kits are preferred for crossing with the assault force. The use of these vehicles is dependent on the nature of the water obstacle. Fording site characteristics are discussed in paragraph 48.

41. Rafts

a. Because of their size and mobility, rafts are not as vulnerable as bridges to enemy fires. Rafts may be used to transport high-priority cargo across the river in the initial stage of the operation. Rafts provide a greater choice of crossing sites than bridges but may delay the building of bridges. On large unfordable rivers, rafts normally are the only initial means of crossing tanks and heavy vehicles. In later phases of the operation, rafts continue to cross returning vehicles and supplement the bridges. Raft sites are located downstream from bridges. Appendix B contains details on the transportation, construction, operation, and capabilities of standard rafts.

b. In operations subject to enemy observation and countermeasures, the initial use of dispersed rafts may be mandatory. However, rafts

alone cannot move traffic at rates normally required to support a rapid advance beyond the river. Rafts must be replaced or supplemented by bridging when the enemy observation or reaction has been reduced. See appendix E for further comparison of alternate crossing capabilities.

42. Assault Bridges

a. Bridges are placed in operation as soon after H-hour as enemy observation and direct fires are removed from the site. Time required for the assembly of bridging equipment and site preparation, to include construction of approaches, is an important consideration in determining when a bridge can be placed in operation. Data on the transportation, construction, operation, capacities, and limitations of bridges are given in appendix B.

b. It is desirable that each assault division have in its crossing front a minimum of two floating bridges capable of carrying division loads. After the bridgehead has been established, additional heavy vehicular bridges, either floating or fixed, are erected as necessary (normally by corps and army engineer units) and the division bridging equipment is released as soon as possible for use in support of the advance beyond the river.

c. Normal wear and tear and changes in water level necessitate constant maintenance of all bridges and their approaches. Local reserves of equipment and the necessary working parties are kept available. As it is often necessary to close bridges for temporary maintenance, the movement plan allows for traffic diversions. Floods and tides adversely affect the maintenance of floating bridges, particularly bridge approaches and abutments. Raft sites should be planned for use under such conditions. For effects of ice on float bridges see paragraph 105.

d. The engineers construct booms and nets upstream and downstream for protection of the bridges. Protective devices are covered by fire and by all-weather surveillance. TM 5-210 shows schematically some of the measures which can be taken to protect a bridge, and discusses their employment.

43. Control of Crossing Means

a. The commander at each echelon deter-

mines whether to keep the means for crossing under his control or to release control to subordinate units. Normally the commander of the division executing an assault crossing is provided control of the means needed to assure success of the operation. In a hasty river crossing, the actual assault division may release control of appropriate crossing means to the commanders of the assault brigades. Retention of control by corps would be justified only under exceptional conditions, such as in a deliberate crossing where elements of two adjacent assault divisions may be sharing crossing means located in the zone of one of the divisions. When initial control is by the assault divisions, provision is made for passage of control to corps as soon as the major portion of the assault division's units are across the river.

b. In a deliberate crossing, the construction of rafts and light bridges to support the assault

is normally initiated on order of the commander of an assaulting division. This authority may be delegated to a brigade commander in a hasty crossing. In a corps operation, the construction of heavy floating bridges normally is initiated on order of the corps commander but authorization may be delegated to a division commanders, particularly in a hasty crossing.

c. As the operation proceeds, the commander must exploit all available means to keep abreast of all aspects of the situation. Loss of equipment resulting from premature construction may lead to failure of the crossing and possible loss of major elements of the crossing force. Failure to initiate bridge construction early in the operation may result in delaying the advance beyond the river and allow the enemy time to reinforce with sufficient strength to delay seriously or prevent seizure of the bridgehead (para 54).

Section V. CROSSING SITES

44. General

Selection of crossing sites is based primarily on consideration of the physical characteristics of the available sites and adjacent areas, the capabilities of available crossing means, the availability of engineer effort, and the existing or anticipated combat situation. Conflicts between tactical and technical requirements are normal. The commander weighs all the factors involved and arrives at the best overall solution.

45. Physical Characteristics

a. The staff planner needs enough information on each potential crossing site so that he can evaluate the influence of a site on any proposed plan for crossing the river. In general terms, the planner needs to know the different types of crossing means that can use the site; the capability of moving troops, equipment and supplies by each of the crossing means; and the engineer effort required to improve and maintain the site to accommodate each of the crossing means. More specifically, the planner needs to know bank, bottom, and water conditions

of the river; concealment and cover available; availability of routes to and from the site; off-road trafficability; time and effort required to assemble rafts and construct bridges; capability to provide screening smokes and fire support; availability of defensible terrain beyond the river; friendly and enemy observation; and the presence of obstacles on both banks.

b. Potentially suitable crossing sites can be identified from maps, aerial photographs, aerial reconnaissance, strategic studies, hydrographic studies or similar sources of information. Whenever possible, ground reconnaissance is conducted to refine and confirm information gathered from other sources. FM 5-36 contains details on site reconnaissance.

46. Crossing Sites for the Assault Elements

a. The desirable characteristics of crossing sites for the assault elements are almost the same whether boats or amphibious vehicles are used in the crossing. Exit conditions, especially for the amphibious vehicles, are more critical than entry because less effort and equipment

can be deployed to improve exits prior to the assault. Each assault crossing site should accommodate a maneuver battalion, a battalion task force, or company teams.

- (1) The site should provide adequate maneuver space for the assault forces. Obstacles, tight boundaries, and defiles should be avoided. A crossing site is normally selected for each assault battalion. This site should provide sufficient space for simultaneous crossing and landing of at least two rifle companies. It is desirable that units be able to cross in a combat formation which will fit the scheme of maneuver on the far bank. Depending on the requirement for dispersion, a battalion crossing site may consist of only a few entry points or it may be a portion of the riverline 500-2000 meters long.
- (2) Suitable assembly areas and attack positions should be available if the crossing is to be made by infantry in assault boats. Mechanized forces should employ assembly areas well to the rear and will not normally use attack positions.
- (3) The site should be located near proposed raft and bridge sites. This will ease the problem of clearing the enemy from the raft and bridge sites early in the operation, facilitating early construction of rafts and bridges.

b. Desirable features include—

- (1) A site not heavily defended or fortified.
- (2) Ready access to a good avenue of approach to objectives on the far shore.
- (3) Dominating ground on near shore for artillery observation and for support by direct fire.
- (4) In nonnuclear war, a salient in the riverline toward the attacker of such size and configuration that its use can be denied the enemy by fire. Use of such an area may facilitate crossing

without being subjected to intense direct fires of the enemy.

- (5) Covered approaches to the river.
- (6) Existing routes leading to sites or easily constructed access routes from the existing road net to the site capable of handling amphibious and fording vehicles.
- (7) Minimal current.
- (8) Unobstructed water area.
- (9) Banks requiring minimum preparations for entrance and exit of amphibious fording vehicles.
- (10) A channel without sharp bends or constrictions where current is accelerated.
- (11) An area suitable for a raft site.
- (12) River bed composition and water depth that will permit deep water fording.
- (13) Landing zones on near and far bank adequate for airmobile operations.

c. A crossing conducted when amphibious vehicles are not available requires two additional features.

- (1) Concealment assembly areas within a reasonable distance of the site.
- (2) Suitable attack positions adjacent to the site.

d. It is desirable to eliminate as many stops in the flow of traffic as possible, particularly in nuclear and chemical-biological warfare. The necessity for occupying attack positions for any appreciable length of time is weighed against the enemy's target acquisition and delivery capabilities.

47. Raft and Amphibious Vehicle Crossing Sites

a. Raft and amphibious vehicle sites should be dispersed across the crossing front of an assault division. Dispersion of these sites should reduce the risk of losing more than one site (and the crossing units at the site) to a single enemy nuclear weapon. The use of dispersed sites should also cause the enemy to delay commitment of his reserves and force

him to disperse his forces and fires. Several rafts may be operated from each site.

b. Desirable features for raft and amphibious vehicle crossing sites include—

- (1) Short, easily constructed access and egress roads between the existing road net and the site.
- (2) Current velocity between 0 and 1.5 meters per second.
- (3) Stream free from snags, rocks, shoals, islands, bars, and other obstructions which hinder crossing.
- (4) Cover and concealment on both shores for vehicles or personnel waiting to be loaded or unloaded.
- (5) Banks requiring minimum grading for approaches and exits. A firm bottom for entering and leaving the water.
- (6) A narrow portion of the river to decrease round trip time and reduce exposure to enemy ground fire or aircraft.
- (7) Water close to the bank deep enough to allow loaded rafts to get close to the bank. If the water close to the bank is not deep enough, bottom conditions become critical. Soft mud will cause difficulty in retracting a loaded raft. Sharp rocks may damage pneumatic floats or puncture aluminum floats.
- (8) Minimal change in stream level.

c. Rafts should operate downstream from floating bridges if both are to operate concurrently. A raft which has lost its power may otherwise drift into the bridge damaging or destroying both the bridge and raft. As noted in paragraph 47 raft sites should be located in the vicinity of sites used for the assault crossings.

d. Rarely will all of the above site features be met. Any deviation from these features must be considered in the planning.

48. Fording Sites

A desirable fording site should have—

- a. Road nets on or near both shores.

b. Covered and concealed approaches to the water which have no overhead obstructions that would be obstacles to tanks with fording kits mounted. Conning towers may be pre-assembled, transported and mounted just short of the river bank if overhead obstructions exist.

c. Stream velocities less than 1.5 meters per second.

d. Unobstructed water area.

e. Suitable banks for entry and exit.

f. Water depth and river bed composition that will permit deep water fording. Maximum water depth of 13.5 feet; maximum mud depth of 2 feet.

49. Floating Bridge Sites

a. The conditions desired for floating bridge sites are similar to those for raft sites.

- (1) Consideration is given to using the approaches, abutments, piers and anchorages of demolished bridges. Anchorage is required for all but the mobile assault bridge. When a bridge is built at other than an existing site, the tasks of constructing approaches and the anchorage are normally longer and more difficult than the erection of the bridge itself. However, construction time may be increased when hostile artillery is registered on existing sites and their approaches are mined or cratered.
- (2) Areas for the temporary storage of bridge parts and for the possible pre-assembly of sections should be available on the near bank 1 to 5 kilometers behind the proposed site. Locations selected should provide concealment and, if possible, cover.

b. A floating bridge site should have—

- (1) Road nets on or near both shores.
- (2) Access roads requiring little preparation.
- (3) Banks firm enough to support the heaviest vehicles.
- (4) Stream current moderate and parallel to banks (0 to 1.5 meters per second).

- (5) Stream free of snags, sand bars, islands, shoals, and large rocks that would hinder crossings.
- (6) Stream bottoms in which anchors hold but do not foul.
- (7) Minimal changes in stream level.
- (8) Existing or easily prepared equipment assembly sites on near bank.

c. Rarely will all of the above site features be met. Any deviation from these figures must be considered in the planning.

50. Number and Type Sites Required

a. The number and types of crossing sites required for an operation vary with the forces participating, the magnitude of the river obstacle, the speed desired, enemy dispositions and capabilities, the scheme of maneuver, and the crossing equipment available.

b. The following is an example and should not be used as a formula. Consider a corps crossing where the frontage is 50,000 meters, the river is 300 meters in width, corps has 3,000 meters of bridging available, opposing forces have a nuclear capability, and corps plans to attack with two mechanized divisions abreast. Assuming each division crosses with two brigades abreast with two assault battalions abreast in each brigade, the following site selections might be made in each division crossing front.

- (1) Four battalion assault crossing sites.
- (2) Four heavy raft sites, with two or three rafts at each site.
- (3) Two to four floating bridge sites well dispersed across the front.

c. Appendix E contains an example of the tactical and technical evaluation of crossing sites.

Section VI. SUPPORTING UNITS AND OPERATIONS

51. Employment of Engineer Units

a. *General.* The engineer echelon for a river crossing operation is larger and more complex than for conventional offensive operations. Divisional engineers will be able to perform only a part of the required engineer tasks. Non-divisional engineers will be essential for all but the smallest crossings. An engineer brigade, consisting of several engineer combat groups, will normally support a corps in a river crossing.

b. *Division Engineer.* The role of the division engineer battalion commander as division engineer is particularly important in a river-crossing operation as in any special operation where additional engineers are required. His knowledge of divisional units and the division method of operation facilitates recommendations on location, employment, and strength of engineer support.

c. *Divisional Engineer Battalion.* The normal and preferred employment of the divisional engineer battalion is in providing engineer support to assault units on the far bank. Organic

engineer companies are either attached to or placed in direct support of the assault brigades. The preservation of the integrity of units and of unit association is particularly desirable for a river-crossing operation. The division engineer company which normally supports a specific brigade is habitually employed with that brigade. These companies are employed to breach obstacles on the far bank and to perform other engineer tasks necessary in maintaining the momentum of the attack. The battalion (-) is retained in general support. Initially, the remaining engineer companies may be assigned limited, short-term tasks on the near bank such as improving crossing sites, fords, and approach roads. They may furnish assault boat crews in some crossings. The divisional bridge company is employed to install rafts, particularly if equipped with MAB equipment. Heavy raft platoons or sections are usually attached to engineer companies supporting the assault brigades. All elements of the divisional engineer battalion should move across the river as early in the operation as possible, keeping the emphasis of engineer support well forward.

d. Engineer Combat Group (Corps/Army). An engineer combat group will normally support an attacking division in a river-crossing operation. The group may be attached to the division or placed in direct support of the division. The group itself is a headquarters which controls and coordinates various engineer units assigned to it. A typical group organization in support of a division in a deliberate crossing might be as follows:

Engineer combat battalions	3
Float bridge companies	2
Panel bridge company	1
Light equipment company	1
Dump truck company	1

- (1) *Engineer Combat Battalion (Corps/Army).* Engineer combat battalions are normally assigned the task of supporting the actual crossing and providing support on the near bank. A battalion may be placed in support of an assault brigade or given an area or task assignment. The engineer combat battalion relieves the divisional engineers of near bank support by performing road maintenance, road construction, raft and bridge construction, and providing crews for assault boats.

- (2) *Separate Companies.* Employment capabilities and equipment for the float and panel bridge companies, light equipment and dump truck companies are discussed in FM 5-1.

52. Military Police

a. The organic military police company of a division cannot provide all the military police support required by an assault division during a river-crossing operation. Nondivisional military police units from field army or corps resources should be attached to or placed in support of divisions to support river-crossing operations.

b. The division military police support the assault units on the far bank by establishing traffic control posts, controlling stragglers, removing or diverting refugees, and relieving capturing troops of prisoners of war. Attached military police usually are assigned traffic control tasks on both the near and the far banks in conjunction with division military police. Control of attached military police will pass to corps or other designated headquarters when division no longer requires their support.

Section VII. COMMAND AND CONTROL

53. Factors Influencing Time of Crossing

a. Construction Time. In nuclear, chemical-biological warfare, the time required for construction of bridges and crossing of essential combat vehicles may determine the time of attack. Bridges represent defile target zones but are necessary for accelerating crossing operations. In most situations, it will be necessary to construct and cross the bridge during the hours of darkness. The time of the attack should comply with this demand. In order to start construction of bridges at night, the attack must be started with sufficient time to insure that the engineers can begin and complete bridge construction during the hours of darkness. The rest of the night will be used to cross equipment and troops. Morning twilight should be used to disassemble the bridge.

Crossing operations can then continue during daylight by rafting on a wide front.

b. Concealment and Visibility. A crossing operation is best concealed from enemy fire and observation when it is carried out under cover of darkness or under conditions of reduced visibility such as smoke, fog, or rain. A quarter moon behind the attacker provides the best natural light conditions for the assault. On dark nights, use of artificial illumination enables the attacking force to marshal and start the assault, as well as to build rafts and bridges under conditions of comparatively good visibility. The use of lights for artificial illumination is carefully timed and tied into the overall deception plan so that the element of surprise is not lost. The importance of surprise which may be gained under the cover of dark-

ness or during conditions of reduced visibility is weighed against the loss of speed and control.

c. Inexperienced Troops. A dawn or daylight crossing under an area smoke haze is usually preferable when inexperienced troops are used in the initial assault because such troops may become disorganized and confused in darkness.

d. Nature of Terrain. Open terrain adjacent to the river facilitates the deployment of troops and equipment but offers little cover or concealment unless screening smoke is used. Conversely, closely wooded, and rough terrain impedes movement but affords cover and concealment. Thus, open terrain generally favors a night attack and closely wooded, or rough terrain favors a daylight attack.

e. Characteristics of River. Swift current, high banks, poor approaches, or tidal water with a mud bottom make crossings difficult. This is particularly true at night.

f. Enemy Dispositions and Capabilities. Since tank and aircraft operations are limited by darkness, bridges can be constructed and used at night and be relatively safe from air and armored attack. Manned aircraft air strikes can be expected at daybreak and at dusk. The accuracy of surface-to-surface missiles will not be limited by visibility. Lanes through mine fields on the far bank are best cleared under cover of darkness or during conditions of reduced visibility. Such conditions may be created by the use of smoke. ✓

g. Speed. Greater speed is possible when the crossing is made in daylight, but this is gained at the direct expense of concealment and surprise. The use of armored carriers, amphibious and fording vehicles, and aircraft for delivery of assault troops and supplies permits speed and surprise, with a resultant reduction in concentration required at the river line. In a night attack, the assault forces cross during darkness and use morning twilight to seize and consolidate the first phase objectives and then expand the bridgehead during daylight.

54. Ordering Construction of Bridges

a. The construction of rafts and light bridges is initiated on order of the commander exer-

cising assault control (normally the division commander in a deliberate crossing and a brigade commander in a hasty crossing).

- (1) The assembly of rafts can usually be initiated earlier than bridges due to their reduced vulnerability to enemy fires.
- (2) When confronted with a river 100 meters or more in width, the commander should order the installation of multiple raft sites. Assembly and operation of rafts should begin as soon after H-hour as possible. Thus, tanks, artillery pieces and air defense artillery automatic weapons may be crossed prior to the time bridges can be placed in operation.

b. The construction of heavy floating vehicular bridges is initiated on order of the commander charged with the river crossing, normally the corps or division commander.

- (1) When confronted with a river less than 100 meters in width, the initial advantage of speed in commencing operation of rafts may be more than offset by the greater efficiency of bridges which can be placed in operation in a short time.
- (2) Construction of bridges should begin as early as possible. Planning for the crossing places great reliance on both bridges and rafts (app E). In a major river crossing it may be desirable to restrict the use of rafts to the crossing of tanks, heavier artillery, air defense artillery, and other essential equipment during the early hours of the crossing. For this purpose, rafts can be used at separate raft sites to provide minimum vulnerability to nuclear attack.

c. The decision to order the initiation of bridge assembly is crucial and is based on an evaluation of the following:

- (1) Mission.
- (2) Combat, combat support, and combat service support required by forces on the far side of the river.

- (3) Amount of bridging available.
- (4) Availability of suitable deep water fording sites and tank units equipped to use the sites, to include underwater reconnaissance capabilities.
- (5) Accuracy and intensity of enemy fire to include nuclear, chemical-biological attacks on the crossing sites.
- (6) Risk of possible loss of the bridgehead if sufficient tanks and other combat

equipment cannot be crossed by rafting operations.

- (7) Destruction of enemy fire delivery positions prior to and early in the crossing.
- (8) The enemy's offensive air capability in the vicinity of the crossing sites.
- (9) Use of smoke and other means to obscure enemy air and ground visual observation and attenuate thermal effects of nuclear bursts.

CHAPTER 4

OPERATION PLANNING CONSIDERATIONS

Section I. FIRE SUPPORT

55. Scope

This chapter provides additional guidance on the planning and execution of a river-crossing operation. The sequence of discussion generally follows the order indicated in the planning guidance (para 32).

56. General

Fire support plans should provide for full utilization of all available means, including tactical air, naval gunfire, field artillery, air defense artillery, tank guns, and long-range infantry weapons. Use of nuclear weapons, toxic chemicals, smoke, and illumination should be considered. When surprise assault crossings are attempted, a preparation may not be fired, but detailed plans for on-call fires must be prepared.

57. Field Artillery

a. The fundamentals of organization for combat covered in FM 6-20-1 apply to employment of field artillery in support of river-crossing operations. Emphasis is placed on fire support to committed maneuver elements organizing to provide continuous and adequate fire support to committed maneuver elements during displacement of artillery units across the river.

b. Field artillery is positioned as far forward as practicable to support the scheme of maneuver including deception activities; to facilitate massing fires promptly in potentially critical areas; to facilitate rapid, uninterrupted displacement across the river; and to avoid creating lucrative nuclear targets. Night occupation of positions, rigid camouflage discipline, limitations on registration and radio communi-

cations, and coordination of patterns of fires with deception plans assist in achieving surprise crossings.

c. Early displacement of fire support units across the river is vital to a rapid advance beyond the river. Rapid displacement may be achieved by appropriate allocation of priorities on use of roads and in crossing schedules, use of aerial vehicles for displacement of light artillery, and exploitation of amphibious capabilities of light and medium artillery.

58. Fire Support Coordination

The principles, responsibilities, and coordinating measures enumerated in FM 6-20-1 are applicable to river-crossing operations.

59. Fire Planning

Fire plans should provide for—

a. Neutralizing enemy maneuver elements in the vicinity of crossing sites.

b. Neutralizing enemy fire support means by counterbattery fires and fires on observation posts.

c. Interdiction fires to limit movements of enemy reserves and to assist in isolating crossing areas.

d. Continuous direct support of committed maneuver elements.

e. Protecting against air attacks with priority to crossing areas.

f. Supporting deception plans.

g. Interdiction fires to assist in isolating successive objective areas and the bridgehead area as a whole.

h. Attacking targets of opportunity throughout the bridgehead area.

i. Supporting defensive operations that may be necessary during buildup within successive objective areas.

60. Air Defense Artillery

a. In river-crossing operations, priority is given to defense of crossing sites, equipment parks, and operations within crossing areas. In addition, protection against air and missile attacks must be provided for ground units, installations, surface traffic, Army aviation facilities and operations, and critical points in the road net.

b. The Regional Air Defense Commander will be fully responsible for and will have full authority in the air defense of his region. He will, however, normally delegate authority to field army commander(s) for control and operational employment of Army air defense means within the field army area. Detailed prior planning and coordination must be effected between the Army Force commander and the Air Force commander.

c. The Army air defense artillery commander is responsible for the preparation of detailed plans and the establishment of extensive coordination with the Air Force commander to provide the required air defense of the crossing areas. The Army air defense artillery commander will recommend priorities and deployment of the fire units to achieve the primary objective of limiting the effectiveness of enemy air offensive to a level permitting freedom of action to friendly forces of all types. Alternate

and dummy crossing sites selected will be included in the priority listing. He will also coordinate with the area air defense command, with the air defense elements of other U.S. services, and with allied air defense, as appropriate.

d. The organic air defense units of a division may not be sufficient to reduce the effectiveness of the hostile air offensive to a level to allow freedom of action for friendly forces of all types. Additional nondivisional air defense units may be required to defend the bridgehead and crossing areas from air attack. Full coverage must be furnished as in a vital area defense configuration.

e. Consistent with other requirements, air defense artillery should be positioned to minimize requirements for early displacement beyond the river. Crossing plans should provide for timely crossing of air defense units to support continuation of the attack. Further discussion of employment of air defense artillery and techniques for organic weapons is provided in FM 44-1 (para 89).

61. Coordination With Air Force and Navy

When a river crossing requires close air support, consideration is given throughout all phases of planning to the information and planning requirements of the Air Force. If the crossing operation is likely to involve the use of naval support, similar attention is given to the Navy's requirements. Army, Navy, and Air Force commanders and staffs exchange information, coordinate plans, and maintain close liaison.

Section II. CROSSING ECHELONS

62. Functional Grouping

For functional convenience and planning purposes, the river crossing force may be divided into five basic echelons. These are the assault, fire support, engineer, follow-up, and rear echelons. No command or operational control within echelons is implied nor is it intended to indicate a sequence of crossing. The composition varies with the combat conditions encountered.

63. Composition

a. Assault Echelon. The general makeup of assault echelon, as given below, is furnished as a guide. Based on the scheme of maneuver and the availability of various types of crossing means, the assault echelons are crossed in waves. The assault echelon may be crossed in amphibious and fording vehicles, aircraft, or assault boats. The organization of the divisions provides many options in the employment of brigades

and task forces to implement the desired scheme of maneuver. In addition to forces normal to offensive operations, the assault echelon may be composed of—

- (1) Amphibious vehicle units.
- (2) Engineer boat teams and guides.
- (3) Army aviation units.
- (4) Smoke generator units.
- (5) Tanks equipped with deep water fording kits.

b. Fire Support Echelon. Fire support is furnished by tactical air, and the normal ground fire support means. Normally, the fire support means of assault divisions are reinforced with corps and Army artillery units. Additional air defense means, other than surface-to-air missile units, which are not required with the assault echelon will accompany the fire support echelon.

c. Engineer Echelon. The normal engineer support for a corps includes two or more engineer groups and additional attachments of engineer troops from army when required. Engineer Amphibious Units, if available, may be used to support the crossing of major rivers. The engineer combat support provided by Engineer Combat Battalions (Army) and Engineer Amphibious Units allows the divisional engineers to continue uninterrupted close support to the assault units of the division.

d. Follow-Up Echelon. The follow-up echelon consists of reserve combat units, far bank engineers, additional field artillery, forward area air defense weapons, signal, and combat service support elements such as military police and medical units, as required for immediate support of the assaulting units.

e. Rear Echelon. The rear echelon is composed of combat service support elements and others whose missions are not directly affected by the river-crossing operation.

64. Missions to Units Within the Echelons

a. Units in the assault echelon establish themselves on the far bank with the mission of seizing intermediate objective(s), if necessary, and securing the bridgehead.

b. Units in the fire support echelon support the assaulting echelon.

c. Missions peculiar to river crossings assigned to the units of the engineer echelon include—

- (1) Reconnaissance, selection and marking fording, swimming, raft and bridge sites.
- (2) Removal of obstacles within and adjacent to the river.
- (3) Construction and maintenance of near-bank raft and bridge site approaches.
- (4) Construction and maintenance of foot-bridges.
- (5) Construction, maintenance and operations of rafts.
- (6) Construction and maintenance of vehicular bridges.
- (7) Construction and maintenance of near-bank and far-bank exits and entrances.
- (8) Construction and Maintenance of bridge protective devices.
- (9) Construction and maintenance of dummy bridges.
- (10) Operation of engineer amphibious vehicles.
- (11) Emergency defense of bridge and raft sites.

d. Units within the follow-up echelon support the advancing troops on the far bank. Specific missions may include—

- (1) Continuation of the advance by passing through or reinforcing the assault troops.
- (2) Completion of mopping up operations on the far bank.
- (3) Removal of far-bank obstacles bypassed by previous echelons.
- (4) Recovery, repair, or evacuation of amphibious carriers and fording tanks disabled in the water.
- (5) Assumption of responsibility for prisoners of war and civilian internees, refugees, displaced persons and other civilians in the area, and removing them from the bridgehead when necessary.
- (6) Recovery and evacuation of patients to the near bank.

- (7) Installation, improvement, and maintenance of signal communication across the river.
- (8) Reinforcement of the fires of artillery units in the assault echelon.
- (9) Provision of combat service support for assault troops on the far bank.
- (10) Ground and air defense of crossing sites.
- (11) Large area screening of crossing sites with smoke. Chemical smoke generator units normally accompany the assault or follow-up echelons and provide screening throughout the operation.
- (12) Traffic control on both sides of the river.

e. The rear echelon units continue normal operations. They cross the water obstacle in accordance with the crossing plan.

65. Employment of Echelons

a. Assault Echelons.

- (1) The assault echelon crosses the obstacle with speed and controlled dispersion, maintaining the capability of employing decisive combat power in critical areas. This assault may consist of surface assault forces crossing the river combined with airmobile assaults. Deployment in depth provides forces to maintain the impetus of the assault. The information and tactics of this element are governed by the following:

- (a) Troops available.
- (b) Fire support available.
- (c) Crossing means available; for example, boats, rafts, bridges, amphibious vehicles, fording tanks, self-propelled artillery with special flotation kits, and aircraft.
- (d) Enemy disposition and capabilities, to include nuclear or chemical delivery means, and air offense capability.
- (e) Visibility conditions.
- (f) Approaches and exits to and from the river and characteristics of the

river to include appropriate fording lanes.

(g) Scheme of maneuver.

- (2) The tactics of the surface assault forces are usually limited initially to several determined attacks at dispersed locations. The surface assault forces push forward rapidly on the far bank to gain room for maneuver against enemy positions, to secure the crossing sites, and to reduce vulnerability from enemy action.
- (3) Every effort should be made to cross tanks by fording as soon as the far bank is secured by friendly units from effective direct fire on the fording sites.
- (4) When airmobile forces are employed as part of the initial assault, the surface assault forces advance inland as rapidly as possible to link up with the airmobile forces. Speed is essential to keep the enemy off balance and seize the required area before they can reorganize and counterattack. Upon link up, the forces proceed to secure the bridgehead.

b. Fire Support Echelon.

- (1) The disposition and employment of fire support units present problems of a special nature. All fire support, except tactical and limited suppressive fires provided by armed helicopters, is usually from the near bank until such time as crossing facilities permit displacement of weapons across the river. Employment of Army aircraft, Air Force transport aviation, amphibious tanks and self-propelled amphibious artillery hasten the time at which weapons can displace and begin their fire from far bank positions. In general, fire support assists in—
- (a) Isolating the bridgehead area.
- (b) Neutralizing enemy opposition at the crossing sites.
- (c) Preventing enemy fires on the crossing sites.

- (d) Providing defense against air attacks.
 - (e) Supporting the combat deception plan.
- (2) The principles for the control of artillery do not differ from other offensive operations.
- (a) Artillery, tanks, and other fire support weapons are located as far forward as practicable to give maximum support to troops moving inland from the far bank and airborne forces landed inland have attached fire support units capable of being air transported. Artillery fires should be registered for the crossing. Interdiction fires to isolate the crossing areas should be delivered prior to troop crossings. If a surprise crossing is to be launched, care is taken not to change the pattern or to noticeably increase the fires. If the element of surprise is not a dominant factor, an extensive preparation may be fired prior to the initial assault. These fires are continued for a predetermined time or until a request that they be lifted is received from assault commanders.
 - (b) Counterbattery fire may assume greater importance in a river-crossing operation since the usable crossing sites in a crossing front normally are limited. This may result in canalizing the movement of units across the river at points known to the enemy. The enemy can be expected to place accurate fires on these crossing sites.
 - (c) Early displacement of fire support units across the river is vital to the rapid continuation of the advance and to the exploitation of the bridgehead. Some light artillery may be crossed by Army aircraft or amphibious vehicles or amphibious artillery may cross early in the assault. As rafts and bridges are placed in operation, tanks not equipped to ford and additional

medium and heavy artillery and air defense artillery are crossed.

- (d) Smoke may be used to obscure enemy visual observation, reduce the effectiveness of air strikes, and reduce the thermal effects from enemy nuclear weapons.

c. Engineer Echelon. The employment of engineer forces is derived from the mission of the assaulting force, availability of engineer troops and equipment, and technical characteristics of the water obstacle. The unit engineer is responsible for the technical plans to provide engineer crossing means for the supported unit. He determines the engineer assistance required and coordinates engineer support for the crossing. He maintains liaison with attached or supporting engineer unit commanders responsible for the accomplishment of specific tasks and coordinates their activities to best meet the needs of the crossing elements. When an engineer amphibious unit is employed, its staff is given the responsibility for technical planning and coordination of engineer effort. Plans for the deployment of engineers include arranging for parties to make early reconnaissance; to include underwater reconnaissance, establishing equipment parks as required, preparation of routes and sites as feasible, accompanying and following the initial assault elements to the river line, and commencing construction of rafts and bridges at the selected sites as soon as prohibitive enemy fire is removed. The large scale use of assault boats and footbridges is not required when the condition of the banks and the velocity of the stream are favorable, and sufficient quantities of Army aircraft and amphibious vehicles are available.

d. Follow-Up Echelon. The grouping of the follow-up echelon is arranged so that portions may cross at any time in accordance with changing conditions on the far bank. This is especially important in the selection and disposition of essential vehicles, weapons, and supplies to be crossed. Reliance is placed on rafts and bridges for heavy weapons and equipment and the bulk of vehicles and supplies. It is essential that the follow-up echelon is not crowded at the crossing sites on the near bank and that sufficient control is maintained to

insure proper dispersion in the bridgehead. This is achieved through a well-planned and

executed crossing plan and traffic movement and control plan.

Section III. MOVEMENT PLANNING AND CONTROL

66. General

a. In river crossings, as in all offensive operations, all movements, both surface and air, are planned and conducted to support the scheme of maneuver. Movement planning for a river crossing is complicated by the lack of crossing means early in the operation and the fact that the assault bridging is one way and constitutes a defile (app D). Movement plans are prepared to insure the delivery of troops, equipment, and supplies to the right place at the right time, and in the best formation and condition for accomplishment of the mission. Emphasis is placed on preservation of unit integrity, availability of cargo and units on arrival, and on speed of movement. Within these guidelines, movement planners should make the fullest use of transport means, crossing means, and road net, while minimizing concentration and congestion. To achieve all of these objectives, plans for movement must be detailed and flexible; control of movement must be positive.

b. Information in this section, with the exception of that on the crossing plan, pertains primarily to surface movement behind the area occupied by the assault brigades. Movement in the forward combat areas, as in all operations, is planned coordinated, and controlled by the commanders of the assault brigades.

c. For information on the preparation of air movement plans and control of air movements see FM 57-35.

67. Concept of Surface Movement Control

When a division is making an assault crossing, all surface movement of troops, equipment, and supplies over the river, within the division zone, is controlled from the division tactical operations center (TOC). Depending on the situation, this control is exercised through the commanders of the assault brigades, other unit commanders, the traffic headquarters, and the crossing area commanders.

a. During the initial assault, movement over the river is controlled through the assault brigade commanders. Control of movement behind these brigades is through unit commanders and the traffic headquarters.

b. Once the crossing areas are established, movement over the river is controlled through the crossing area commanders; movement within the areas of the assault brigades is controlled through the brigade commanders, and movement elsewhere in the division zone is controlled through unit commanders and the traffic headquarters. The crossing area commander controls traffic in accordance with the movement plans and crossing plan. Regardless of scheduling, vehicles move into the crossing area only on call of the crossing area commander.

c. The turnover of responsibility from the commander of the assaulting brigades to the crossing area commanders is by mutual agreement or by direction of the division commander. The decision as to when an assault brigade commander will relinquish control of the crossing sites to the crossing area commander depends on the situation of the brigade and on conditions within the crossing area. As the assault forces move forward, the traffic headquarters control movement beyond the crossing areas and up to the area controlled by the assault force.

d. Normally, corps assumes responsibility for control of movement over the river when the division rear boundary is moved to the far bank.

68. Crossing Plan

a. The crossing plan provides for the movement of the assault force during the crossing of the obstacle itself. This plan is based primarily on the scheme of maneuver, the availability of crossing sites and the availability and capability of crossing means. The crossing plan is developed in coordination with and concurrently with other plans, especially those concerned with surface movement to and from the

river, air movement, construction and maintenance of roads to and from the crossing sites, and the construction and operation of rafts and bridges (app D, E).

b. Specifically, the crossing plan provides for:

- (1) Delineating crossing areas.
- (2) Designating assault crossing sites and allocating crossing sites and means to assault elements.
- (3) Designating fording and amphibious vehicle crossing sites and allocating their use to various units.
- (4) Designating the number, type, capacity, location, and time of opening of raft and bridges to be constructed.
- (5) Allocating unit priorities for use of the crossing sites and crossing means.
- (6) Designating crossing area commanders and passage of control information.
- (7) Designating staging areas and engineer equipment parks as required.

69. Traffic Headquarters

a. Traffic headquarters is an operating and planning agency delegated authority to plan, schedule, route, and monitor the movement of traffic. During a river crossing when the movement of traffic has a direct and vital influence on the progress of the assault, the traffic headquarters should be collocated with the division TOC. Traffic headquarters must work closely with elements of the division general and special staffs, in particular the G3, G4, transportation officer, division engineer, signal officer, and provost marshal.

b. In a river-crossing operation, the traffic headquarters places priority on the following functions:

- (1) Assisting the division staff in developing priorities for movement and use of routes by elements of the division and its attached and supporting units.
- (2) Establishing and disseminating a provisional allotment of times and routes of movement to moving units.
- (3) Consolidating road movement tables prepared by moving units, scheduling highway movements, and preparing

the division road movement plan. The road movement plan is based on the crossing plan. See FM 101-5 for details of preparation and use.

- (4) Preparing the traffic circulation plan. This plan identifies the road net and includes classification of routes, directions of movement, bridge and raft capacities, other route restrictions, and locations of staging areas, holding areas, traffic control posts, engineer regulating points, and traffic regulating lines as required.
- (5) Monitoring the movement of traffic throughout the division area, exclusive of the crossing areas and forward combat zone.
- (6) As directed by the TOC, changing routes, schedules, or priorities and notifying unit or convoy commanders through command channels, if possible, or through traffic control posts.

c. The division transportation section provides the nucleus of traffic headquarters at division level. The section requires augmentation and support to operate the traffic headquarters. Additional movement and administrative personnel are needed. If individuals with the required skills are not available from the cellular units in TOE 55-500 or field army sources, personnel from within the division should be trained and used. The division signal battalion provides the traffic headquarters with communications support; the division military police company provides assistance in regulating the flow of traffic (para 72). FM 55-9 and FM 100-10 provide details of the operation of traffic headquarters.

70. Crossing Area Commander

The division commander designates a crossing area commander for each crossing area. He is primarily responsible for insuring optimum flow of traffic across the river within his area. He is vested with authority to exercise absolute control of the crossing means within the area and the traffic while located within the area (fig. 6). He insures that the crossing area is devoid of all except essential personnel and equipment and that there is no undue concen-

tration within the crossing area. He is responsible for designating dispersal areas within the crossing area. He is also responsible for defense of the area. The crossing area commander acts in close coordination with the division TOC, the senior engineer in the crossing area, and commanders of elements designated to cross within his area. The crossing area commander may be an assistant division commander in a critical crossing area. (Para 67 and 86 indicate further responsibilities of the crossing area commander.)

71. Traffic Regulating Line

A traffic regulating line is a control measure used to delineate areas of responsibility for traffic regulation and control as exercised by different elements of command (fig. 6). A traffic regulating line to supplement normal control delineated by unit boundaries may be established immediately to the rear of the reserve and trains areas of assault brigades to limit the brigade commander's responsibility

for traffic control to his rear. A traffic regulating line may be established on either side of the river to delineate the traffic regulation and control responsibilities of the crossing area commander. Other traffic regulating lines may be established to facilitate the control of vehicular density throughout the division and to indicate the forward limit of corps' area of responsibility for traffic regulation. Traffic regulating lines should be established along easily defined terrain features or manmade features.

72. Traffic Control Posts (TCP)

Military police at TCP's, within the area of an assaulting division, perform their normal functions of traffic control by enforcing traffic rules and providing information and directions. In a river crossing, these TCP's also assist in traffic regulation by reporting to traffic headquarters on the movements of units and convoys to make sure the schedules are being met. TCP's may also relay messages between traffic headquarters and moving units. Mobile TCP's

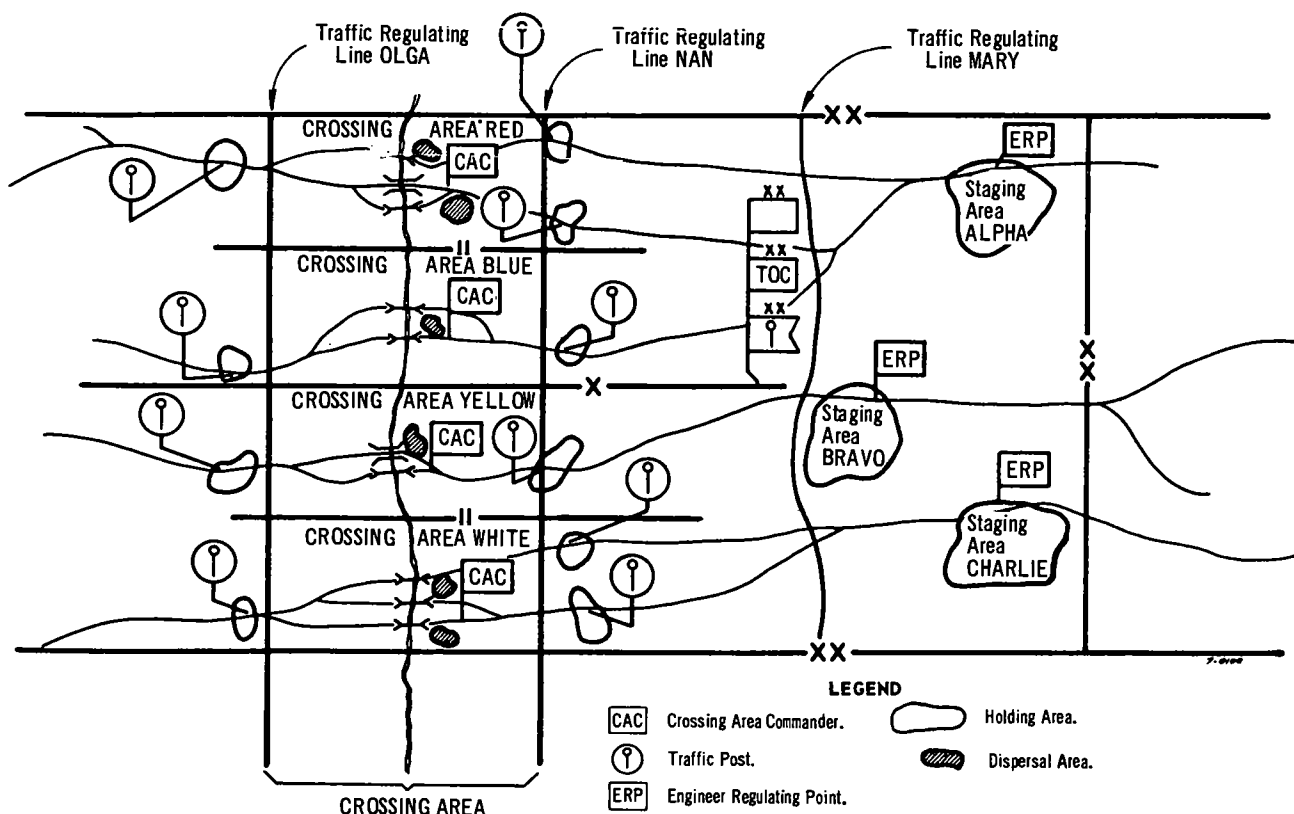


Figure 6. Traffic facilities for a river crossing.

patrol between the fixed locations. TCP's are located on both banks of the river in order to control and regulate traffic moving toward or away from the river and normally will be located at the following specific points.

a. Major crossroads and road junctions along the MSR and near division rear and lateral boundaries where uncontrolled entry of traffic from adjacent unit areas could interfere with division surface movements.

b. Principal entrances to and exits from staging areas.

c. Entrances and exits to holding and dispersal areas.

d. Critical crossroads and road junctions across the river and within or beyond crossing areas.

e. Engineer regulating points (ERP's).

73. Staging Areas

Staging areas are waiting spaces for vehicles approaching the river (fig. 6). They are located far enough from the river to facilitate rerouting and use of the alternate roads to raft and bridge sites. Areas selected for staging require cover and concealment, easy accessibility, and enough area for vehicle and equipment dispersion. Staging areas are normally for corps and army units that will support the division and cross in the division zone. Holding areas are designated by traffic headquarters in the traffic circulation plan.

74. Holding Areas

Holding areas are waiting spaces provided near crossing areas to handle vehicles in the event of a sudden interruption in the movement of traffic across the river (fig 6). Vehicles are moved into these areas and dispersed rather than having them stand on the roads and restrict the flow of traffic into crossing areas. Holding areas are normally sited just outside the crossing areas in locations with access to all principal roads leading to the crossing sites. Holding areas must be established on the near and far banks. Holding areas on the far bank may be used to temporarily hold and reassemble unit convoys which are utilizing various crossing means prior to

continuing movement. Depending upon the availability of terrain, these holding areas should be located so as to facilitate traffic into and out of the area consistent with the principal of maximum flow, minimum control. Holding areas are normally established and operated by military police as provided for in the traffic circulation plan.

75. Dispersal Areas

Dispersal areas are spaces located with crossing areas and along the roads leading to the bridge and raft sites. Dispersal areas provide space where vehicles can be halted and dispersed to avoid congestion on the access roads to the crossing sites when the flow of traffic has been disrupted or there is a reduction in the capability of the crossing means. The dispersal area detail operates under and is in constant communication with the crossing area commander (fig. 6).

76. Engineer Regulating Points

Engineer regulating points (ERP's) are locations in the vicinity of staging areas, holding areas, or crossing sites where technical checks are made to insure that vehicles crossing the river match the capability of the crossing means (fig. 6). Personnel at the ERP's also assist the traffic headquarters and crossing area commander in maintaining maximum traffic flow. The division engineer furnishes personnel to operate ERP's. ERP's with the crossing areas are controlled by the crossing area commander; all other ERP's are under the operational control of the traffic headquarters.

a. At ERP's outside the crossing areas, vehicles are examined to determine correct load classifications and to insure proper loading with respect to technique and dimensions. Most of these checks should be made at locations sufficiently far from the river to allow flexibility in routings of traffic and to prevent congestion that might occur if these checks were accomplished closer to the river.

b. At ERP's within the crossing areas, the load carrying capability of each of the crossing means is determined. This information is kept current and is disseminated to traffic headquarters and the crossing area commanders

when rerouting is required because technical difficulties or enemy action renders a crossing means inoperable or reduces its capacity. As required, vehicle checks are also made at these ERP's.

77. Engineer Equipment Parks

Engineer equipment parks are spaces reserved near bridge and raft sites for the assembly of engineer vehicles, equipment, and material to be used during the crossing operation. It is desirable that empty engineering bridge vehicles be moved away from the river and crossing areas on alternate routes to reduce vehicle density within the crossing areas. Location of equipment parks and staging areas should facilitate this movement.

78. Movement Control Techniques

Listed below are certain control techniques which, if used, will expedite the flow of traffic across the river.

a. Designating and marking certain vehicles and equipment such as command, communications, ammunition, and ambulance vehicles to insure high priority of movement on the road net and on the crossing means.

b. Plainly marking convoys with their priority and serial number.

c. Marking certain vehicles, such as those carrying class III and V supplies, to indicate their cargo.

d. Assigning an overall priority to each element scheduled to cross the river. This will assist in maintaining a proper order of movement if some of the crossing means are destroyed.

e. Restricting the flow of traffic returning from the far bank in the early stages of the operation. Essential returning vehicles or personnel should cross on rafts or be moved by helicopter.

f. Establishing alternating one-way traffic over the bridges only after movement to the far bank is adequate to meet the needs of the assault forces.

g. Establishing one-way routes and limiting types of traffic that is authorized to move to the rear during the various phases of the river crossing operation.

h. Notifying the civilian populace of movements and route restrictions. Leaflets, posters, and loudspeakers broadcasts may be used to disseminate this information.

Section IV. COMMUNICATIONS

79. General

a. In a river crossing, reliable communications are necessary for continuous coordination and for efficient employment of the large number and variety of supporting units peculiar to this type of operation. Close coordination and control of combat and combat support elements are essential. All available means of signal communications may be required to insure reliable contact. Communications security is an important consideration. The enemy must be denied the information he needs to react effectively and in strength against the crossing force when it is vulnerable to counterattack.

b. Communications planning is continuous and concurrent with tactical planning. The communications plan is developed to support the scheme of maneuver and should provide

for the use of multiple means. AM and FM radio, VHF radio relay, radio/wire integration, wire, messenger, and visual and sound signals all can be used to advantage in a river crossing. The final communications plan will include special wire and radio requirements for positive control of units during the crossing (app. D). Communications order are published in the signal annex to the operations order.

c. Prior to a deliberate crossing, the use of radio may be restricted for reasons of security and surprise. Maximum reliance will be placed initially on wire communication, supplemented by messenger. After the assault begins or during a hasty crossing, greater reliance must be placed on radio, visual and sound communications. Almost complete reliance must be placed on radio communications within the bridge-

head area during the assault. As soon as operations on the far bank permit, brigade signal teams and forward area signal centers should be expeditiously deployed across the river to reestablish normal command control communications. Wire installations are left in place and revert to corps control after the division has crossed the river. Further discussion of communications is contained in FM 11-, 24-, and 61-series field manuals.

80. Special Communications Requirements

a. Units having heavy communications traffic in a river crossing, such as engineer and military police units, require their own radio and wire nets. Communications are established and maintained between the crossing area commanders (CAC), the engineer and security units at the crossing sites, dispersal areas, the traffic control posts (TCP's), holding areas, the division TOC and traffic headquarters. The Division Signal Battalion provides communication equipment support for the crossing area commander.

b. Engineer units usually can control their own elements and enter the nets of supported units with organic communications equipment. Additional equipment required should be furnished by the divisional signal battalion. Military police elements operating traffic control posts can, with organic equipment, perform their normal function of traffic control. These elements will require equipment support to maintain contact with traffic headquarters in performing the function of monitoring the movement of traffic (para 69).

81. Communication Means

a. *Wire Communications.* Wire is more secure than radio, but less flexible, and should be used extensively as conditions permit. Units should establish and operate wire facilities when feasible. Normally sufficient telephone circuits exist between the forward area signal centers and division main by means of radio relay. Wire circuits are extended from the forward signal centers to provide direct access from division TOC and traffic headquarters to the CAC's and to key TCP's at holding areas

and crossing sites. If time permits, lateral lines are established between TCP's and between CAC's, providing greater reliability through alternate routing. Wire should be extended across the river at the earliest practicable time. The division wire capability should be augmented with wire teams from higher headquarters to install extensive wire system.

b. *Radio Communications.* Special movement control radio nets are required to serve as an alternate means to the wire system and to control and coordinate the crossing of units during the assault. Examples of special nets are—

- (1) *Crossing Area Commander's Net (FM).* This net should include the crossing sites within the crossing area, traffic control points, engineer units and dispersal areas supporting the crossing area, and major crossing units who enter the net while in the crossing area.
- (2) *Division Movement Control Net (FM).* This net connects traffic headquarters, acting as the net control station, with the division TOC, the Crossing Area Commanders, and the holding areas. Holding areas monitor the net, and enter as required.

c. *Radio/Wire Integration.* The division signal battalion should establish one or more RWI station(s) well forward on the near bank of the river as soon as possible after crossing operations commence.

d. *Messenger Service.* The crossing area commanders, attached engineer and military police units must be included in the scheduled messenger service. Special messengers, both motor and air, should be available for direct, priority communications which cannot be transmitted electronically.

e. *Airmobile Operations.* An airmobile assault may be conducted in conjunction with a river crossing. Airmobile operations require special communications planning to provide pathfinder, air traffic control, and link up communications. A further discussion of communications for airmobile operations is contained in FM 57-35 and FM 24-1.

Section V. CHEMICAL AGENTS AND ILLUMINATION

82. Chemical Agents

River-crossing operations provide opportunities for the effective employment of chemical agents by both the attacker and defender. Personnel taking part in this type operation must be protected against enemy chemical attack if a threat for such an attack exists.

a. The defender can use chemical agents to increase the barrier effect of the river obstacle. Nonpersistent chemicals are normally used against attacking troops concentrating prior to and during the crossing. Persistent chemicals may be used against likely enemy crossing sites, to complicate or to canalize his attack, and to delay the enemy attempt to cross the river.

b. The attacker can use chemical agents to assist in reducing the defender's ability to maneuver his counterattack force, and in denying the defender the use of concealed areas with good observation and fields of fire to the front or flanks of the crossing force. Nonpersistent chemicals may be used to cause casual-

ties, to confuse the enemy, and to complicate the river-crossing operation. Persistent chemicals are used to assist in protecting the flanks, to contaminate the most likely avenues of approach of enemy counterattack forces, and to contaminate enemy reserve positions. Chemical munitions employment concepts are discussed in FM 3-10.

83. Artificial Illumination

For a night assault crossing, artificial illumination may be used to disclose enemy positions; to blind the enemy; to assist maneuver of the assault elements, including airmobile forces; to facilitate adjustment of observed fires, or to deceive the enemy. In a night crossing where an effort is made to achieve surprise, artificial illumination should be used only after the assault is launched and surprise is lost. Construction of rafts and bridges at night can be hastened through the use of artificial illumination, if the enemy cannot take advantage of the exposure of this activity.

Section VI. SECURITY

84. General

In planning river-crossing operations, particular attention is given to flank protection, local defense of crossing sites and bridge equipment parks, clearance of enemy forces from the near bank, defense against air and missile attacks, combat cover and deception activities (para 90-96), and passive defense against mass destruction and mass casualty weapons.

85. Flank Security

a. During the advance to the river, requirements for flank protection are the same as in other offensive operations. Means of providing or enhancing flank security during the advance include aerial and ground surveillance, echelonment of maneuver units, retention of reserves prepared for rapid deployment overland or by airmobile means, use of follow and support elements to contain or destroy bypassed enemy

forces, denial operations using toxic chemicals, employment of tactical fighter aircraft or armed reconnaissance flights, prior planning for prompt fire support for units on the flanks, and advancing rapidly to disrupt enemy defenses, threaten his rear areas, and deny him time to mass forces for counteractions.

b. In hasty crossings, the advantages to be gained by maintaining the momentum of the attack may justify accepting greater risks and employing relatively small forces to protect the flanks of the crossing force, but the danger of defeat in detail when elements of the force are separated by a major obstacle must be considered. In deliberate crossings, forces on the flanks must be strong enough to repel or stop enemy attacks while the crossing force is astride the river. Flank security forces may be reduced when friendly adjacent or following forces are disposed to provide prompt assistance in neutralizing enemy attacks.

86. Crossing Sites and Bridge Equipment Parks

a. In addition to the normal requirements for local security, crossing sites and bridge equipment parks must be defended. Rafts and bridges at the crossing sites need protection against ground and air attacks as well as waterborne hazards such as floating mines, river craft, swimmer demolition parties or similar devices which could destroy the crossing means. (TM 5-210 contains details on systems to protect the bridge against waterborne hazards.) The importance of bridging equipment to the success of the operation requires that the equipment be protected even before it is placed in the river.

b. Initially, the assault forces provide local security of the crossing sites (para 18). Follow and support units relieve the assault forces of this responsibility as soon as possible. When responsibility for a crossing area passes from the commander of an assault brigade to a crossing area commander, the latter assumes responsibility for defense of the sites within his crossing area. Eventually, when the bridgehead is secured, the crossing sites are, in effect, secured from enemy counteraction by all of the crossing force on the far bank. For details on air defense of the crossing sites see para 60 and 89.

c. The crossing area commander develops his basic defense plan using the forces available in his area on a continuing basis. These forces are primarily the nondivisional engineer units working on or along the river. The crossing area commander may, on an emergency basis, also make use of forces passing through his area. Should the situation warrant, combat elements would be provided to assist in the defense of the crossing sites. Plans provide for field artillery support and air defense of the crossing area and arrangements are made for other combat and combat service support. Means are provided for direct communications between the commander of the crossing area defense and the corps artillery fire direction center, particularly after divisional artillery has crossed the river. Every means, to include smoke, is employed to prevent the enemy from delivering accurate fire on the crossing sites.

87. Clearing the Near Bank

In a deliberate crossing, the crossing force may clear the near bank of enemy forces prior to the assault of the river. In a hasty crossing, the near bank of the river may not be cleared before the assault forces move across the obstacle; emphasis is placed on sustaining the momentum of the attack and crossing where enemy opposition is weakest. In all crossings, assault forces should clear the near bank of any enemy forces that could seriously interfere with accomplishment of the mission. To the extent feasible, assault forces engaged in a hasty crossing should also secure their flanks and the crossing sites until relieved. A follow and support unit may be assigned the mission of holding and clearing the near bank.

88. Mopping Up

Mopping up on the far bank of the river is carried on concurrently with the advance inland. Since assault units must maintain the impetus of the attack, the task of mopping up is usually assigned to specific units of the reserve or follow and support units (para 27). If circumstances require elements of the assault echelon to mop up, provision is made for their relief as soon as possible. Mopping up tasks may be assigned to organic or attached reconnaissance units. This responsibility must be specifically assigned in orders.

89. Defense Against Air and Missile Attacks

a. All crossing areas must be defended from air and missile attack. Bridge sites are particularly susceptible because of their static nature and importance. Smoke may be used to provide concealment during assembly, erection, and after the bridge is placed in operation. However, smoke may impair the effectiveness of visually directed weapons.

b. The importance and large volume of fire potential of organic automatic weapons and small arms when used against low flying, hostile aircraft cannot be overlooked in providing air defense protection of river-crossing operations.

c. Commanders should plan to employ both active and passive measures for defense against air attack. Active air defense means include attached Army air defense artillery weapons, organic automatic weapons, and small arms. Passive air defense means include dispersion, cover, concealment, camouflage, deception and mobility. Vulnerability to air and missile attack is reduced by night movement and use of smoke to conceal preparations, equipment, and crossing operations.

d. Automatic weapons are particularly effective for river-crossing operations and will be deployed well forward, on the near side, at the earliest opportunity to provide depth of air coverage on the far side during the crossing and buildup of troops and vehicles. Particular attention is given to the low altitude attack, since the river is a likely avenue of approach for this form of attack. The Hawk missile sys-

tem was specifically designed to counter the low altitude threat. If sufficient fire units are available, they should be employed along the probable routes of approach, however, 6400 mil coverage is also desirable. Again in the crossing plan, provisions are made for early crossing of appropriate air defense units to provide continuous air defense in support of the exploitation phase.

e. Rules of engagement must be formulated and outlined in unit SOP's for the employment of individual, crew served, and other organic weapons capable of being used against hostile aircraft. Commanders must insure that timely use is made of the SOP and that related techniques have been reviewed during training and rehearsals for the river-crossing operations (app C).

f. Detailed discussion of air defense tactics and weapons is contained in FM 44-1.

Section VII. COMBAT COVER AND DECEPTION

90. General

a. Employment of all types of combat deception measures in river-crossing operations is emphasized. Judicious use of deceptive measures assists the commander in achieving maximum surprise, causes the enemy to redispense his forces in a manner which favors the crossing operations, and protects friendly forces and river-crossing equipment.

b. Combat deception is a continuing action carried out by all echelons of command. Deception measures deserving of special attention in river-crossing operations are concealment, use of feints and demonstrations, smoke screens, communications security, and careful timing.

91. Combat Cover and Deception

a. Combat cover and deception measures are employed to deny the enemy accurate knowledge of the composition and activities of friendly forces and to deceive him as to the disposition, movements, composition, and plans of the crossing force. In a river crossing, special emphasis is placed on concealment, the use of demonstrations and feints, and the timing

and coordination of all deception activities. Major deception activities are conducted only on the authorization of the crossing force commander except that in a hasty crossing, a division or brigade should be given authority to conduct certain activities such as local feints and demonstrations.

b. Concealment of troops and equipment is essential during preparation for the crossing. Areas selected for troop assembly, fire support positions, supply storage, and parks for equipment and vehicles should be in concealed locations as far back from the river as permitted by the mission and time required to move to the river. When feasible, necessary movements of equipment and personnel should be conducted at night or during other periods of limited visibility, and all movements should be coordinated with the deception plan. Natural concealment should be improved through the use of camouflage and, when practicable, smoke (para 94).

c. *Demonstrations.* Demonstrations in support of a river crossing are made in areas away from those used in the actual crossing. Demonstrations should duplicate activities

normally associated with a river-crossing operation. Examples of these activities are—

- (1) Movement of troops into forward assembly areas or attack positions.
- (2) Movement of weapons and equipment such as tanks, artillery, air defense weapons, and engineer equipment into forward areas.
- (3) Delivery of chemical and nonnuclear fires into areas where no decision is sought.
- (4) Friendly air activity and the use of smoke.
- (5) Employment of special deception units.
- (6) Employment of psychological operations media, such as leaflets and loud-speaker broadcasts.
- (7) Use of friendly guerrilla forces to conduct diversionary operations.

d. Feints. Feints in the form of limited objective attacks across the river may be used to cause the enemy to delay commitment of his reserves, to disclose his dispositions, or commit them prematurely or in the wrong area. Feints may be so planned, timed, and executed that if the feinting troops gain a decided advantage, their success can be exploited. Feints are conducted on the authority of the crossing force commander.

e. Ruses and Displays. The use of dummy positions and equipment, establishment of false radio nets, and employment of sonic or electronic simulators may be useful in misleading the enemy as to the time and place of the crossing.

f. Plans. Tactical cover and deception plans are prepared for both hasty and deliberate crossings. Within these plans all of the cover and deception activities are integrated so that the total picture presented to the enemy will induce the desired reaction. Plans for a deliberate crossing usually will be more detailed and involve the use of more means than plans in support of a hasty crossing.

92. Concealment and Camouflage

Concealment and camouflage are essential during assembly of troops and equipment and preparation for the crossing. Concealed assem-

bly areas, supply storage areas, and equipment and vehicle parks help achieve surprise. Fire support elements may occupy concealed positions before the crossing if this can be done without compromising security. When artillery registrations are conducted, they should not be so localized that they reveal the location of planned crossing sites. Concealed locations for all the activities are selected as far back from the river as permitted by the mission and time required to move the troops and equipment to the river before H-hour. Troops, equipment, supplies, and vehicles are ordinarily moved during darkness. There is a minimum of activity in crossing areas during daylight. Ordinarily the bulk of the fire support elements move into positions during the night before the crossing. Whenever practicable, smoke is used to screen the preparatory work on the near bank by means of large area haze-type screens, supplemented as necessary by obscuring smoke screens laid on hostile observation posts by mortars, artillery, or tactical air (fig. 7).

93. Dispersion

a. The total requirement for personnel in a river-crossing operation and the required concentration of essential units close to the river create a serious troop density problem. Careful planning is necessary to minimize the vulnerability of the entire force with respect to enemy use of nuclear weapons and with special emphasis on the assaulting elements and supporting forces in the vicinity of the river.

b. When designating units to move close to the river early in the operation, consideration is given to the ability of the unit to perform its mission and the dispersion. Only those units that must be close to the river to perform their missions should be moved forward.

94. Smoke

a. Smoke may be used to conceal preparations for the crossing, the crossing itself, and to assist in the deception plan. Skillful use of smoke confuses the enemy and may cause him to shift his fires to unremunerative targets and to commit his reserves against other than the principal crossings. Smoke may be used in conjunction with feints and demonstrations to con-

ceal the forces involved or to present an appearance of an activity which does not actually exist. When deception is desired, smoke is maintained in extent and density with that employed in the actual area of operations (fig. 7).

b. The use of smoke to obscure enemy air and ground visual observation of troop and equipment assembly areas, weapons positions, combat service support installations, crossing means, crossing sites, and objectives to be seized by the airmobile assault aids in providing security for the crossing. Smoke also attenuates the thermal effect of nuclear bursts which may dictate an increased use of smoke during nuclear warfare. (See FM 3-50 for smoke operations.)

c. Whenever haze or blanket smoke is used, it is desirable to position generators to provide 360 degree coverage of the area to be smoked. To provide this coverage early in the operation, smoke units may be required to cross with the assault force. If practicable smoke generators should be in position before the need for smoke develops.

d. Due to the limit smoke places on visibility, assault units which are to move through a smoke screen must determine azimuths over which they are to proceed and the artillery must fire registration and preplan fires before smoke is used. Smoke may also impair the effectiveness of visually directed air defense weapons.

e. The use of smoke is coordinated and controlled by the commander charged with the river-crossing operations.

f. Some other factors considered in using smoke are—

- (1) Adverse weather conditions, especially high winds, may nullify the use of smoke. The commander needs accurate weather forecasts. Smoke generators and smoke pots are sited to take maximum advantage of prevailing and predicted winds on actual and dummy crossing sites.
- (2) The size of the area covered by smoke should exceed that actually required for the preparation and assault. Smoking only small areas may assist

the enemy in massing artillery fires and directing air strikes on likely areas concealed by smoke. A large area serves to confuse the enemy as to the intended site of the crossing and permits a maximum amount of dispersion.

- (3) The demands of friendly ground and air observation may conflict with the need for denying the enemy observation. Target areas for air strikes and landing areas for airmobile forces should be clear of smoke at the right times. The allocation of "smoke" and "nonsmoke" periods may solve this problem and help confuse the enemy.
- (4) The smoke should cause minimum interference with operations of friendly flank units.
- (5) The means for area screening should be established early on the far bank. If practicable, smoke generators should be in position before the need for screening develops.
- (6) The reactions of the enemy to the smoke and his resulting countermeasures should be observed and taken into account.
- (7) Periodic checks for the adequacy of the smoke should be made from the air. For haze-type smoke, aerial observation is the only effective means for checking.

95. Timing

a. Timing and integration of the measures discussed above into the deception plan is important. A detailed schedule for each phase of the plan is necessary. To be effective, various measures are employed in combination with other measures to provide realism. For example, the use of sonic simulators to portray tanks moving into an area is combined with radio activity and dummy tanks. The initial activity precedes the actual assault by sufficient time to permit enemy reaction. Too much time intervening between the deceptive action and the actual assault assists an alert enemy to determine the nature of the threat and move his forces to oppose the crossing. To accom-

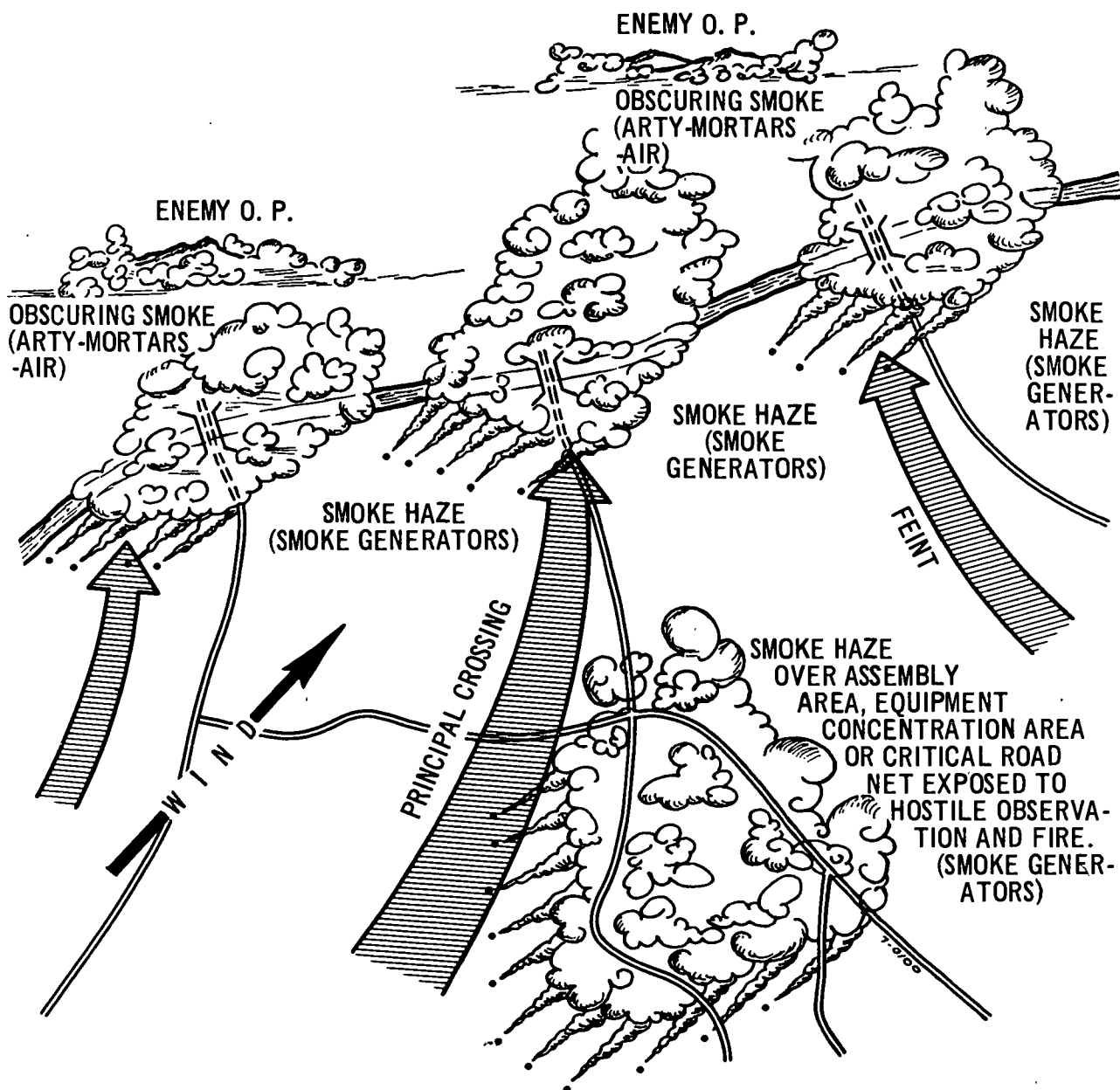


Figure 7. Smoke screens used for concealment and to deceive the enemy as to the exact location of the crossing.

plish its purpose, the deception plan must induce a desired enemy reaction.

b. If the operation is of such a large scale that there is great activity in the selected crossing areas on the near bank, the appearance of similar activity may be duplicated at other points along the crossing front. All activity on the near bank and demonstrations along the river are carefully timed to cover the movement of troops and equipment, registra-

tion of fires, preparatory near bank reconnaissance, and work for the actual crossing.

96. Electronic and Communications Deception

Prior to a crossing, electronic, wire communications and communications deception may be used to assist in obtaining surprise as to the time or place of crossing (FM 24-150 and FM 32-10).

Section VIII. TRAINING AND REHEARSALS

97. Training

Combined training of the various units participating in the initial assault is desirable. During this training period units should bring their equipment to a high state of readiness, complete their basic load, and prescribed loads of supplies. An example of a typical infantry division training program for a river crossing is contained in appendix C. Over-Water Safety Procedures—appendix B.

98. Rehearsals

Rehearsals, based on the actual operation and logistical plan, improve coordination between the troops making the crossing and all supporting troops. Where possible units draw special equipment required to conduct the crossing and train in the use of this special equipment.

CHAPTER 5

COMBAT SERVICE SUPPORT PLANNING AND EXECUTION

Section I. BASIC CONSIDERATIONS AND SUPPLY PLANNING

99. Basic Considerations

a. Combat service support planning for a river-crossing operation is generally the same as for other types of offensive operation. Emphasis is placed on insuring continued combat service support during the period that assault forces are separated from their support installations by the river and minimizing congestion in the crossing area. Planners should anticipate and plan to counter the effects of losses of supplies, equipment, and key personnel; delays in rafting operations and bridge construction; enemy interference with both surface and air movements in rear areas and in crossing areas; limitations on two-way traffic on roads; and changes in weather conditions.

b. Maintenance should be expedited in preparation for crossings, and mobile teams should be available in crossing areas to accomplish emergency vehicle repairs and minimize the probability of vehicles becoming inoperative during rafting operations or while crossing bridges.

c. River-crossing operations require special considerations for supply, medical support, and use of transportation means.

d. For a passage of lines, maximum use is made of the combat service support facilities of the unit being passed through.

e. River-crossing operations require that the combat service support installations be echeloned forward to support the operation for the longest period without displacement after the attack is launched. Support then can be given continuously to maintain the momentum of the attack.

f. The principal consideration in locating the combat service support installations is the ability of the individual installations and activities to perform their assigned missions. After that, dispersion and defensibility are considered. Defensibility must be balanced against the dispersion necessary to preclude simultaneous destruction of adjacent installations. Although dispersed logistic installations do not normally present lucrative targets for nuclear or chemical weapon attacks, these installations must habitually employ passive defense measures to reduce exposure and vulnerability to such attack. These passive measures include—

- (1) Dispersion between installations consistent with the ability to perform their assigned mission and to satisfy requirements of local defense.
- (2) Taking maximum advantage of terrain (cover and concealment).
- (3) Avoiding the locations that are near or adjacent to likely nuclear or chemical targets.

g. See FM 54-2, FM 101-5 and FM 100-10 for further details of combat service support procedures and responsibilities. See also appendix D.

100. Supply Planning

a. As soon as the situation permits, critical supplies required by the assault forces are delivered to the far bank of the river. In the early stages of the operation, airlift can carry much of the supply tonnage to distributing points established on the far bank. Army aircraft may be used to air drop critically needed

supplies into the bridgehead or to deliver air-landed supplies across the river. Additional supplies can be transported across the river by assault boats, rafts, or amphibious vehicles; supply can be accomplished through the use of preloaded vehicles that cross by air, rafts, or bridges as soon as practicable after the initial assault.

b. Plans provide for—

- (1) Increased quantities of class V for preparatory fires and the assault. Units crossing the river should cross with basic loads intact. Ammunition supply vehicles must have a high priority in movement plans. Because of the high rate of fire peculiar to automatic weapons, plans must be made for their resupply of ammunition based on the expected intensity of the air battle. In the early stages of a river-crossing operation, mobile class V distributing points may be established on the far bank.
- (2) Early establishment of supply storage areas or distributing points and means for their control on the far bank.
- (3) Minimum stock levels of critical supplies adequate to insure continued operation in case of interruption of traffic crossing the river.

- (4) The buildup and control of stock levels to support further offensive operations.
- (5) Prompt alleviations of critical supply situations which may occur. Since stock control may be lost in the distributing points in the bridgehead, alternate procedures such as resupply from rear facilities may be more rapid.
- (6) A reverse in engineer equipment is necessary to insure that the vital river crossing means are kept in operation. Reserve stocks of engineer class IV bridging material should be placed in equipment parks in the vicinity of bridge and raft sites.
- (7) One or more class III distributing points in the bridgehead to be established promptly. The size of this supply point depends on the number of vehicles employed in exploiting the bridgehead and on the requirements of later phases of the operation. Mobile fuel tankers should be given a high priority in crossing the river on rafts and bridges. Considerations may be given to the use of temporary small diameter pipeline and hoseline systems to serve the far bank.

Section II. MEDICAL SUPPORT

101. General Considerations

All medical personnel organic to units crossing the river will cross with their supported units. Combat battalion aid stations are established in the bridgehead as early as possible. Division medical battalion ambulances accompany medical platoons of the assault battalions whenever feasible to expedite evacuation. Designated boats, rafts, amphibious vehicles, and aircraft are used to evacuate patients from the far bank early in the operation. In guerrilla warfare, particularly in internal defense operational environments, air evacuation may be the main means used to evacuate patients from

both the near and far banks. Detailed medical considerations are in FM 8-10 and FM 8-15.

102. Clearing Stations

Division clearing stations and supporting hospitals are sited to cross the river as early as practicable. Echeloned displacement or the leapfrog technique may be used to displace clearing stations. The nature of a river crossing dictates decentralization of control of medical means. The clearing stations prepare to care for an overload of patients pending the resumption of normal evacuation to supporting medical installations.

Section III. PRISONERS OF WAR AND CIVIL AFFAIRS

103. Prisoner of War Control

Prisoners of war are evacuated from the bridgehead area using available secondary crossing means. A division prisoner of war collecting point is normally established on the near bank of the river sufficiently far to the rear to prevent interference with combat operations and river line activities. Normal prisoner evacuation and interrogation procedure is re-established when the division prisoner of war collecting point moves to the far side of the river. Maximum use is made of returning transportation.

104. Civil Affairs

a. Rigid control of the movement of civilians is necessary. Civilians living in the near-bank area and those living in the bridgehead area are kept in place unless particular requirements of the situation necessitate evacuation of limited areas. Refugees and local civilians, if necessary, are quickly moved away from the river to designated areas in the rear of the staging areas. Displaced persons will be moved from the area as soon as the tactical situation permits. Civilians are not allowed to assemble along the far bank of the river during movement from the fighting zone to the rear. They are crossed promptly by planned evacuation routes. It may be necessary to establish foot bridges or light rafts to insure their rapid passage to the rear. Separate routes are established and controlled to avoid congestion of main troop

and vehicular routes. Civilians are not allowed to cross the river from the near bank to the far bank or to move along the river line. The relatively limited area of the bridgehead and the concentration of combat units within the bridgehead may require partial or total evacuation of civilians. The enemy can be expected to use the civilians as an obstacle to operations within the bridgehead. The following special considerations may apply in control of civilians during a river-crossing operation.

- (1) Security screening of civilians should be accomplished prior to evacuation in order to prevent espionage or sabotage of crossing sites.
- (2) The use of civilian vehicles for evacuation will further congest the crossing areas. FM 41-10 provides guidance for control of civilians.

b. In internal defense situations, care must be exercised that river-crossing operations interrupt as little as possible the economic activity of the local area. Restrictions imposed must be explained, possibly by use of psychological operations media, and they must be lifted as soon as possible. Leaflets, posters, and loud-speaker broadcast operations can assist in the control and movement of the civilian population. It is essential that goods move to markets and that governmental internal security, economic, social, psychological, civic, and intelligence services continue with minimal interruptions during the river-crossing operation.

CHAPTER 6

SPECIAL CONSIDERATIONS

Section I. SPECIAL CONDITIONS

105. Cold Weather Conditions

a. Ice often complicates stream crossings. Assault boats, conning towers of fording tanks, and amphibious vehicles are vulnerable to floating ice and may be damaged if forced through ice layers. Normal floating bridges require protective measures to prevent damage to their floats.

b. Ice has a disastrous effect on floating bridges unless the flow of ice under the bridge is carefully controlled. Blocks of ice may be passed under and between the float supports if the blocks are broken into small chunks and pushed under the bridge. Explosives are used to break up ice jams. Construction of floating bridges should be avoided when ice is "running" on a river.

c. Ice bridges can be used under certain conditions such as crossing open channels having a slow-moving current if the ice is thick enough. If the ice is weak or there is open water, it is often more economical and time saving to clear the ice with explosives and use standard floating bridges. Special precautions are necessary near the edge of ice and open water. Floating bridges should be removed before the spring break-up. Detailed information concerning reconnaissance for ice bridges and tables for carrying capacity of ice are contained in FM 31-71 and FM 5-36. See FM 31-72 for stream crossings in mountain operations.

106. Swamp Areas

Swamps present particular problems to an attacking force. Most vehicles and heavy equip-

ment are limited to the main routes of communication. Standard bridges are used to close gaps in the main lines of communication. As in the case of defiles, the speed of the advance over the restricted number of routes through the swamp is increased if possible. See FM 5-29.

107. Causeways

Causeways leading in the direction of advance constitute defiles. Causeways are ordinarily encountered either across swampy areas or in shallow flooded areas. The enemy may destroy the causeway forcing the attacking troops to assault the far side of the breach. Capture of the causeway may be accomplished by the rapid advance of forward units. Airborne or airmobile units may be dropped on the far side to prevent destruction of the causeway. Forcing a crossing through the swamps or flooded areas surrounding the causeway require special equipment such as shallow draft boats. An operation of this type is similar in many respects to the crossing of a wide river.

108. Very Wide Rivers

Very wide rivers present specialized crossing problems. Such crossing operations may have a pattern similar to amphibious operations and differ from ordinary crossings in that greater emphasis is given to special equipment, training, and large-scale rehearsals. See FM 31-12.

a. In addition to normal crossing means, barges and other river craft are usable in crossing very wide rivers. Barges may be weighted, sunk, and used as piers for either floating or fixed bridges. They may be kept

floating, securely anchored, and used as pontoons for expedient floating bridges in place of or in addition to standard bridges. Barges and other craft are used to ferry supplies, equipment, troops and vehicles across the river.

b. When rivers are crossed under cover of darkness, guides may be sent across the river just before the assault crossing to guide the assault troops to their intended landing areas by means of infrared beams or other means.

Section II. OTHER TACTICAL OPERATIONS

109. Jungle Operations

In large scale jungle operations the procedures described in this manual are applicable. The jungle provides excellent concealment for river crossing operations in most instances. Troop and hand carried equipment can be brought up to almost any desired site without road construction. However, when selecting sites, the climatic conditions of the area pertaining to the annual rainfall and flooding conditions must be analysed. Flash flooding is characteristic of jungle areas, even in the dry season. If heavy equipment is to be used, the road construction requirement and soil trafficability must be considered. As a rule, vehicles and heavy equipment are limited to main routes of communications. See FM 31-30.

110. Retrograde Operations

a. Planned retrograde operations over an unfordable river are characterized by detailed, centralized planning and control. Forced retrograde operations are characterized by greater reliance on contingency plans and unit SOP's. The doctrine and techniques described in this manual apply to both planned and forced operations; particularly paragraphs 66 through 78; pertaining to movement regulation and control.

b. It is essential to reach and cross the river before the enemy and prevent him from seizing or destroying bridges or other crossing means. The doctrine and techniques on retrograde operations found in FM 61-100 apply to such a situation. In addition, planning includes provisions for assigning engineers early in the operation to maintain existing bridges, rafts, swim and ford sites, to construct new bridges, and to maintain or construct routes to and from the river. Provisions must be made for defense of crossing areas against ground and air attacks. Strong security forces supported by artillery are employed to hold and protect

the crossing areas against airborne/airmobile operations, guerrillas, infiltrators, or air attacks. Friendly guerrilla forces can be utilized to assist in retrograde movements. They may seize and hold critical terrain such as bridges, defiles, and tunnels, and conduct limited attacks, ambushes and harassing operations to hinder the enemy's forward movement. Guerrilla forces may also assist military personnel who are separated from their units to return to friendly control. See also FM 31-21 and FM 21-77.

c. The destruction or removal of bridges is of major importance to the retrograde force. Plans and means should be provided so that bridges are destroyed or removed once they are no longer needed. Authority for destruction or removal of bridges or rafts should be clearly defined in orders. The commander of the overall force conducting the retrograde operation may retain this authority or he may delegate it to a subordinate commander. There is no general rule applicable in all situations.

- (1) In certain situations, where all fixed bridges over a river have been destroyed, reliance for crossing is on military floating bridges. The main body will cross the major portion of their vehicles early in the operation so that floating bridges can be converted to rafts. The remainder of the main body will be crossed by rafts. The covering force normally will cross by the use of amphibious or deep fording vehicles, assault boats, or by aircraft. If it is necessary, due to heavy items of equipment, for the covering force to use rafts, maximum use is made of the mobile assault raft.
- (2) In situations where there are existing fixed bridges over the river, a demolition firing party and a demolition guard are designated for each bridge

to be destroyed. The guard commander has the authority to destroy the bridge, subject to conditions established by the retrograde force commander. A list of all units that are to use the bridge is furnished the guard commander. Each unit commander notifies the guard commander when his unit has cleared. After the main body has crossed, the majority of the bridges in the crossing zone are destroyed. Certain predesignated bridges are left for use by the covering force, and are destroyed once the covering force has crossed.

d. Army aviation units are employed to the maximum extent possible to evacuate personnel, supplies, equipment, essential non-amphibious vehicles in the covering force and to assist in removal of bridges and rafts.

111. Internal Defense Operations

Internal defense operational environments are influenced considerably by the lack of a well-defined area of operations, and by considerations to win the support of the population. The enemy forces may be more concerned with obtaining influence over the civilian population and destruction of friendly forces, than with control of terrain. His tactics will be directed toward these objectives. The population may have insurgents concealed in their midst. The control of a neutral civilian population may be one of the primary objectives in mission accomplishment. Additional emphasis and considerations in this environment are given to the effects of river-crossing operation population and its control and on the enemy forces. Some specific considerations are—

a. River-crossing operations will be characterized by an increased use of small-unit and independent unit operations. The hasty crossing will be normal. Planning, execution, and control will be generally at an echelon below the division, and will be the responsibility of the force commander conducting the river crossing. The scope, planning considerations, available

planning time, and the resources available may be reduced. Greater dependence and use may be required of civilian-controlled crossing means and resources.

b. The capabilities of insurgent forces to react to support a defense on the near bank, or to attack the flanks or rear of the friendly forces requires that combat support and combat service support units possess the capability for all-around defense. Consideration must be given to this insurgent capability in selecting a bridgehead or far bank objectives. Fire support should be planned and units located so that fires can be placed in all directions. Security forces must be included with each crossing echelon. Security is then provided the follow-up and rear echelon units against attack by insurgent armed forces-type companies, battalions or regiments (para 27).

c. Psychological operations plans provide themes and media to be employed against the enemy and the civilian population. Psychological operation means may be used to support deception operations. Intelligence necessary to support these operations may contribute to information on the enemy. The use of leaflets, posters, and loud speaker broadcasts may inform, control, or direct civilians toward a desired reaction.

d. *Friendly Guerrilla Forces.* Planning and subsequent close coordination with friendly guerrilla forces which may be located in the vicinity of the river crossing can contribute to the success of the operation. Their use to support deception plans, to disseminate information to civilians, for reconnaissance of crossing sites, the river or far bank, as an intelligence source, or to attack enemy rear installations will support mission accomplishment. For additional details see FM 31-21.

e. Gaining the support of the civilian population may be an inherent goal of internal defense operations. The well-being and safety of civilians and their properties should be considered in planning operations. The effects on the civilian population may be considerations in the selection of crossing sites, use of smoke, chemicals, and fires to support the operation.

APPENDIX A

REFERENCES

1. Army Regulations

AR 310-3	Military Publications—Preparation, Coordination, and Approval.
AR 320-5	Dictionary of United States Army Terms.
AR 320-50	Authorized Abbreviations and Brevity Codes.

2. Field Manuals

FM 1-5	Aviation Company.
FM 1-15	Aviation Battalion.
FM 1-60	Army Aviation Air Traffic Operations—Tactical.
FM 1-100	Army Aviation.
FM 3-10	Employment of Chemical and Biological Agents.
(S) FM 3-10A	Employment of Biological Agents (U).
FM 3-50	Chemical Smoke Generator Units and Smoke Operations.
FM 5-1	Engineer Troop Organizations and Operations.
FM 5-20	Camouflage, Basic Principles and Field Camouflage.
FM 5-23	Field Decoy Installations.
FM 5-25	Explosives and Demolitions.
FM 5-26	Employment of Atomic Demolition Munitions (ADM).
FM 5-29	Passage of Mass Obstacles.
FM 5-34	Engineer Field Data.
FM 5-35	Engineers, Reference and Logistical Data.
FM 5-36	Route Reconnaissance and Classification.
FM 5-135	Engineer Battalion, Armored Infantry and Infantry (Mechanized) Division.
FM 5-136	Engineer Battalion, Airborne Division.
FM 5-142	Nondivisional Engineer Combat Units.
FM 5-144	Engineer Amphibious Units.
FM 6-10	Field Artillery Communications.
FM 6-20-1	Field Artillery Tactics.
FM 6-20-2	Field Artillery Techniques.
FM 7-11	Rifle Company, Infantry, Airborne, and Mechanized.
FM 7-15	Rifle Platoon and Squads—Infantry, Airborne, and Mechanized.
FM 7-20	Infantry, Airborne Infantry, and Mechanized Infantry Battalions.
FM 7-30	Infantry, Airborne, and Mechanized Division Brigades.
FM 8-10	Medical Service, Theater of Operations.
FM 8-15	Division Medical Service, Infantry, Airborne, Mechanized and Armored Divisions.
FM 8-35	Transportation of the Sick and Wounded.
FM 9-30	Maintenance Battalion, Division Support Command.
FM 10-8	Air Delivery of Supplies and Equipment in the Field Army.

FM 10-50	Supply and Transport Battalion, Division Support Command.
FM 11-50	Signal Battalion, Armored Infantry and Infantry (Mechanized) Divisions.
FM 11-57	Signal Battalion, Airborne Division.
FM 17-1	Armor Operations.
FM 17-30	The Armored Division Brigade.
FM 17-36	Divisional Armored and Air Cavalry Units.
FM 19-2	Military Police Support in the Field Army.
FM 19-5	The Military Policeman.
FM 19-25	Military Police Traffic Control.
FM 19-40	Enemy Prisoners of War and Civilian Internees.
FM 21-5	Military Training Management.
FM 21-26	Map Reading.
FM 21-30	Military Symbols.
FM 21-31	Topographic Symbols.
FM 21-40	Small Unit Procedures in Chemical, Biological and Radiological (CBR) Operations.
FM 21-41	Soldier's Handbook for Chemical and Biological Operations and Nuclear Warfare.
FM 21-48	Chemical, Biological and Radiological (CBR) and Nuclear Defense Training Exercises.
FM 21-77	Evasion and Escape.
(C) FM 21-77A	Evasion and Escape (U).
FM 23-65	Browning Machine Gun Cal .50 HB, M2.
FM 24-1	Tactical Communications Doctrine.
(C) FM 24-150	Electronic Warfare (Ground Based) (U).
FM 27-10	The Law of Land Warfare.
FM 30-5	Combat Intelligence.
FM 30-10	Terrain Intelligence.
FM 30-30	Aircraft Recognition Manual.
FM 31-10	Barriers and Denial Operations.
FM 31-12	Army Forces in Amphibious Operations (The Army Landing Force).
FM 31-16	Counter guerrilla Operations.
FM 31-21	Special Forces Operations.
(S) FM 31-21A	Special Forces Operations (U).
FM 31-22	U.S. Army Counterinsurgency Forces.
(S) FM 31-22A	U.S. Army Counterinsurgency Forces (U).
FM 31-30	Jungle Training and Operations.
(C) FM 31-40	Tactical Cover and Deception (U).
FM 31-70	Basic Cold Weather Manual.
FM 31-71	Northern Operations.
FM 31-72	Mountain Operations.
(CM) FM 32-5	Communications Security (U).
(S) FM 32-10	United States Army Security Agency in Support of a Field Army (U).
FM 33-5	Psychological Operations—Techniques and Procedures.
FM 41-10	Civil Affairs Operations.
FM 44-1	U.S. Army Air Defense Employment.
(S) FM 44-1A	U.S. Army Air Defense Employment (U).
FM 44-2	Air Defense Artillery Employment (Automatic Weapons).
FM 44-8	Army Air Defense Command Posts.
(CM) FM 44-95	Air Defense Artillery Battalion, Nike Hercules (U).
FM 44-96	Air Defense Artillery Missile Unit, Hawk (Battalion and Battery).

(S) FM 44-96A	Air Defense Artillery Missile Unit, Hawk (Battalion and Battery) (U).
FM 54-2	The Division Support Command.
FM 55-6	Transportation Services in Theaters of Operations.
FM 55-9	Transportation Services and the Transportation Brigade in the Field Army.
FM 57-10	Army Forces in Joint Airborne Operations.
FM 57-35	Airmobile Operations.
FM 61-100	The Division.
FM 100-5	Field Service Regulations—Operations.
FM 100-10	Field Service Regulations—Administration.
FM 100-15	Field Service Regulations—Larger Units.
FM 101-5	Staff Officers Field Manual: Staff Organization and Procedure.
FM 101-10	Staff Officer's Field Manual: Organizational, Technical, and Logistical Data.
(Parts I & II)	
FM 101-31-1	Staff Officers Field Manual: Nuclear Weapons Employment.

3. Technical Manuals

TM 5-210	Military Floating Bridge Equipment.
TM 5-216	Armored Vehicle Launched Bridge.
TM 5-220	Passage of Obstacles other than Minefields.
TM 5-277	Bailey Bridge.
TM 5-312	Military Fixed Bridges.
TM 9-500	Data Sheets for Ordnance Type Materiel.
TM 55-510	Amphibious Lighter: Operator's Handbook.
TM 57-210	Air Movement of Troops and Equipment.

4. Other DA Publications

DA Pam 108-1	Index of Army Films, Transparencies, GTA Charts, and Recordings.
DA Pam 310-1	Index of Administrative Publications.
DA Pam 310-2	Index of Blank Forms.
DA Pam 310-3	Index of Doctrinal, Training, and Organizational Publications.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Lubrication Orders and Modification Work Orders.
JCS Pub 1	Dictionary of United States Military Terms for Joint Usage.
JCS Pub 2	Unified Action Armed Forces (UNAAF).
(C) JCS Pub 3	Joint Logistics and Personnel Policy and Guidance (U).
TC 101-2	Tactical Operations Centers.

5. STANAGS, SOLOGS

STANAG 2017	Order to the Demolition Firing Party Commander.
STANAG 2019	Military Symbols.
(SOLOG-28)	
STANAG 2021	Computation of Bridge, Raft, and Vehicle Classifications.
(SOLOG-45R)	

APPENDIX B

CROSSING EQUIPMENT

1. General

This appendix provides supplemental information on the types and capabilities of crossing means used during river-crossing operations.

2. Amphibious Vehicles

a. *Types.* Amphibious vehicles are divided into three general categories. These are carriers, landing vehicles (LVT), and lighters (LARC).

- (1) Carriers include the tracked vehicles developed to transport personnel, cargo, mortars (SP) and those used for command and reconnaissance. The mobile assault bridge (MAB/ARCE) and the self-propelled artillery vehicles with flotation devices installed are included. These vehicles are normally available to the division and corps.
- (2) Landing vehicles (LVT series) are designed as personnel carriers and combat support vehicles for use during coastal amphibious operations. Limited availability generally restricts their use to the crossing of very wide rivers.
- (3) Lighters (LARC series) are vehicles developed for transporting supplies and equipment from ships to on-shore dumps during amphibious operations. Lighters may be used on large rivers for supply buildup on the far bank.

b. *Operational Considerations.* These vehicles enhance the speed and mobility of assault elements. Amphibious vehicles may be preloaded on the near bank and may be used to supplement rafts prior to bridge construction. Engineer effort may be required to prepare and

maintain entry and exit slopes for large numbers of tracked vehicles. Lateral drifts affects swimming vehicles. For stream velocities of 0.85 meters per second or less, drift may be negligible. Drift will occur for velocities over 0.85 meters per second. When the stream velocity and speed of the swimming vehicle are the same, drift will be one meter downstream for each meter of forward movement.

c. *Technical Characteristics.* See FM 5-144, FM 17-1, FM 31-12, TM 9-500, and appropriate technical manuals.

3. Assault Boats

a. *Reconnaissance Boat.* The three-man reconnaissance boat weighs 24 pounds, 33 pounds complete in pack with paddles, repair kit, and pump. This boat can be inflated in five minutes. This boat can operate in a maximum stream velocity of 1.5 m/sec., and has a capacity of three combat equipped men. The purpose of the boat is to transport surface and underwater reconnaissance personnel.

b. *Plastic Assault Boat M3.* The assault boat M3 is 4.9 meters in length, weighs 300 pounds and transports 12 passengers with packs in addition to a crew of 3. A stack of 10 inverted boats can be carried on a 2½ ton utility pole-type trailer or a 2½ ton 6 x 6 cargo truck. It may be used as a storm boat and in this role a 25 HP outboard motor is attached. This assembly, carrying one operator and five infantrymen, can exceed 20 mph and will withstand beaching at full speed (see table I). The assault boat may be found in the float bridge company of the Engineer Group, Combat (Corps/Army).

c. *Pneumatic Assault Boat* (fig. 8). The pneumatic assault boat is 5.2 meters in length,



Figure 8. 15-man pneumatic assault boat.

weighs 260 pounds and transports 12 passengers with equipment in addition to a crew of 3. It may be propelled by paddle or by outboard motor. The stern of the boat is equipped for mounting a standard 25-HP outboard motor. Caution must be exercised when operating

the boat with an outboard motor for a sudden surge of power may damage the boat. This boat is found in the float bridge company and engineer combat battalion (see table I).

d. For use of assault boats to evacuate patients, see FM 8-35.

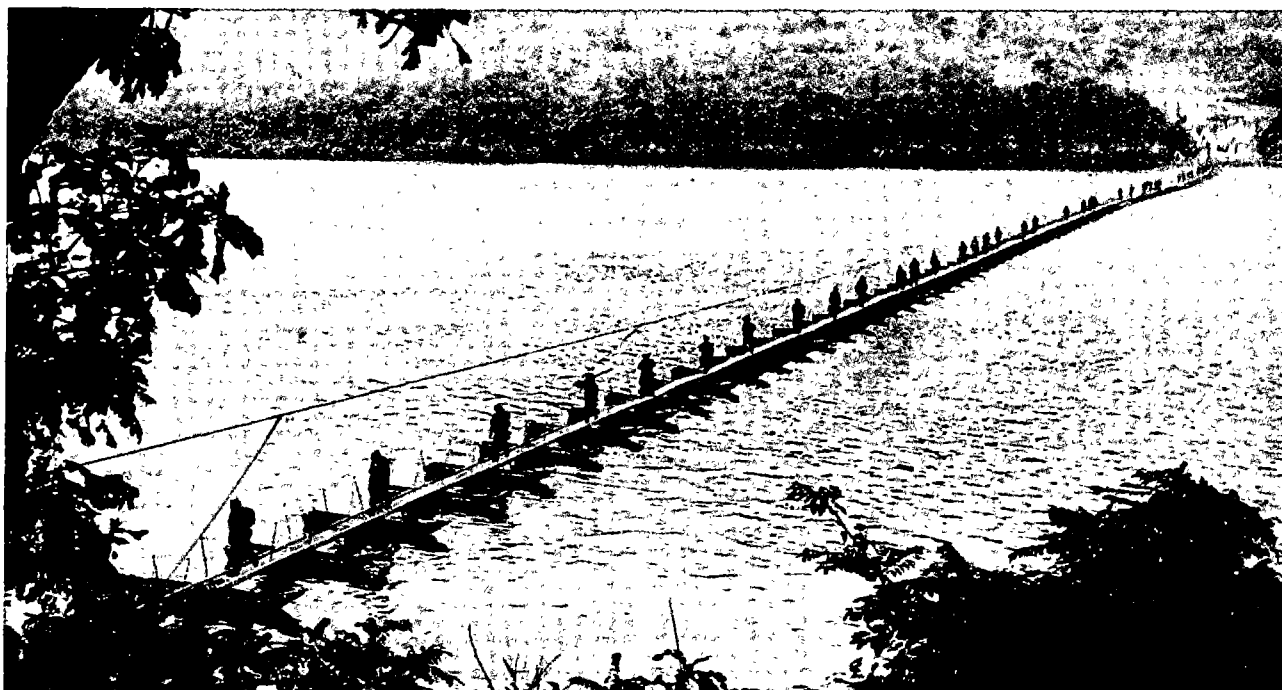


Figure 9. Aluminum footbridge.

4. Footbridges

a. For use and characteristics, see table III.

b. The aluminum footbridge (fig. 9) can be employed safely in currents up to 3.5 meters per second. One set of aluminum footbridge contains 144 meters of bridging and is transported on two 2½-ton cargo trucks and two 2½-ton utility pole-type trailers. The footbridge set is located in the float bridge company.

c. The aluminum footbridge components can be assembled as a bridge or raft (fig. 10) for transport of ¼-ton vehicles and other loads of similar weight.

5. Rafts and Ferries

For types, use, and characteristics see table II.

Caution: Commanders and staff planners must use table II with caution when using times listed in column 4 to determine operational times for rafts (see note 2, table II).

When required, preparation or construction of roads and approaches *normally requires more time* than raft construction. Site preparation time, rather than raft or ferry construction time, normally may be the deciding factor in arriving at operational times for rafts or ferries.

Table I. Assault Boats

1		2	3	4	5		
River Crossing Means		Crew Engrs	Maximum loads (in addition to crew)	Maximum Stream Velocity	Time in mins for round trip across stream w/width		
					90m	150m	300m
1.	Plastic Assault boat						
	a. Paddled	3 men	12 riflemen with individual equipment	1.2 m/sec	4	6	10
	b. Outboard Motor Propelled	2 men	12 riflemen with individual equipment	1.5 m/sec	3	4	5
		2 men	7 riflemen with individual equipment	2.5 m/sec	3	4	5
	c. Employed as Storm Boat	1 man	5 riflemen with individual equipment	3.2 m/sec	3	4	5
2.	Pneumatic Assault Boat						
	a. Paddled	3 men	12 riflemen with individual equipment	1.5 m/sec	4	6	10
	b. Outboard Motor Propelled	2 men	12 riflemen with individual equipment	3.5 m/sec	--	4	5

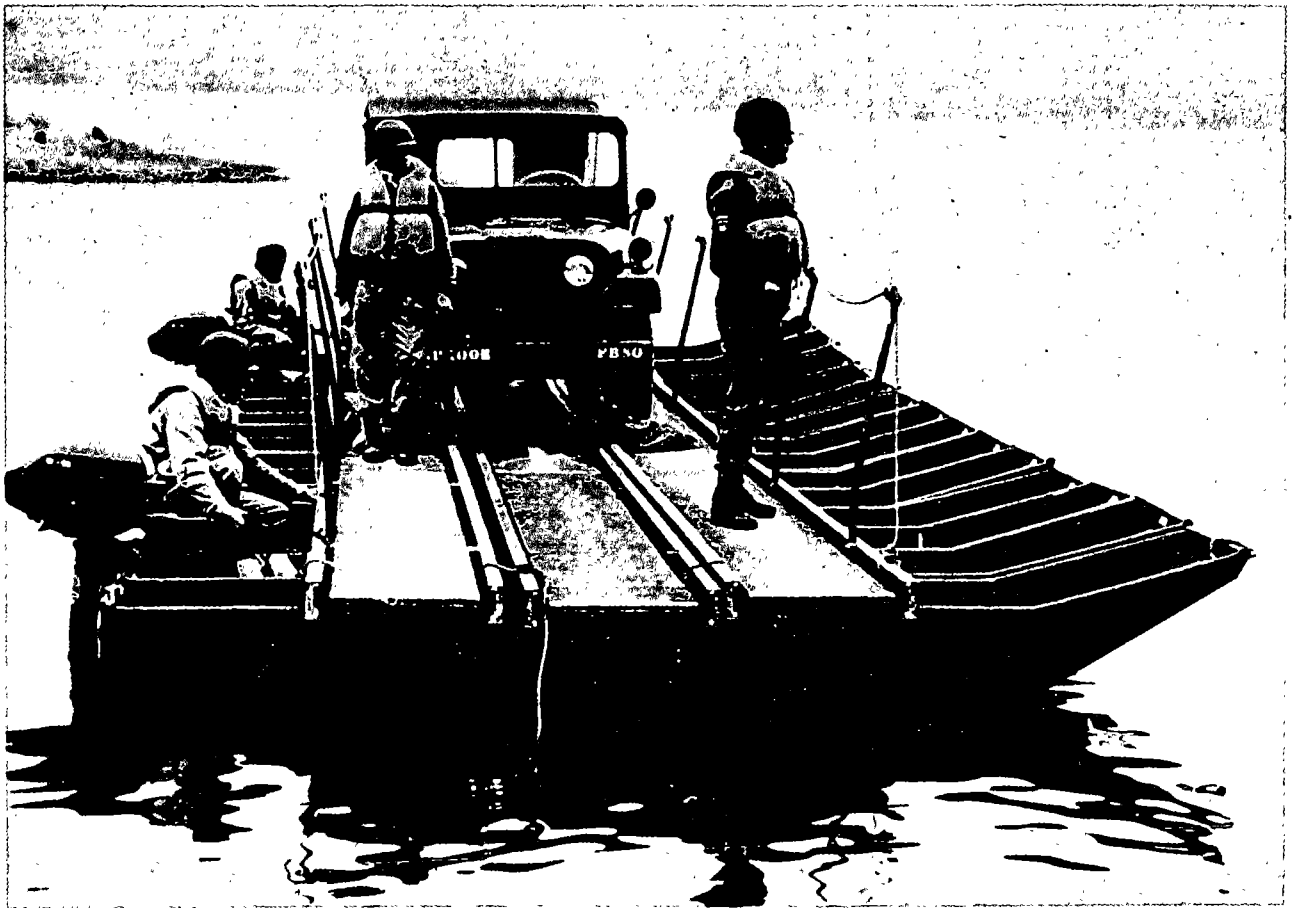


Figure 10. Aluminum footbridge raft.

- a. Light Tactical Raft. See figure 11.*
- b. M4T6 Raft. See figure 12.*
- c. Class 60 Raft. See figure 13.*
- d. Mobile Assault Ferry (MAB). See figure 14.*

- e. Amphibious River Crossing Equipment (ARCE) Ferry. See figure 15.*
- f. M4 Raft. See figure 16.*

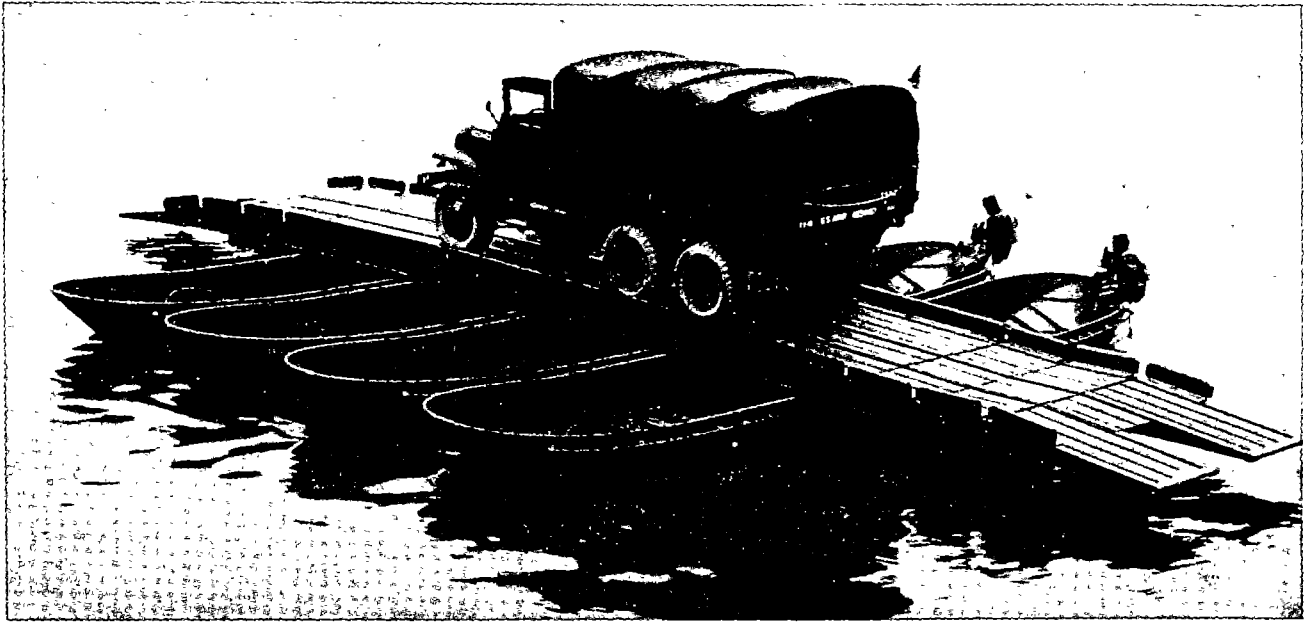


Figure 11. Light tactical raft.

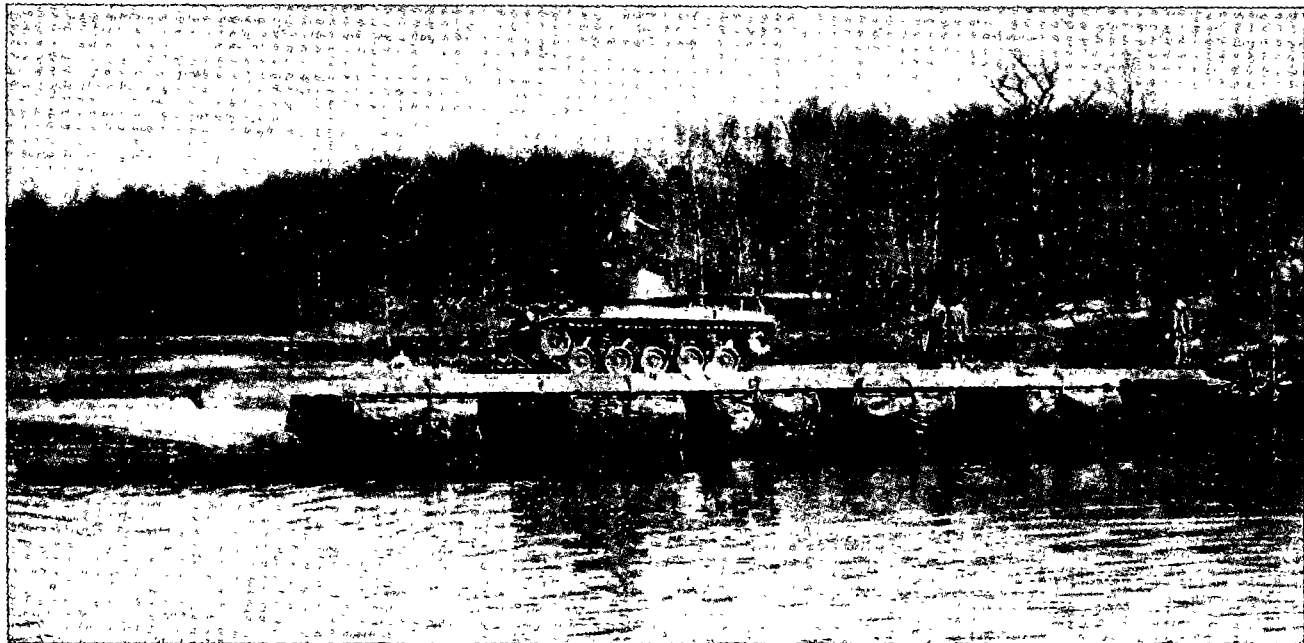


Figure 12. M4T6 raft.

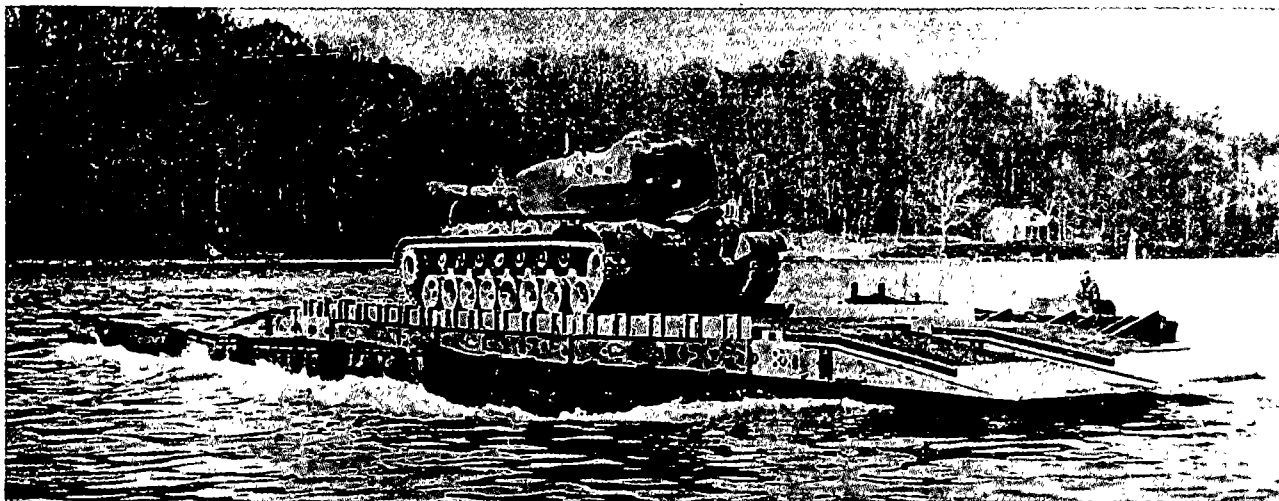


Figure 13. Class 60 raft.

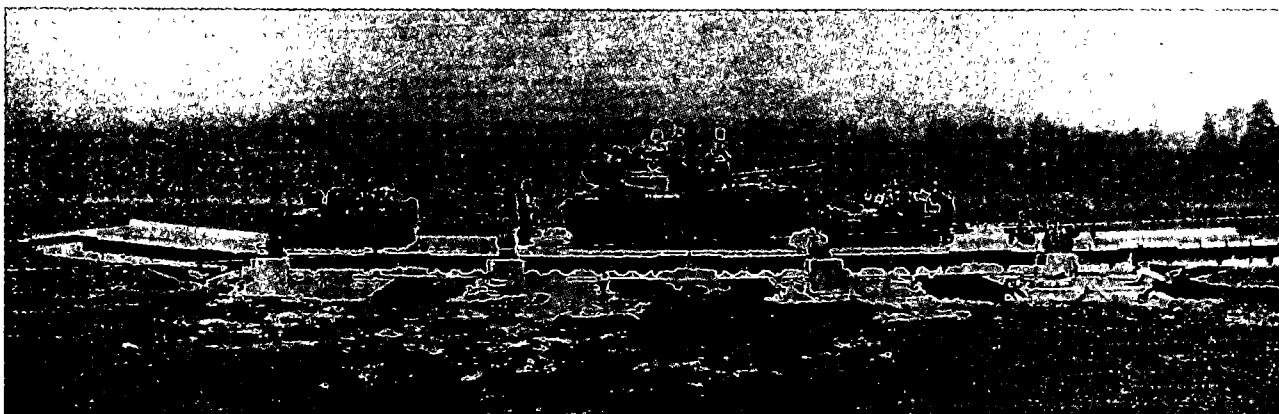


Figure 14. Mobile assault ferry (MAB).

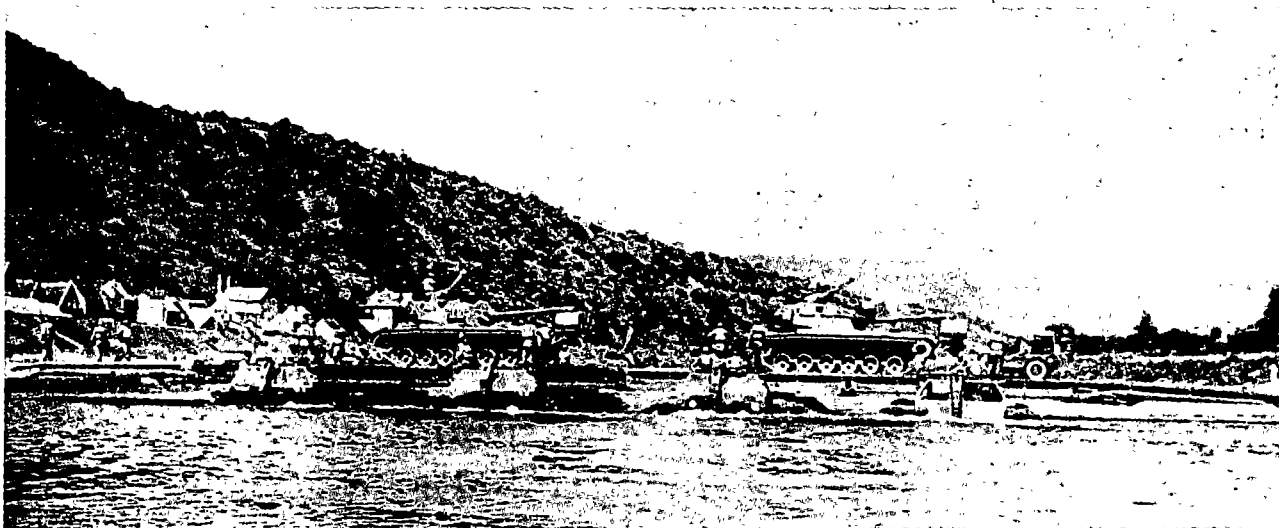


Figure 15. Amphibious river crossing equipment (ARCE) ferry.

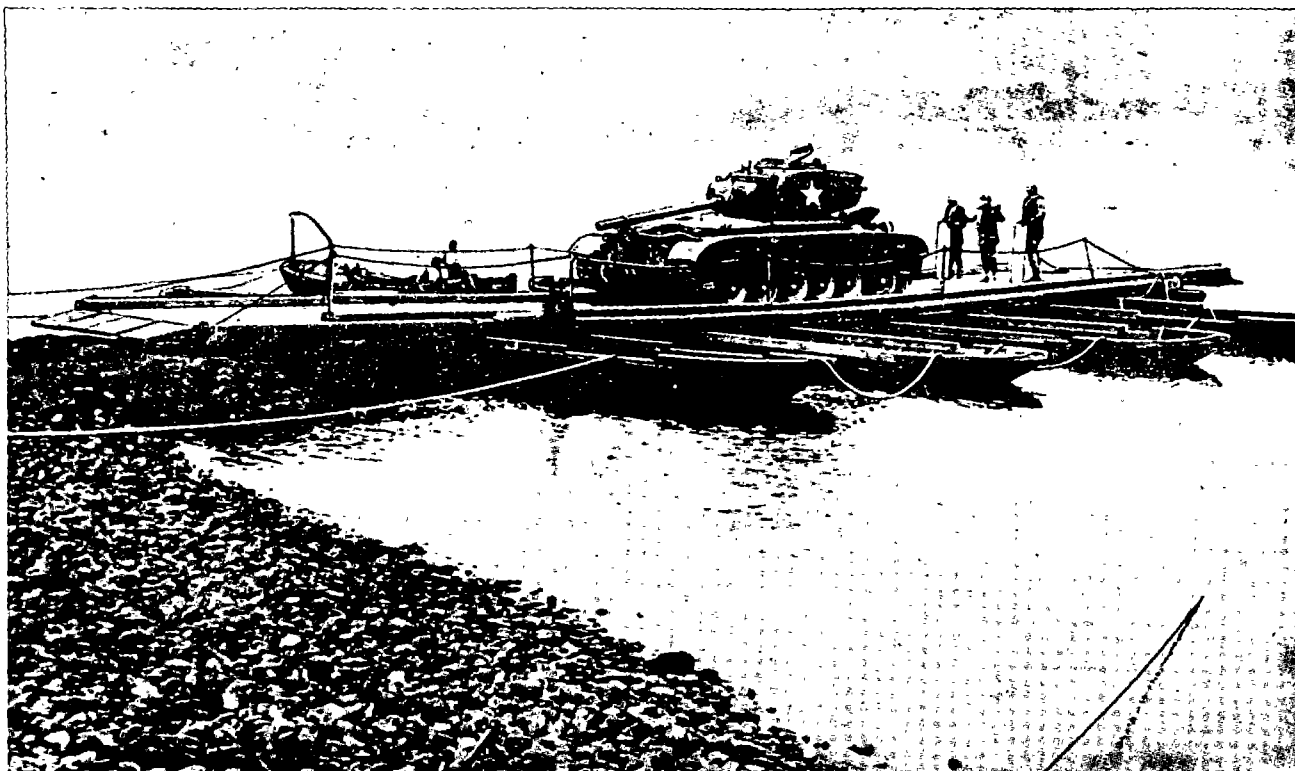


Figure 16. M4 raft (limited standard).

6. Floating Vehicular Bridges

a. General. For types, use, and characteristics, see table III.

Caution: Commanders and staff planners must use table III with caution when using times listed in column 3 to determine operational times for bridges (see note 3, table III).

When required, preparation or construction of roads and approaches *normally requires more time* than bridge construction. Site preparation time, rather than bridge construction time, normally will be the deciding factor in arriving at operational times for bridges.

Table II. Rafts and Ferries

	1	2	3		4	5	6	7								8	9	
1.	Type of raft	No of pontons or floats	Length (meters)		Construc- tion time (min) ²	Construc- tion party	Operating crew	Class and number of power units needed ³								Type of power unit required	Transportation required (For raft equipment only. Additional needed for const equip and trps)	
			Overoll incl romps	Available for loading ¹				Normal crossing				Risk crossing						
								Stream velocity (meters per second)				Stream velocity (meters per second)						
								1	1.6	2.3	3	1	1.6	2.3	3			
2.	Light tacti- cal raft without articula- tors	4 (3 bay)	14.3	10.0	30	1 Squad and out- board opera- tors	16 1	16 1	16 1	13 2	4 4	20 1	20 1	18 2	8 4	25 hp out- board motor. ¹⁰ a. Must be lauoched upstream of far shore exit as power units will not coun- teract velocity of stream wheo the raft is loaded.	2½-ton cargo truck with 2½-ton pole trailer	
		5 (5 bay)	21.1	16.8	35		16 1	16 1	15 1	12 2	6 4	19 1	18 1	16 2	9 4			
		6 (5 bay)	21.1	16.8	40		18 1	18 1	18 1	18 3	13 4a	22 1	22 2	22 3	18 4a			
	Light tacti- cal raft with artic- ulators	4 (3 bay)	18.0	10.0	30		12 1	12 1	12 1	12 2	4 3	14 1	14 1	14 2	9 4			
		4 (4 bay)	21.4	13.4	35		10 1	10 1	10 2	10 2	2 3	12 1	12 1	12 2	6 4			
		5 (5 bay)	24.8	16.8	40		9 1	9 1	9 1	9 2	6 4	11 1	11 1	11 2	9 4			
		6 (4 bay)	21.4	13.4	40		13 1	13 1	13 1	13 2	12 4a	15 1	15 1	15 2	15 4a			

Table II. Rafts and Ferries—Continued

	1	2	3		4	5	6	7								8	9							
1.	Type of raft	No of pontons or floats	Length (meters)		Construction time (min) ²	Construction party	Operating crew	Class and number of power units needed ³								Type of power unit required	Transportation required (For raft equipment only. Additional needed for const equip and trps)							
			Overall incl ramps	Available for loading ¹				Normal crossing				Risk crossing												
								Stream velocity (meters per second)				Stream velocity (meters per second)												
								1	1.6	2.3	3	1	1.6	2.3	3									
3.	Class 60	4 Normal	28.2	15.5	⁶ 70 ⁷ 30	1 Plat ^{6,7}	1 Squad and power unit operators	45 1	40 1	45 1	40 2	45 2	40 2	35 2	55 1	50 1	55 1	50 2	55 2	50 3	45 3	27-ft bridge erection boat ⁸	5	5-ton bridge truck
		5 Reinf	28.2	15.5	⁶ 80 ⁷ 35			60 1	55 1	60 1	55 2	50 4	70 1	60 1	65 2	60 4	55 4							
		6 Reinf	28.2	16.5	⁶ 90 ⁷ 50			75 1	65 1	75 1	65 2	65 4	90 1	80 1	90 1	80 2	80 4	70 4						
4.	M4 ^{4,5} (limited standard)	4	26.5	15.7	⁶ 70	1 Plat	1 Squad and power unit operators	55 1	50 1	55 1	50 1	55 1	50 1	60 1	55 1	60 1	55 1	60 1	55 1	60 1	55 1	27-ft bridge erection boat ⁸	5	2½-ton bolster truck with 2½-ton bolster trailer
		6 Reinf	26.5	15.7	⁶ 80			75 1	70 1	75 1	70 1	70 2	80 1	75 1	80 1	75 1	80 2	75 2						
		7 Reinf	26.5	15.7	⁶ 85			90 1	85 1	90 1	85 1	85 3	95 1	90 1	95 1	90 1	95 1	95 3	90 3					
5.	M4T6 ⁴	4	26.5	15.7	90	1 Plat	1 Squad and power unit operators	55 1	50 1	55 1	50 2	45 3	35 3	65 1	60 1	65 1	60 2	55 2	45 3	45 3	27-ft bridge erection boat ⁸	5	5-ton bridge truck	
		5 Reinf	27.1	15.3	100			60 1	60 1	60 1	60 2	50 3	75 1	70 1	75 1	70 2	65 3							
6.	Mobile Assault Bridge/ferry (MAB) or (MFABF)	0/2 ¹¹	22.5	8.5	6	None ⁹	amphibious vehicle crews	See para 6e. (Tentative)								Self-contained power	Self-contained							
		1/2 ¹¹	30.5	16.5	8																			
		2/2 ¹¹	38.4	24.4	10																			
		3/2 ¹¹	46.3	32.4	12																			
		4/2 ¹¹	54.2	40.4	12																			
7.	Amphibious River Crossing Equipment (ARCE)	2/- ¹¹	32.0	17.2	15	None ⁹	1 Man and amphibious vehicle crews	See para 6e. (Tentative)								Self-contained power	Amphibious bridge vehicles plus 2 amphibious ramp carriers or 1 5-ton tractor with 25-ton low bed trailer							
		3/- ¹¹	40.0	25.2	20																			
		4/- ¹¹	48.0	33.2	25																			
		5/- ¹¹	56.0	41.2	31																			

Table II. Rafts and Ferries—Continued

Operating characteristics of rafts and ferries	Stream width (meters)		
	75	150	300
No of round trips per hr in currents of 1.6 mps in daylight (reduce 50 percent for night or adverse conditions)	Trips/hr		
Light Tactical Raft	8	6	4
Class 60	6	4	2
M4T6	8	6	4
ARCE/MAB (MFAB/F)	8	6	4
No. of rafts which can be used efficiently at one time	1	2	3

¹ Measured from outside edge to outside edge of end pontoons or float saddle beams, except mobile assault ferry which is measured from ramp joint to ramp joint.

² Construction time includes unloading and assembly only, does not include preparation of landing sites or construction of access roads. Times are based on use of trained personnel and no delays.

³ Capacities are based on loading rafts with center of gravity of loads 6 inches downstream of raft centerline and on properly inflated floats, or conversion from highway travel condition to water entry configuration for ARCE ferry.

⁴ Roadway width consists of 18 balk between curbs in 22 balk deck.

⁵ Extreme caution is required in loading and unloading vehicles weighing more than 60 tons.

⁶ Truck-crane or equivalent required for assembly time.

⁷ Complete bays preassembled in rear area and launched directly from transporting trailer into water at assembly site.

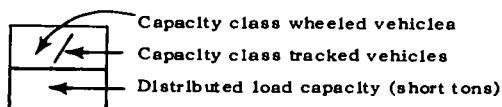
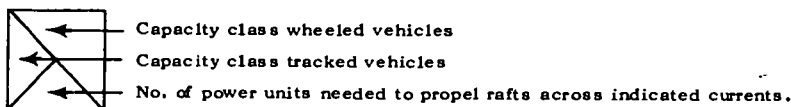
⁸ One 19-ft bridge erection boat may be used in current not over 1.6 mps. In 1.6 mps current and over, two 19-ft boats may be substituted for one 27-ft boat.

⁹ Exclusive of amphibious vehicle crews.

¹⁰ 27-ft erection boat may be used when pusher connector is lashed to pontoons.

¹¹ Number of interior bays/no. of ramp bays

KEY



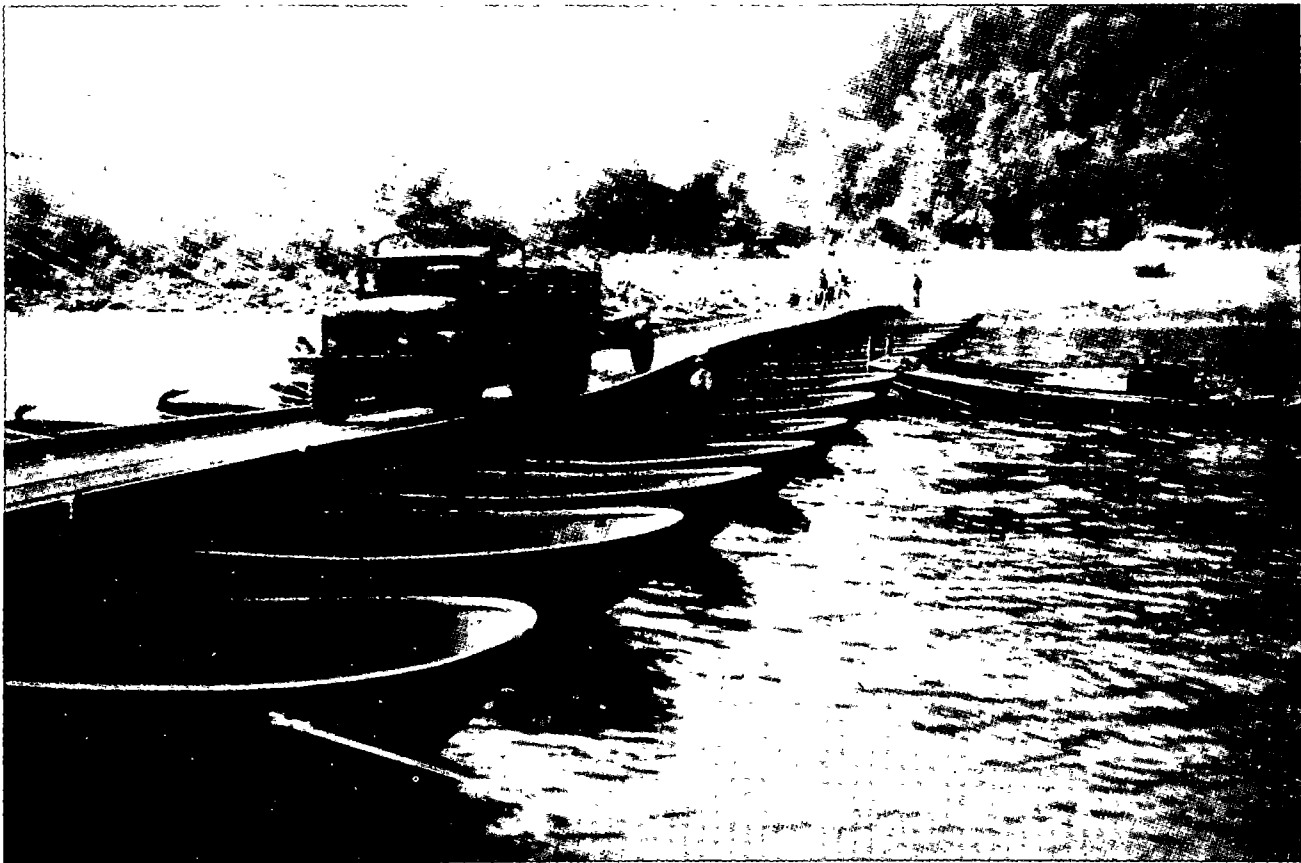


Figure 17. Light tactical bridge.

b. *Light Tactical Bridge* (fig. 17). The light tactical bridge equipment can be used to assemble either rafts of floating bridges. The bridge can carry up to class 16 loads in currents not exceeding 1.6 meters per second. One

set of this bridging provides 13 meters of normal bridging. This bridge is located in the bridge companies of the infantry, armored, and mechanized divisions and the float bridge companies.

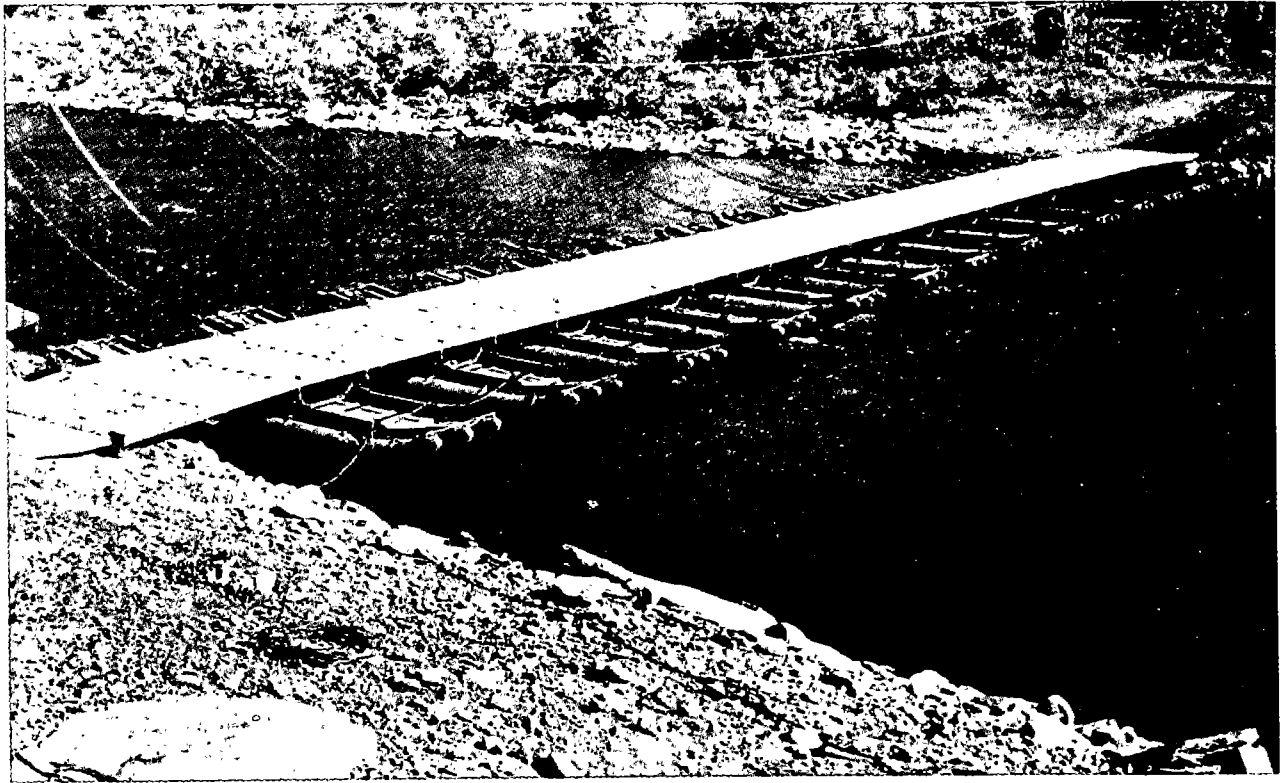


Figure 18. M4T6 bridge.

c. M4T6 Floating Bridge (fig. 18). This bridge is a standard item and is organic to float bridge companies. It may be issued to bridge companies of the infantry, armored, and mechanized divisions where mobile assault bridge

equipment is not available. It consists of a continuous roadway of aluminum-alloy deck balk supported by 24-ton pneumatic floats. This bridge will provide a means for crossing divisional, corps, and army loads.

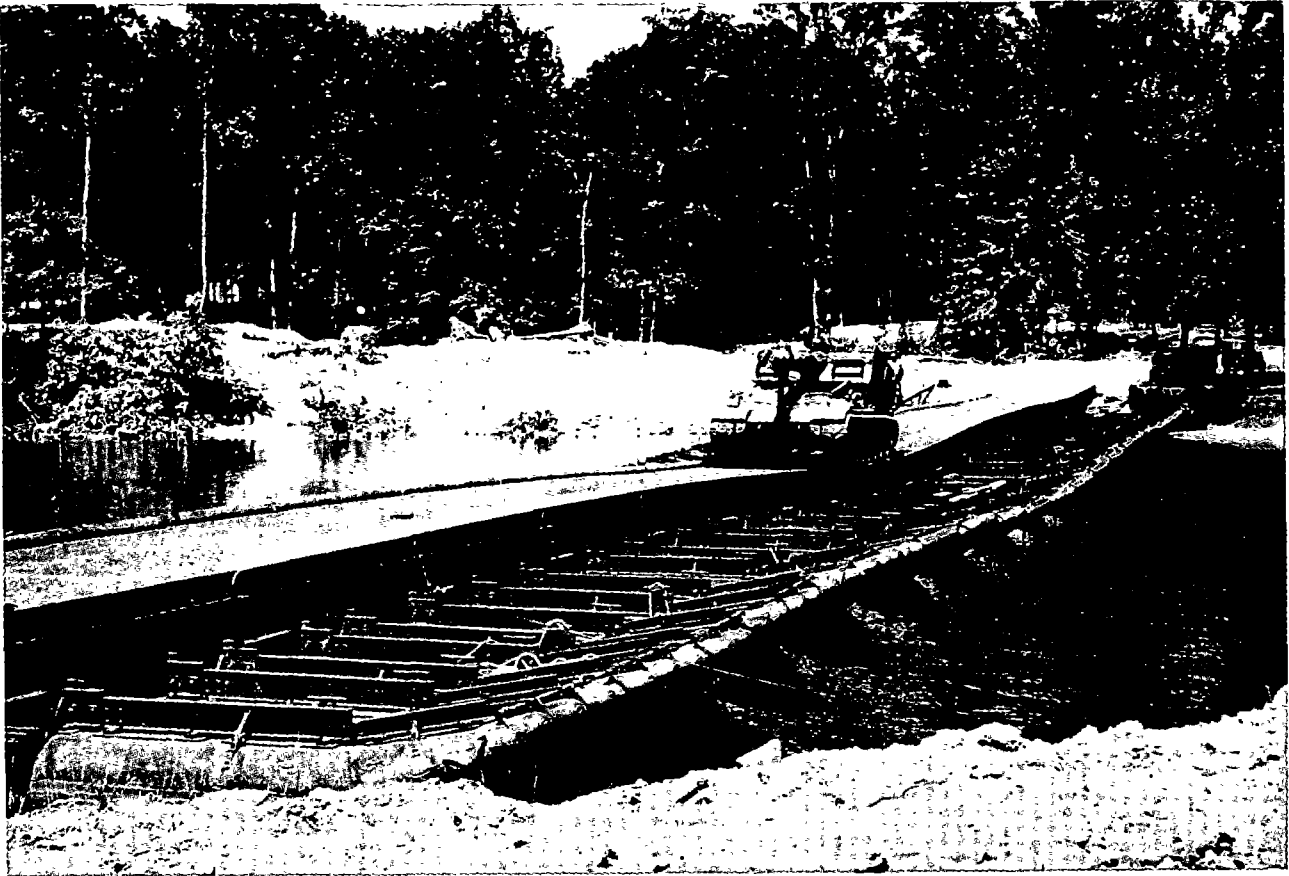


Figure 19. Class 60, floating bridge.

d. *Class 60 Floating Bridge* (fig. 19). This bridge has a flush deck 4.1 meters wide supported by 24-ton pneumatic floats. The width of the deck exceeds the ground contact width of all presently standard vehicles and provides

a means for crossing divisional, corps and army loads. It may be found in float bridge companies or divisional bridge companies in lieu of the M4T6 bridging.

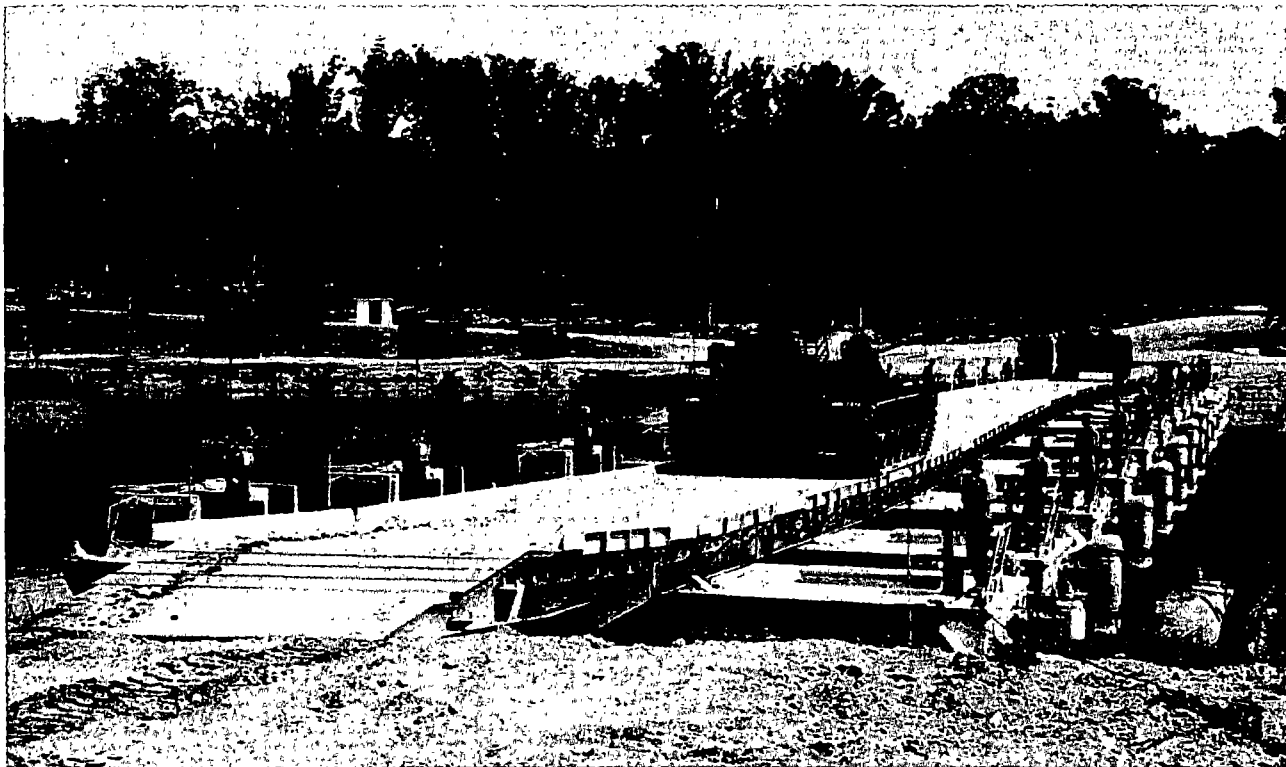


Figure 20. Mobile assault bridge.

e. Mobile Assault Bridge (MAB) (fig. 20). The mobile floating assault bridge/ferry (MF-ABF) can be used to rapidly assemble either ferries or floating bridges. The bridge company of the armored, infantry, and mechanized divisions and the Engineer Assault Bridge Company, Mobile (Army/Corps) will be equipped with this type of bridging. Each bridge vehicle

constructs 8 meters of bridge capable of carrying division loads. Bridge vehicles enter the water from march column and can be joined together for a 144 meter bridge in $\frac{3}{4}$ to 1 hour. The MAB can operate in stream velocities up to 1.97 mps with class 62 loads and up to 2.6 meters per second with class 55 loads for nor-



Figure 21. ARCE bridge.

mal crossings (tentative). Caution and risk crossing are a function of the MAB ferry speed in water and the ferry load, as determined by the amount of freeboard. See tables II and III and TM 5-210.

f. Amphibious River Crossing Equipment (ARCE) (fig. 21). This French-designed equipment can be used to rapidly assemble either ferries or floating bridges. Its capabilities parallel those of the U.S.-designed mobile floating assault bridge (MAB) described above; however, additional time is required to prepare the ARCE for entry into the water. At the

present time, the bridge company of the armored, infantry and mechanized divisions in Europe are equipped with this type bridging. One major difference between the ARCE and MAB should be noted. The ARCE ramp unit serves only to transport the ramp on land and in the water until the ramp is connected to the exterior bridge unit. When the ramps are connected, the ramp carries disengage and have no ferry load carrying capability. A 4 unit ARCE ferry use 4 bridge units and 2 ramp units (fig. 15). When the MAB is used, a 4 unit ferry consists of 2 bridge and 2 ramp units (fig. 14 and tables II and III).

Table III. Floating Bridges

1		2		3			4		5																		6																												
1. Type of bridge		Transportation required ¹		Construction Party ² /Construction Time ³ (hours)			Maint crew (No men)		Load classes ⁴																		Traffic capacity and vehicular distance for safe crossing in daylight (except as otherwise noted) ⁸																												
				Stream width (meters)					Safe crossing (posted capacity) ⁵						Caution crossing ⁶						Risk crossing ⁷																																		
									Stream velocities in meters per second (mps)																																														
									Up to 80			80-160			160-325			1		1.6		2.3		2.6		3			3.6		1		1.6		2.3		2.6		3		3.6														
2. Footbridge, aluminum		1 2½-ton truck and 1 2½-ton pole trailer per 77.4 meters of bridge.		1 Plat	1 Plat		---			1 Sqd		Safe																		Day: 75 men per min Night: 40 men per min at 2-pace distance. ⁹																									
3. Light tactical bridges		2 2½-ton truck and 1 2½-ton pole trailer per 14.4 meters of bridge.		1 Plat	2 Plat		---			1 Sqd		16		16		13		11		8		2		18		18		15		12		9		3		21		21		17		14		11		5		400 vehicles per hr 30 meters distance between vehicles. ¹⁶							
4. M4T6 ¹⁰ float bridge		Normal		1 5-ton truck per 4.9 meters of bridge.		1 Co	2 Ca		2 Co to 1 Ba			1 Sqd		50		45		40		35		30		25		60		58		54		49		45		35		68		66		62		59		54		43		400 vehicles per hr ¹⁶					
		Reinforced		1 5-ton truck per 3.3 meters of bridge.		2-3	3-5		5-10					75		75		70		75		65		55		27		80		80		79		73		66		43		67		45		90		90		90		87		81		59	
5. Class 60 floating bridge		Normal		1 5-ton bridge truck per 4.9 meters of bridge.		1 Co	2 Co		2 Co to 1 Ba			1 Sqd to 1 Plat ¹⁴		60		55		11		45		40		35		22		65		62		56		52		45		34		75		72		67		62		57		46		400 vehicles per hr 30 meters distance between vehicles. ¹⁶			
		Reinforced		1 5-ton bridge truck per 4.9 meters of bridge.		1 Co	2 Co		2 Co to 1 Ba					65		65		65		65		30		35		75		75		75		75		75		47		51		85		85		85		85		70		74					
6. M4 floating bridge (limited standard)		Normal ¹²		1 2½-ton bolster truck and 1 2½-ton bolster trailer per 4.9 meters of bridge.		1 Co	2 Co		2 Co to 1 Ba			1 Sqd to 1 Plat ¹⁴		60		60		45		50		45		30		18		68		65		58		52		44		29		72		68		61		58		53		37					
		Reinforced ¹³		1 2½-ton bolster truck and 1 2½-ton bolster trailer per 3.3 meters of bridge.		1 Co	2 Co		2 Co to 1 Ba					95		95		75		80		60		45		24		100		100		99		88		75		62		35		37		105		105		101		96		88		74	
7. Mobile Assault Bridge/Ferry (MAB) (MFABF)		Number of interior units = bridge length (m) ÷ 20 7.92 (plus 2 ramp units)		Note 15	Note 15		Note 15			Note 15		62		62		62		55		55		(Ratings are tentative)																		400 vehicles per hr 30 meters distance between vehicles. ¹⁶															
8. Amphibious river crossing equipment (ARCE)		1 Amph brg veh per 8.0 meters of brg exclusive of 8.0 meters ramp at each end of brg & 2 amph ramp carriers or 1 ST tractor w/25 ton low bed tr.		Note 15	Note 15		Note 15			Note 15		60		60		65		55		55		(Ratings are tentative)																		400 vehicles per hr 30 meters distance between vehicles. ¹⁶															
				1	1½-2		1½-3																																																

¹Transportation for bridge equipment only. Additional needed for any construction equipment required, and for troops.

²Average for trained troops and continuous daylight assembly. Allowances are required for specific situation and the longer spans.

³Includes unloading and assembly only in daylight. Does not include access roads, assembly sites, abutments, or anchorages. Does not include conversion from highway travel condition to water entry configuration for the ARCE units. Time is based on use of trained troops and no delays. Average time with 2 assembly sites.

⁴Based on abutment at level within 12-in of floating bridge deck level.

⁵Vehicle anywhere on bridge deck between curbs. Speeds up to 40 kph permitted, but 24 kph recommended. Vehicle spacing, 30 meters.

⁶Center of vehicle within 12 in of bridge centerline. Maximum speed 13 kph. Vehicle spacing 50 meters. No stopping, accelerating, or gear shifting.

⁷Center of vehicle within 9 in of bridge centerline with guide. Maximum speed 5 kph. One vehicle on bridge. No stopping, accelerating, or gear shifting.

⁸Traffic capacities are for all traffic moving forward or rearward.

⁹Reduce capacity 20 percent for currents of 3 to 3.6 mps.

¹⁰Ratings based on 18 inch curbs (166% in) in 22 balk wide superstructure.

¹¹60-ton tanks having tread widths of 143 inches or more may cross safely up to 2.3 mps.

¹²Ratings based on use of reinforcing ponton in end span and 18 balk between curbs (166% in) in 22 balk wide superstructure.

¹³Ratings based on use of double deck and span, 100 percent reinforced floating section and 20 balk between curbs (165 in) in 24 balk wide superstructure.

¹⁴Depending on length of bridge and general conditions.

¹⁵Only MAB crews are required, plus bank and access road preparation as needed.

¹⁶Based on ideal approach and ramp angle conditions.

KEY

	Class for wheeled and tracked vehicles
	Class for wheeled vehicles
	Class for tracked vehicles

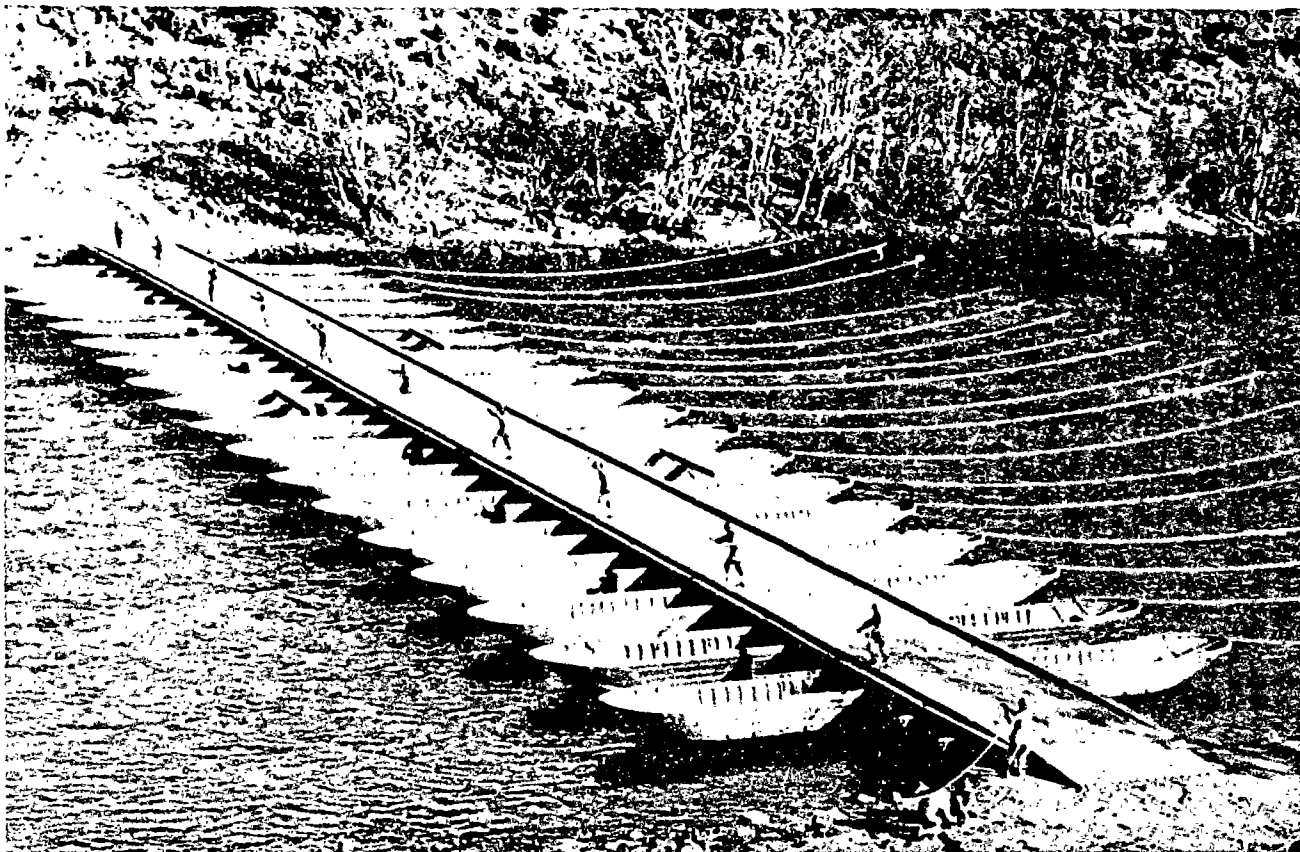


Figure 22. M4 floating bridge (limited standard).

g. M4 Floating Bridge (fig. 22). This bridge is limited standard. It consists of a continuous roadway of aluminum alloy deck balk supported by aluminum pontoons. Shore connections are made by resting the end balk upon abutment sills on the banks or by using one or more trestle spans. Balk are pinned to removable ponton gunwales, permitting pontoons to be replaced without disturbing the bridge deck.

7. Armored Vehicle Launched Bridge (AVLB)

The AVLB is a 18.3 meter span crossing device capable of handling all divisional loads. It is organic to the tank and division engineer battalions of all divisions except the airborne. The AVLB is employed primarily in assault crossings of short gaps. It is suitable for spanning narrow streams, antitank ditches, craters, canals, partially blown bridges, and similar obstacles.

8. Panel Bridge, Bailey Type, M2 (TM 5-277)

a. Types of Structure.

- (1) *General.* Panel-bridge equipment can be used to build fixed bridges and panel crib piers and towers. Other special structures such as suspension bridges, retractable bridges, and mobile bridges, can be constructed using special parts.
- (2) *Normal construction.* Panel-bridge equipment normally is used to erect fixed simple-span, single-lane, through-type bridges from 9 to 64 meters long. The bridge can be assembled to meet varying conditions of span and load.
- (3) *Special construction.*
 - (a) *Bridges.* Panel-bridge equipment also can be used to build two-lane, through-type bridges, single-lane, or two-lane deck-type bridges, rail-way bridges, and bridges on piers.

It can also be used as the superstructure for floating bridges using navy cubes, barges, or other expedient floats.

- (b) *Piers.* Panel-crib piers and towers up to 21.3 meters high can be built with panel-bridge equipment and special crib-pier parts.

- (c) *Expedients.* Panel-bridge equipment also can be used in whole or in part to build many structures, such as causeways, box anchors, towers for floating-bridge cables, loading hoppers, and gantries.

b. *Situations.*

- (1) *General.* The panel bridge is used to

Table IV. Short Fixed Spans

a. Capacity of M4 decking for short fixed spans.

Type of crossing	Capacity for specified span length (meters) and ratio of deck/roadway widths														
	7.1	9.1			11.7				13.7						
	$\frac{22}{18}$	$\frac{22}{18}$	$\frac{22}{16}$	$\frac{24}{18}$	$\frac{22}{18}$	$\frac{22}{16}$	$\frac{24}{18}$	$\frac{26}{18}$	$\frac{20}{16}$	$\frac{22}{18}$	$\frac{22}{16}$	$\frac{24}{18}$	$\frac{24}{16}$	$\frac{26}{18}$	$\frac{26}{16}$
Normal	120*	85	90	90	45	50	55	65	24	24	30	30	40	40	45
	100	65	70	70	35	40	45	50	25	25	30	30	35	35	40
Caution		100	100	105	70	70	75	82	40	46	46	51	51	56	56
		80	80	85	51	51	55	50	35	40	40	43	43	46	46
Risk		110	110	115	78	78	85	90	47	54	54	60	60	66	66
		90	90	95	57	57	62	67	40	45	45	49	49	53	53

*Limited by roadway width.

Wheeled vehicle class/tracked vehicle class.

22 Total width of bridge in number of balk

18 Total width of roadway in number of balk

b. Capacity of class 60 decking for short fixed spans.

Types of crossings	Capacity for specified clear span (meters)										
	7.3	7.9	8.5	9.1	9.8	10.4	11.0	11.6	12.2	15.2	18.3
Normal	120*	120*	115	105	95	85	75	65	60	30	20
	100*	95	80	65	60	55	50	45	40	30	22
Caution	120*	120*	120*	110	105	90	81	75	68	36	22
	100*	100	87	75	70	63	58	53	50	36	25
Risk	120*	120*	120*	120*	120	110	100	90	83	50	28
	100*	100*	100	90	85	75	68	65	60	45	30

*Limited by roadway width.

Wheeled vehicle class/tracked vehicle class.

carry both division and army loads as a tactical bridge. It may be used in the assault, in the buildup, or as a line of communications bridge.

(2) *Tactical.*

(a) *Initial assault.* For the initial assault, the panel bridge generally is not used except in special situations.

(b) *Buildup.* The fixed simple-span panel bridge is used most often for the buildup. However, when a long, simple-span bridge is needed, it is sometimes more economical in time and material to build a bridge on piers, especially if partially demolished piers already exist.

(3) *Line of communications.* The panel bridge is an excellent line of communications bridge. It can be built as a through-type bridge and as a fixed deck-type bridge.

9. Short Gap Fixed Spans

The M4 decking on the M4 and the M4T6 bridge and class 60 decking can be used to span short gaps (table IV).

10. Fording Vehicles

a. *Types.* Tanks and tank support vehicles which may be used in river crossings include—

(1) *Shallow fording.*

(a) All light and medium tanks to depths of four feet without deep fording kits.

(b) Vehicle tank recovery medium.

(c) Certain wheeled combat service support vehicles.

b. *Deep Water Fording.* Armored vehicles, with the deep water fording kit mounted, that can ford up to 13½ feet of water depth when suitable river conditions are available (TM 9-500).

11. Landing Craft

a. *Types.* Landing craft which may be used in a river crossing include:

(1) Landing craft, mechanized, MARK VI (LCM 6).

(2) Landing craft, mechanized, MARK VIII (LCM 8).

(3) Landing craft utility (LCU).

b. *Technical Characteristics.* See FM 31-12.

12. Army Aviation

For detailed capabilities and characteristics of Army aircraft see TM 57-210 and FM 101-10, Part I.

13. Safety Procedures Over-Water

Commanders must evaluate safety procedures used in training compared to requirements for safety during combat operations. Plans must include provisions for the supply, distribution, and handling of life preservers if they are to be used by the crossing force during rehearsals or operations.

a. A unit Standing Operating Procedure (SOP) should be established to provide over-water safety procedures to be used.

b. FM 5-144 provides guidance for crews and passengers when operating over water in amphibious vehicles.

c. Appropriate Technical Manuals describe requirements for operation of type amphibious vehicles in water.

APPENDIX C

EXAMPLE TRAINING PROGRAM

20th Inf Div
EAST SPRINGFIELD, NY, (WC1542)
121000 Jul ____

TRAINING PROGRAM (From 28 Jul to 6 Aug)

TM 9

Reference: Map, NEW YORK, 1:25,000 EAST
SPRINGFIELD

1. Information

This division conducts a river crossing training in the OTSEGO Lake area in preparation for the MOHAWK River crossing.

2. General Plan

The training objectives for this program and subsequent maneuver are to:

- a. Train division units in river crossing operations employing various crossing means.
- b. Train division units in surface movement control procedures.
- c. Familiarize drivers with procedures to be used with various crossing means.
- d. To rehearse units for the river crossing maneuver.

3. Detailed Plans

a. The following subjects are to be covered prior to the river-crossing maneuver.

(1) Common instruction.

- (a) Assault units will conduct 2 crossings; one in assault boats and one in amphibious carriers.
- (b) Vehicle operators of class 12 vehicles or smaller will cross twice, once

on light tactical raft and once either on M4T6 raft or MAB ferry.

- (c) Amphibious and fording vehicle operators will train in entrance, crossing and exit procedures.
 - (d) Instruction in movement control procedures.
 - (e) Instruction in over-water safety procedures.
 - (f) Training on employment of organic automatic weapons and small arms to include a review of the use of individual and other weapons against hostile aircraft, rules of engagement, use of tracer ammunition, firing techniques, aircraft recognition, and control methods.
- (2) Infantry training.
- (a) Loading into and crossing in amphibious vehicles.
 - (b) Loading and unloading from Army aircraft. Exterior sling load procedures will be included.
 - (c) Boat team training and use of assault boats.
- (3) Artillery training.
- (a) Training in loading and unloading artillery on rafts and in Army aircrafts.
 - (b) Installation and use of floatation kits; crossing of amphibious artillery.

(4) Tank training.

- (a) Loading, crossing, and unloading tanks on heavy rafts and bridges.
- (b) Installation, maintenance and use of deep water fording kits, to include escape training, recovery procedures, methods of entry into, exit from, and crossing of water obstacles.

(5) Engineer training.

- (a) Use of improvised road mats.
- (b) Construction of light tactical raft and bridge, M4T6 raft and bridge.
- (c) Installation and maintenance of bridge protective measures.
- (d) Operation of engineer regulating points.

b. Training will be by brigade.

c. Training site schedule Inclosure 1 (omitted).

4. Administrative Instructions

a. Unit training schedules will be submitted to G3 NLT 20 July _____.

b. All training activities will stress and integrate defense against CBR attack, operations in smoke haze, passive air defense procedures, communication security, concealment and camouflage, and operations while under air attack.

c. During the training period, units may conduct other training as necessary in preparation for the river-crossing maneuver.

d. Equipment available for use during common training, Inclosure 2 (omitted).

e. Unit staffs will prepare appropriate plans for communications, chemical smoke, intelligence, reconnaissance, medical support, other combat service support activities required and related to river-crossing operations. Plans for psychological operations, handling of POWs and civilians will also be developed.

APPENDIX D

EXAMPLE ANNEXES TO DIVISION PLANS AND THE PLANNING SEQUENCE

1. Example annexes to division plans are shown below:

a. Operation Plan.

Annexes: A—Intelligence

Appendix 1—Intelligence estimate

Tab A—Analysis of area of operations

Inclosure 1—Weather forecast and light data

Inclosure 2—Topographic areas overlay

Inclosure 3—Relief and drainage overlay

Inclosure 4—Trafficability overlay

Inclosure 5—Hydrologic overlay

Tab B—Enemy dispositions overlay

Appendix 2—Tactical air reconnaissance

Tab A—Air photo reconnaissance overlay

Tab B—Visual air reconnaissance overlay

Appendix 3—Counterintelligence

B—Operation overlay

C—Fire support

Appendix 1—Artillery fire

Appendix 2—Air fire

Tab A—Position areas and zones of fire

Tab B—Artillery fire

Tab C—Counterbattery

Appendix 3—Chemical

D—Illumination

E—Air movement

Appendix 1—Flight route diagram

F—Engineer

Appendix 1—Allocation of engineer equipment and supplies

Appendix 2—Schedule of engineer tasks

G—Crossing

Appendix 1—Crossing overlay

Appendix 2—Raft data and priority of crossing

H—Smoke

I—Surface movement

Appendix 1—March overlay

Appendix 2—March table

Appendix 3—Traffic circulation and control

- J—Rear area security
 - Appendix 1—Antimechanized and antiairborne defense
 - Appendix 2—Antiguerrilla defense
 - Appendix 3—Traffic circulation and control
- K—Tactical cover and deception
- L—Electronic warfare and signal security
- M—Administration
 - Appendix 1—Aerial resupply
 - Appendix 2—Civil affairs
 - Appendix 3—CBR security
- N—Signal
 - Appendix 1—Teletypewriter traffic diagram
 - Appendix 2—Telephone traffic diagram
 - Appendix 3—Radio nets
 - Appendix 4—Messenger and air courier schedule
 - Appendix 5—Emergency and/or supplementary communications

2. Although many of the plans required are prepared concurrently, the following sequence is indicative as to the order of preparation:

- | | <i>Responsible officer</i> |
|---|--|
| a. Intelligence plan ----- | G2 |
| b. Operation plan ----- | G3 |
| c. Fire support plan ----- | Division artillery commander |
| d. Engineer plan ----- | Division engineer |
| e. Crossing plan ----- | G3 |
| f. Surface movement plan ----- | G4 |
| g. Air movement plan ----- | Division aviation officer |
| h. Signal (communications) plan ----- | Division signal officer |
| i. Rear area security plan ----- | G3 |
| j. Tactical cover and deception plan --- | G3 |
| k. Electronic warfare and signal security plan. | Division signal officer and
USASA representative. |
| l. Administrative plan ----- | G4 |
| m. Traffic circulation plan ----- | G4 |
| n. Traffic control plan ----- | Division provost marshal |
| o. Aerial resupply plan ----- | G4 |
| p. Civil affairs plan ----- | G5 |
| q. CBR defense plan ----- | Chemical officer |

3. CROSSING FORCE OPERATIONAL PLANNING REQUIREMENTS

a. Corps is responsible for control of the detailed planning for and conduct of a river-crossing operation. Upon receipt of a directive from Army, tentative plans previously prepared for a specific area are developed in detail.

b. Employment of the division or smaller unit on an independent river crossing normally requires augmentation with combat support and combat service support units.

c. Planning staffs of units conducting independent operations may have reduced planning time, and the detail may vary, however, all planning factors should be considered.

d. Planning is developed from the bridgehead line back toward the river line. The sequence is generally as follows: (C—Corps, D—Division, I—Independent crossing force).

- (1) Alert subordinate units as early as possible. C, D, I.
- (2) Select bridgehead. C, I.
- (3) Select objectives of primary interest to: C, D, I.
- (4) Estimate the strength and allocation of troops necessary to secure the bridgehead. C, I.
- (5) Determine time required for seizing the selected bridgehead. C, I.
- (6) Consider availability of resources; use of airborne and airmobile forces; and capabilities of friendly guerrillas. C, I.
- (7) Consider seizure of intermediate objectives if required. C, D, I.
- (8) Estimate strength and allocation of assault troops. C, D, I.
- (9) Determine crossing force maneuver plan. C, D, I.
- (10) Determine missions to be assigned to divisions and corps troops. C.
- (11) Determine missions to be assigned to brigades and division troops. D, I.
- (12) Designate boundaries and control measures. C, D, I.
- (13) Estimate the quantity and type of fire support required. C, D, I.
- (14) Determine the number of air defense artillery units required. C, D, I.
- (15) Determine most advantageous crossing means and sites. C, D, I.
- (16) Designate crossing fronts, areas, sites, and as necessary, the location of bridge sites. C, D, I.
- (17) Estimate times at which rafts, ferries, and bridges should be operational. C, I.
- (18) Determine amounts and types of crossing equipment and additional troops required, such as engineer and military police. C, D, I.
- (19) Determine the crossing sequence of units (crossing plan). C, D, I.
- (20) Determine special communication requirements. Develop communications plan. C, D, I.
- (21) Determine the number of phases required. C, I.
- (22) Determine combat and combat service support requirements for each phase. C, D, I.
- (23) Determine special training required and preparation of training plans. C, D, I.
- (24) Evaluate the command's vulnerability to enemy attack including nuclear, chemical-biological, and air attack during each operation phase. C, D, I.

- (25) Develop deception plans as required. C, D, I.
- (26) Determine the civil affairs requirements for each phase. C, D, I.
- (27) Re-evaluate and adjust overall requirements. C, D, I.
- (28) Disseminate to subordinate units tentative plans, intelligence, and the crossing force commander's concept and phasing. C, D, I.
- (29) Coordination and approval of subordinate unit plans. C, D, I.

APPENDIX E

DEVELOPING A CROSSING PLAN

1. General

This appendix describes one method by which a division crossing plan may be developed. The hypothetical 20th Infantry Division has been used in the examples, however, the same procedures are applicable to other type divisions. The details and format should be varied, as required, to suit the existing situation.

2. Site Selection

In most river-crossing operations, the combat maneuver plans and technical considerations of site selection are in conflict. For example, from a technical viewpoint, the selection of an old permanent bridge location usually offers several advantages as a floating bridge site. The access roads are simple to construct, and the piers of the old bridge can be used to anchor the floating bridge. However, from a tactical viewpoint, old bridge sites are usually heavily mined and are excellent registration points for enemy artillery. The commander must recognize the existence of this conflict, weigh existing factors, and make necessary compromises to arrive at a sound, workable solution. Tables V and VI show a *sample format* that may be used in evaluating the tactical and technical aspects of crossing sites. Additions and deletions to the features listed should be made as warranted by existing conditions. Similar tables may be established for evaluating swim sites, fording sites, or for comparing the advantages and disadvantages for the use of Army aviation, amphibious vehicles and assault boats in a particular situation. (Para 3, 4; tables VII, VIII, IX, below.)

3. Organizing Alternate Crossing Capabilities for Comparison

In selecting the proper crossing alternative, the number of vehicles to be crossed must be weighed against the available crossing means. Table VII lists the vehicle raft requirements for organic and attached vehicles available at the time of the crossing. Table VIII shows the available crossing means.

4. Comparison of Alternate Crossing Capabilities

a. Table IX is a comparison of the alternative crossing capabilities and is an estimate of the number of vehicles that can be crossed per hour after the attack is launched.

b. The following intelligence and planning factors were used in developing table IX:

- (1) Velocity of river—1.6 meters per second.
- (2) Width of river throughout crossing front—100 meters.
- (3) Construction begins:
 - (a) Light Tactical Raft—H+1
 - (b) M4T6 raft—H+1 hr 30 min
 - (c) Mobile Assault Ferry—H+1 hr 30 min
 - (d) M4T6 bridge—H+2 hr 30 min
- (4) Construction times (tables II and III): site and approach road preparation were minimal.
 - (a) Light Tactical Raft—30 min
 - (b) M4T6 Raft—1 hr 30 min
 - (c) Mobile Assault Ferry—25 min
 - (d) M4T6 Bridge—3 hr 30 min

Table V. Evaluation of Assault Crossing Sites

		Assault site		
		1	2	***
Access to Crossing Site (Road net [RN] and Cross Country Mobility [CCM])	Foot Troops (with Assault Boats)	RN—Fair CCM—Poor (Marshes)	RN—Fair CCM—Good	***
	APC	RN—Fair CCM—Poor (Marshes)	RN—Fair CCM—Good	***
Egress from Crossing Site	Foot Troops	RN—Poor CCM—Fair	RN—Good CCM—Good	***
	APC	RN—Poor CCM—Fair	RN—Good CCM—Good	***
Stream Velocity	Assault Boats	Fair	Good	***
	APC	Fair	Good	***
Obstacles Affecting Movement	Near shore	None	None ¹	***
	Water Area	None	None ¹	***
	Far shore	None	None ¹	***
Bank (composition and slopes)	Foot troops in assault boats	Fair	Good	***
	APC	Poor—far shore requires con- siderable engineer work	Fair	***
Enemy Situation—far shore		Poor—enemy positions along ridge	Poor—enemy positions vicinity Hill 206	***
Assembly Areas Available		Fair	Fair	***
Attack Positions Available	Day	Poor—too far from river	Poor—little concealment	***
	Night	Good	Good	***
Avenues of Approach (to objective—far shore)		Fair—terrain good, but long	Good	***
Dominating Terrain (near shore)		Poor	Fair	***
Space for Movement		Poor—limited to North by division boundary	Good	***
Remarks and/or Recommendations		Reject. Site presents difficult problems, both tactical and technical	Select. Advis- able to employ night assault or smoke attack positions	***

*Except vicinity of old bridge site.

Table VI. Evaluation of Float Bridge and Raft Sites

Feature		Site			
		***	G	H	***
Roads (Vicinity Near Shore)	Class	***	60	60	***
	Road Net	***	Good	Fair	***
Roads (Vicinity Far Shore)	Class	***	60	60	***
	Road Net	***	Good	Fair (1-way)	***
Road Construction Requirements	Near Shore	***	Repair craters	Requires 400m access road	***
	Far Shore	***	Remove mines	Remove mines, clear rubble	***
Crossing Class (on stream velocity for wheel/track)	LTR (4-pontoon)	***	12/12	12/12	***
	Mobile Assault Raft (4-float)	***	60/65 or 2 ea 60	60/65 or 2 ea 60	***
	M4T6 Raft (4-float)	***	50/55	50/55	***
	M4T6 Bridge	***	45/55	45/55	***
Obstructions (water area)		***	None	None	
Width of River (Meters)		***	98	100	***
Banks	Preparation required	***	Good	Poor—will require some gravel and revetting	***
	Support loads	***	Good	Fair	***
Equipment Erection Area	River	***	Fair	Fair	***
	Rear	***	Good	Good	***
Anchorage	Holdfasts	***	Good	Fair	***
	Bottom	***	Poor	Poor	***
Remarks and/or Recommendations		***	Select. Good raft or bridge site	Reject. Poor raft and bridge site. Would require considerable effort and tie-in to only fair road net	***

Table VII. Vehicle Raft Requirements

Unit	Amphibious vehicles	Light tactical raft (vehicles C1 12 or less)	M4T6 or mobile aslt (vehicles C1 12 and over)
1st Bde, 20th Inf Div:			
Bde Hq- - - - -	2	48	1
1/66 Inf- - - - -	0	117	1
* * *- - - - -	* *	* *	* *
63d Arty Gp Hq- - - - -	0	30	0
1/45 Arty (105) - - - - -	0	121	1
1/651 Arty (155) - - - - -	0	97	32
* *- - - - -	* *	* *	* *
* * *- - - - -			
Fwd Spt Co, Maint Bn - - - - -	0	41	3
* * *- - - - -	*	* *	* *
Total 1st Bde - - - - -	37	933	172
2d Bde, 20th Inf Div:			
Bde Hq- - - - -	2	48	1
* * *- - - - -	* *	* *	* *
A 1/1 Armor- - - - -	2	5	18
* * *- - - - -	* *	* *	* *
Total 2d Bde- - - - -	16	636	45
3d Bde, 20th Inf Div:			
* * *- - - - -			
Total 3d Bde- - - - -	27	438	89
Div Arty, 20th Inf Div:			
HHB- - - - -	0	67	0
1/47 Arty (105)- - - - -	0	121	1
* * *- - - - -	* *	* *	* *
Total Div Arty- - - - -	0	601	153
Div Trp, 20th Inf Div:			
HHC- - - - -	0	44	0
1/21 Cav- - - - -	42	126	48
* * *- - - - -	* *	* *	* *
Total Div Trp - - - - -	42	930	246
Spt Comd, 20th Inf Div:			
HHC & Band - - - - -	0	19	0
* * *- - - - -	* *	* *	* *
Total Spt Comd - - - - -	0	297	62
20th Inf Div Total - - - - -	122	3835	767

Table VIII. Available Crossing Means

	Recon Boats 3-man	Aslt Boats 15-man	Foot Bridge	LTR (C1 12)	M4T6	Mobile Aslt Bridge/Ferry
HHC, Inf Bde (3)----	3					
HHC, 20th Engr Bn --	4					
Engr Co (4), 20th Engr Bn-----	12					
Bridge Co, 20th Engr Bn-----	12	18	-----	2	-----	1-44 Meter Bridge or 4-4 Float Ferries
Bridge Co, 114th Engr Gp-----	10	70	144 meters	6	216 meters Bridge or 10-4 Float Rafts or combi- nation	
TOTALS-----	41	88	144 meters	8	216 meters Bridge or 10-4 Float Rafts or combi- nation	1-44 meter Bridge or 4-4 Float Ferries

Table IX. Estimated Vehicle Crossing Capability

ALTER-NATIVE	CROSSING MEANS	CUMULATIVE VEHICLES CROSSED																
		H+1	H+2	H+3	H+4	H+5	H+6	H+7	H+8	H+9	H+10	H+11	H+12	H+13	**	H+24	H+25	
A	8-LTR (C1 12): Total round trips	0	28	84	140	196	252	308	364	420	476	532	588	644	**	1260	1316	
	10-M4T6 Rafts (C1 55): Total round trips	0	0	0	70	140	210	280	350	420	490	560	630	700	**	1470	1540	
	4-Mobile Aslt Ferries (C1 60): Total C1 60 vehicles	0	0	56	112	168	224	280	336	392	448	504	560	616	**	1232	1288	
	0-M4T6 Bridges: Total number of vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	**	0	0	
	Total Vehicles - - - - -	0	28	140	322	504	686	868	1050	1232	1414	1596	1778	1960	**	3962	4144	
B	8-LTR - - - - -	0	28	84	140	196	252	308	364	420	476	532	588	644	**			
	5-M4T6 Rafts - - - - -	0	0	0	35	70	105	140	175	210	245	280	315	350	**			
	4-Mobile Aslt Ferries - - - - -	0	0	56	112	168	224	280	336	392	448	504	560	616	**			
	1-M4T6 Bridge - - - - -	0	0	0	0	0	0	400	800	1200	1600	2000	2400	2800	**			
	Total Vehicles - - - - -	0	28	140	287	434	581	1128	1675	2222	2769	3316	3863	4410	**			
C	8-LTR - - - - -	0	28	84	140	196	252	308	364	420	476	*						
	0-M4T6 Rafts - - - - -	0	0	0	0	0	0	0	0	0	0	*						
	4-Mobile Aslt Ferries - - - - -	0	0	56	112	168	224	280	336	392	448	*						
	2-M4T6 Bridges - - - - -	0	0	0	0	0	0	800	1600	2400	3200	*						
	Total Vehicles - - - - -	0	28	140	252	364	476	1388	2300	3212	4124	*						

(5) Round trips per hour (table II):

(a) Light Tactical Ferry—7

(b) M4T6 Raft—7

(c) Mobile Assault Ferry—7

(6) Light Tactical Raft (LTR) and M4T6 raft capabilities are based on one vehicle per trip (increase to two vehicles for M4T6 rafts transporting class 12 and smaller vehicles).

(7) Mobile Assault Ferry vehicles are computed on basis of two class 60 vehicles per trip. (Number of vehicles can be increased by two ferries carrying vehicles under class 12.)

(8) In table IX the figures for each hour are cumulative and do not include vehicles that cross using their amphibious capability.

c. In analyzing the alternatives, the following were considered:

(1) The crossing volume provided should be sufficient to permit timely accomplishment of the mission.

(2) Amount of organic and attached engineer effort required to construct and operate the crossing means.

(3) Provision for buildup of essential vehicles and equipment in the bridgehead between the time of the assault crossing and completion of floating bridges.

(4) Vulnerability of crossing means to enemy attack.

(5) Traffic control problems created by limited crossing means.

(6) Congestion created by limited crossing means thereby presenting a lucrative target to the enemy.

d. In selecting the crossing capability best suited for this particular situation the relative merits of raft versus bridge operation were examined. Rafts are excellent means of moving essential vehicles into the bridgehead during the interval between the assault crossing and completion of the bridge. Essential vehicles are the vehicles considered most important to the success of the operation for the assistance they

or their contents can provide for the assault force on the far bank. Some of these vehicles are—

(1) Armored vehicles.

(2) Engineer equipment for far bank tasks.

(3) Ammunition carriers.

(4) Heavy weapons carriers.

(5) Artillery forward observer vehicles.

(6) Forward air control party vehicles.

(7) Medical vehicles.

(8) Air defense vehicles for far bank.

(9) Artillery vehicles.

(10) Smoke generator vehicles.

(11) Communication vehicles.

e. Because rafts are likely to furnish the only available means to cross the essential vehicles, they should be constructed as early as possible. However, employing men and equipment on the construction of rafts (except Mobile Assault Ferries) may retard the building of bridges. In addition, rafts generally cannot cross a sufficient volume of combat, combat support, and combat service support vehicles at an acceptable rate for sustained operations. Rafts must be replaced or supplemented by bridging when enemy observation or reaction has been reduced.

f. In light of the above, the following rationale was used in selecting the optimum alternative from those shown in table IX:

(1) Alternative A was rejected since it would not provide a sufficient crossing volume to allow for the timely accomplishment of the division's mission.

(2) Alternative B allows the division a maximum number of essential vehicles in the bridgehead early in the operation. It also provides a bridge which allows the division to cross a sufficient volume to accomplish its mission. However, the success of the operation now depends on the ability to prevent the enemy from destroying this one bridge. In addition, the dif-

ficulty in controlling the traffic through this "bottleneck" so as not to present a nuclear/chemical target would be great.

- (3) In this particular example, alternative C was selected as the one upon which to base the crossing plan. Alternative C provides for a sufficient volume of essential vehicles in the bridgehead early in the operation and

also allows the extra advantage on one additional bridge. Using this alternative, the division does not have to hinge the success of the operation on one bridge, and the problems of movement control are greatly simplified.

- g. The crossing plan contained in the following sample operation order is based on the data developed in the preceding paragraphs.

5. Sample Operation Order

(Classification)

Copy No 3
20th Inf Div
JONESBORO (RC 3132)
AGSATLAND
141130 Jul 196____
CL 532

OPORD 5

References: * * *

Task org:

* * *

Div Trp

* * *

114th Engr Gp

* * *

20th Avn Bn

125th Avn Bn

* * *

1. SITUATION

* * *

2. MISSION

Div atks 150205 Jul; secures corps bridgehead in zone; prepares to continue atk to the east.

3. EXECUTION

a. Concept of operation, Annex B, Operations Overlay.

- (1) General. This is a deliberate river crossing executed in two phases. Initial assault crossings by assault

boats and helicopters prior to first light. Sequence for operation is as follows:

(a) Phase I (H—1 to H+15):

1. H—1. Engineer elements infiltrate across river for reconnaissance and demolition missions.
2. H—15 minutes to H-hour. Non-nuclear artillery preparation.
3. H-hour to H+15. Amphibious assault of river line; initiate raft and bridge construction.
4. H+1. Airmobile troops arrive in vicinity of objective 1.
5. Secure line RED.

(b) Phase II (H+15—H+30):

1. H+15. Airmobile unit lands vicinity of objective 3; ground units continue atk to the east, seize objective 4.
2. Objective 3 secured by airmobile unit.
3. Secure line BLUE (corps bridgehead line).

(2) Maneuver.

- (a) Phase I. Infiltration elements cross river, execute demolition missions, select and mark assault exits. 1st and 2d Bdes move from assembly areas in time to begin simultaneous crossings at H-hour by assault

(Classification)

boats. 1st Bde secures crossing sites and seizes objective 1 by air-mobile and ground assault. 2d Bde secures crossing sites and seizes objective 2. Both Bdes secure line RED in zone.

- (b) Phase II. 1st and 2d Bdes continue, on division order, to attack to east; seize objectives 4 and 3 respectively, by ground and airmobile assaults; secure line BLUE in zone; and prepare to continue attack to east.
- (3) Fires.
 - (a) Nuclear. No nuclear preparation will be fired. Fires will be planned to block enemy avenues of approach with priority from the east. Appendix 1 (Artillery Fire) and Appendix 2 (Air Fire) to ANNEX C, Fire Support.
 - (b) Artillery. A nonnuclear preparation will be fired during Phase I, beginning at H—15 minutes, to neutralize enemy forces east of river and to cover final movement of assault infantry battalions from assembly areas. Fires will be planned to restrict movement of enemy reserves into the area. Priority of fires to 1st Bde; 3d Bde when committed. Appendix 1 (Artillery Fire) to ANNEX C, Fire Support.
 - (c) Air. During Phase I, air will bomb and smoke western slopes of objective 1 and 2. Throughout operation air will provide fighter cover for all helicopter movement throughout Phase I and II. Appendix 2 (Air Fire) to ANNEX C, Fire Support.
 - (d) Chemical. Nonpersistent chemicals will be fired in conjunction with artillery preparation in Phase I. Persistent and nonpersistent chem-

icals will be fired in conjunction with nonnuclear fires to supplement effects against enemy fortifications and movement of enemy reserves. (Appendix 3, Chemical, to ANNEX C, Fire Support.)

(e) ANNEX C, Fire Support.

b. * * *
* * *
* * *

e. 20th Avn Bn—Gp
20 Avn Bn
125 Avn Bn

- (1) Support 1st Bde and 2d Bde in that order.
- (2) Phase I. Deliver assault Bde forces vicinity objective 1 beginning at H. Be prepared to support 114th Engr Gp with one medium helicopter aviation company in movement of bridge components to river line.
- (3) Phase II. Support 2d Bde to secure objective 3.
- (4) ANNEX E, Air Movement.

h. 20th Engr Bn:

- (1) Be prepared to support 3d Bde with one company when committed.
- (2) Construct and operate four MAB ferries at site Mike and site Papa.
- (3) ANNEX F, Engineer.
- (4) ANNEX G, Crossing.

i. 144th Engr Gp:

- (1) Support 1st and 2d Bde with assault boats.
- (2) Construct M4T6 bridge at site Echo and site Quebec; footbridge at site Whiskey.
- (3) Construct LTR rafts in division zone.
- (4) ANNEX F, Engineer.
- (5) ANNEX G, Crossing Plan.

(Classification)

j. * * *

n. Coordinating instruction.
(1) ANNEX G, Crossing.
(2) * * *

4. ADMINISTRATION AND LOGISTICS
* * *

5. COMMAND AND SIGNAL
* * *

Acknowledge.

SMITH
Maj Gen

Annexes: (continued).

D—Illumination (omitted)
E—Air Movement (omitted)
F—Engineer (omitted)
G—Crossing
H—Smoke (omitted)
I—Surface Movement (omitted)
J—Administration (omitted)
K—Signal (omitted)

Distribution:

A
22d Inf Div
52d Mech Div

Annexes: A—Intelligence (omitted)
B—Operation Overlay
C—Fire Support (omitted)

OFFICIAL:
/s/King
KING
G3

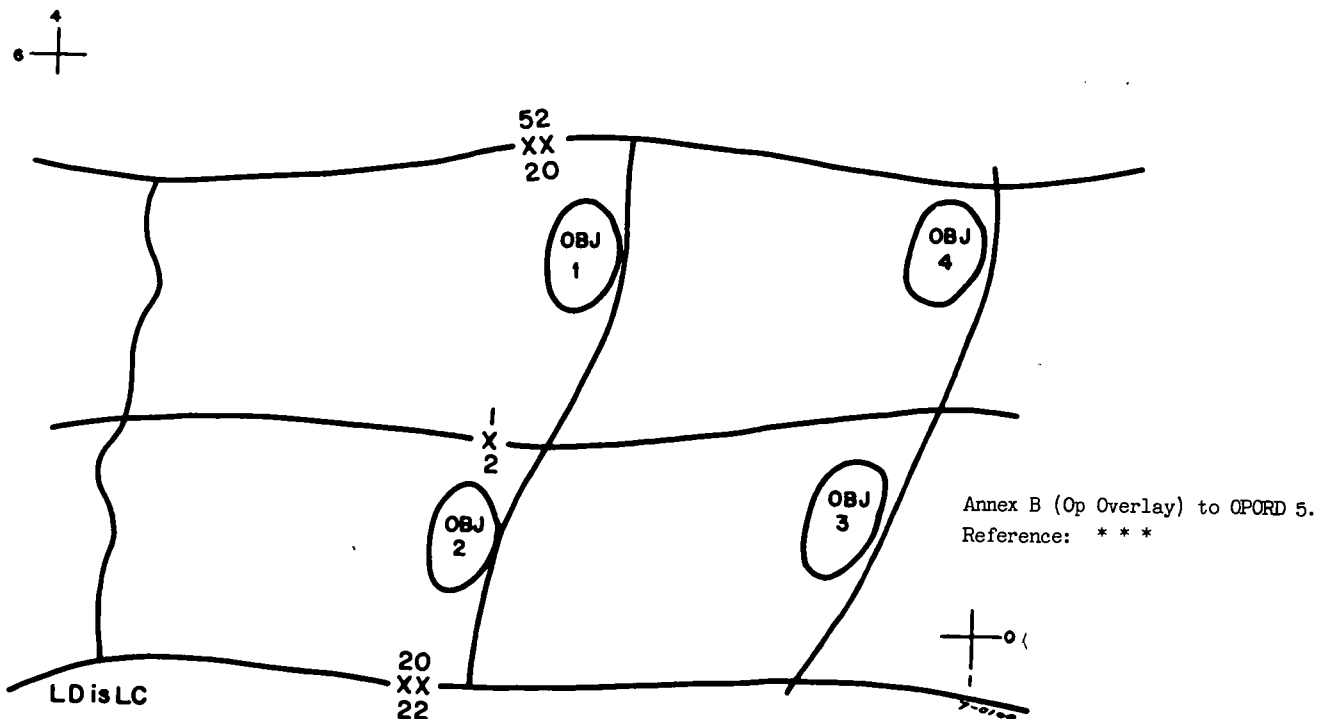


Figure 23. ANNEX B (Op Overlay) TO OPORD 5.

(Classification)

ANNEX G (Crossing) to OPORD 5

References: * * *

1. CROSSING SITE LOCATIONS. Appendix 1, Crossing Overlay.

2. ASSAULT CROSSINGS.

a. 1st Bde.

(1) Crossing area OREGON: assault crossing sites 2 and 3.

(2) Crossing area VERMONT: assault crossing sites 6, 7 and 8.

b. 2d Bde.

(1) Crossing area TEXAS: assault crossing sites 10 and 11.

(2) Crossing area FLORIDA: assault crossing site 13.

c. 1st Recon Sqdn, 21st Cav. Crossing area OREGON: assault crossing site 2 on order.

3. RAFT SITES

Type and capacity of LTR's and Mobile Assault Ferries and priority of crossing. Appendix 2, Raft Data and Priority of Crossing.

4. FLOATING BRIDGES

a. Type and capacity of bridges in 20th Inf Div zone:

CROSSING AREA	SITE	TYPE BRIDGE	CL	APPROX OPENING TIME
OREGON	ECHO	M4T6	45/55	H+6
TEXAS	QUEBEC	M4T6	45/55	H+6
FLORIDA	WHISKEY	ALUM FOOT BRIDGE	Foot	H+2

b. Tentative priority of crossings.

(1) Site ECHO

H+6 to H+6 hr 15 min---Div Trp

H+6 hr 15 min to H+8

hr 15 min-----1st Bde

H+8 hr 15 min to H+9

hr 45 min-----3d Bde

H+9 hr 45 min to H+10---Div Trp

H+10 to H+11 -----Spt Comd

(2) Site QUEBEC

H+6 to H+6 hr 15 min---Div Trp

H+6 hr 15 min to H+7

hr 30 min-----2d Bde

H+7 hr 30 min to H+9---Div Arty

H+9 to H+11-----Div Trp

(3) Site WHISKEY

H+2 to H+11-----2d Bde

5. CONTROL OF CROSSING

a. Brigades executing assault crossings control movement across river within their zone until crossing areas are established. Crossing areas established on division order. Crossing area commanders are designated below:

CROSSING AREA	COMMANDER	CP LOCATION
OREGON	Brig Gen BLACK, ADC, 20th Inf Div	FS4448
VERMONT	Lt Col GREEN, XO, 3d Bde, 20th Inf Div	FS4331
TEXAS	Brig Gen BLUE, ADC, 20th Inf Div	FS4212
FLORIDA	Lt Col BROWN, Div HHC, 20th Inf Div	FS4204

b. All raft and bridge crossing priorities will be adjusted based on actual opening times of rafts and bridges.

Appendix: 1—Crossing Overlay

2—Raft Data and Priority of Crossing

(Classification)

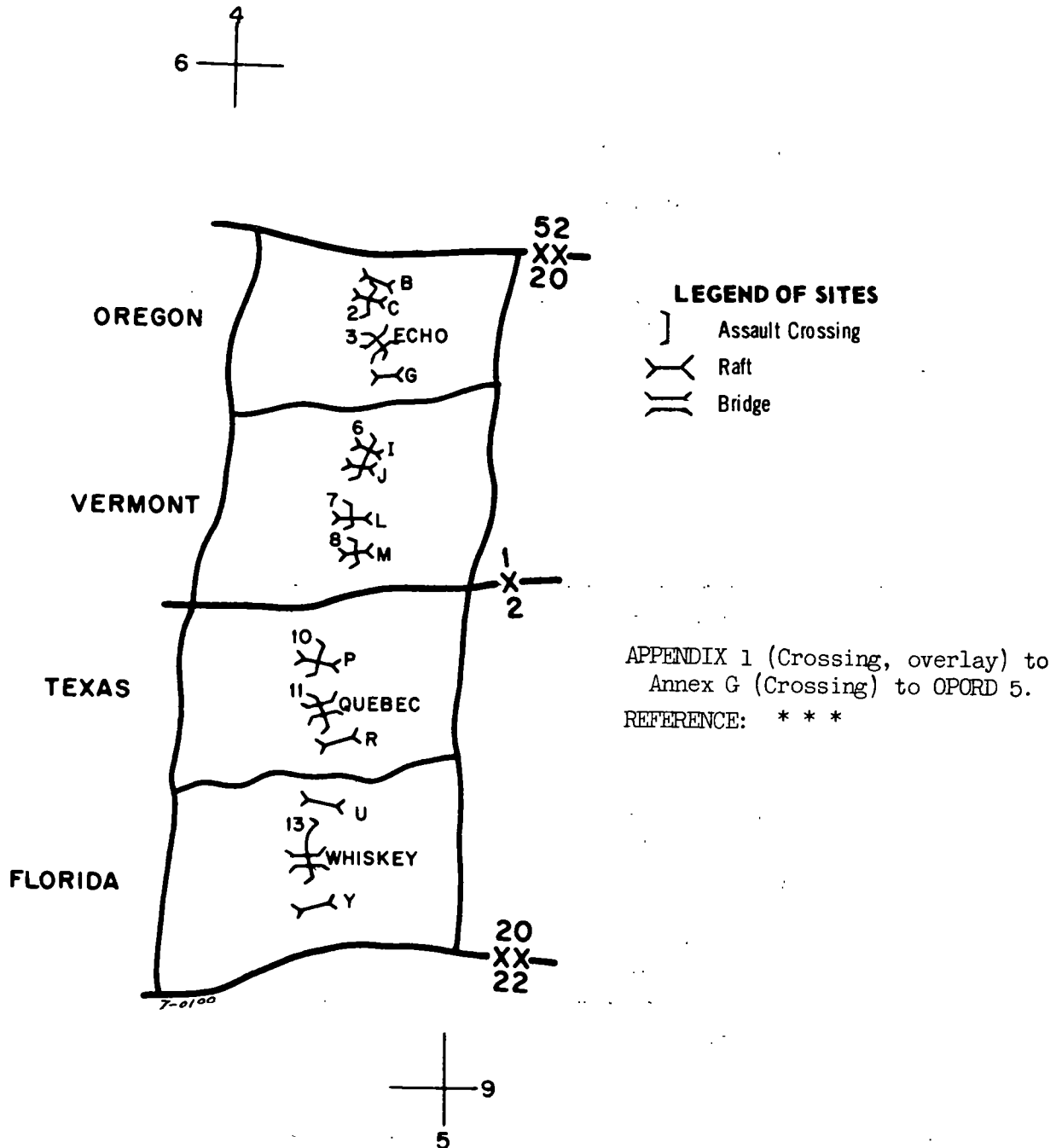


Figure 24. APPENDIX 1 (Crossing overlay) to ANNEX G (Crossing) to OPORD 5.

(Classification)

(Classification)

Copy No 3
20th Inf Div
JONESBORO (RC3132)
AGSATLAND
141130 Jul 196__
CL 532

Appendix 2 (Raft Data and Priority of Crossing) to ANNEX G (Crossing) to OPORT 5

1. Type and capacity of LTR's and Mobile Assault Rafts in zone of 1st Bde.

CROSSING AREA	SITE	NO. AND TYPE RAFT	OPENING TIME (APPROX)	ROUND TRIPS EA HOUR PER RAFT	CAPACITY PER HR (DAY) TANK G.P. VEH		CAPACITY PER HR (NIGHT) TANK G.P. VEH	
OREGON	B	1—LTR	H+ hr 30 min	7	—	7	—	3
	C	1—Mbl Aslt	H+2 hr	7	14	(28)	6	(12)
	G	2—LTR	H+1 hr 30 min	7	—	14	—	6
TOTAL capacity per hour, Mobile Aslt Ferry					14	(28)	6	(12)
TOTAL capacity per hour, LTR					—	21	—	9
VERMONT	I	1—Mbl Aslt	H+2 hr	7	14	(28)	6	(12)
	J	1—LTR	H+1 hr 30 min	7	—	7	—	3
	L	1—Mbl Aslt	H+1 hr 30 min	7	14	(28)	6	(12)
	M	1—LTR	H+ hr 30 min	7	—	7	—	3
TOTAL capacity per hour, Mobile Aslt Ferry					28	(56)	12	(24)
TOTAL capacity per hour, LTR					—	14	—	6

(Classification)

(Classification)

2. Type and capacity of LTR's and Mobile Assault Ferries in zone of 2d Bde.

CROSSING AREA	SITE	NO. AND TYPE RAFT	OPENING TIME (APPROX)	ROUND TRIPS EA HOUR PER RAFT	CAPACITY PER HR (DAY) TANK G.P. VEH		CAPACITY PER HR (NIGHT) TANK G.P. VEH	
TEXAS	P	1—LTR	H+1 hr 30 min	7	—	7	—	3
	R	1—LTR	H+1 hr 30 min	7	—	7	—	3
	TOTAL capacity per hour, Mobile Aslt Ferry				—	14	—	6
FLORIDA	U	1—Mbl Aslt	H+2 hr	7	14	(28)	6	(12)
	Y	1—LTR	H+1 hr 30 min	7	—	7	—	3
	TOTAL capacity per hour, Mobile Aslt Ferry				14	(28)	6	(12)
TOTAL capacity per hour, LTR					—	7	—	3

Note: Figures in parentheses indicate vehicle capability when heavy rafts are not being used for tanks or special vehicles.

3. Tentative priority of raft sites. Bdes plan crossing of DS Arty.

SITE		TIME PERIOD		UNIT	SITE		TIME PERIOD		UNIT
B	H+1	hr 30 min -	H+6	1st Bde	M	H+1	hr 30 min -	H+4	1st Bde
	H+6	-	H+11	Div Trp		H+4	-	H+11	Div Arty
C	H+2	-	H+5	1st Bde	P	H+1	hr 30 min -	H+9	2d Bde
	H+5	-	H+11	Div Trp		H+9	-	H+11	Div Trp
G	H+1	hr 30 min -	H+9	1st Bde	R	H+1	hr 30 min -	H+5	2d Bde
	H+9	-	H+11	Spt Comd		H+5	-	H+11	Div Arty
I	H+2	-	H+9	1st Bde	U	H+2	-	H+7	2d Bde
	H+9	-	H+11	Spt Comd		H+7	-	H+11	Div Arty
J	H+1	hr 30 min -	H+9	1st Bde	Y	H+1	hr 30 min -	H+9	2d Bde
	H+9	-	H+11	Div Trp		H+9	-	H+11	Div Trp
L	H+2	-	H+4	1st Bde	Distribution: Same as OPORD 5				
	H+4	-	H+11	Div Arty					

(Classification)

INDEX

	Paragraphs	Page
Administrative plan -----	99,100,app D	43,73
Aerial bridge -----	38	15
Airborne forces -----	21,26,110	9,12,47
Air defense artillery -----	3,33,60,89	2,14,26,37
Air force support -----	10,38,60,61,65, 85,app D	6,15,26,28,36,73
Airmobile forces -----	21,26,30,65,81	9,12,28,35
Air movement -----	6,26,38,app B	3,12,15,52
Air superiority -----	3	2
Ammunition -----	78,99,101,app E	34,43,44,77
Amphibious vehicles -----	30,36,39,47,63, 100,app B	12,15,16,19, 26,43,52
Armor -----	9,17,30,33,53,54	6,8,12,14,22,23
Armored carriers -----	37,40,54,app B	15,17,23,52
Artificial illumination -----	53,83	22,36
Artillery:		
Communications -----	86	37
Counterbattery fires -----	65	28
Displacement -----	6,27,65	3,25,28
Enemy -----	30	12
Fire support -----	32,63,65	14,26,28
Observation -----	46	18
Planning -----	59	25
Preparatory fires -----	65,95	28,40
Training -----	App C	71
Units -----	3,57,64,100	2,25,27,47
Assault:		
Boats -----	39	16
Bridges -----	42	17
Crossing sites -----	46	18
Daylight -----	53	22
Echelon -----	63,65	26,28
Force -----	4,7,14	3,4,7
Line of departure -----	15	7
Night -----	53	22
Of river -----	16	7
Vulnerability -----	9	6
Attack:		
Broad front -----	13	7
Narrow front -----	13	7
Time of -----	17,53,95	8,22,40
Aviation -----	3,7,32,36,38,65, 100,100	2,4,14,15,28,43,47
Avenues of approach -----	10,31,45,49,60,89	6,13,18,20,26,37
Bailey bridge -----	app B	52
Barges -----	10,108,app B	6,46,52
Boats -----	10,39,46,108	6,16,18,46
Bridge, floating		
General -----	42,app B	17,52
Partially demolished -----	42	17

	Paragraphs	Page
Protective devices -----	42,86	17,37
Requirements -----	50	21
Bridgehead:		
Antaircraft defense -----	33,89	14,37
Antitank defense -----	33	14
Buildup -----	19,21	8,9
Definition -----	4	3
Maneuver space -----	22-24	10
Objectives -----	5,20-25	3,8
Selection -----	20	8
Bridges:		
Construction -----	54	23
Defense against air attack -----	89	37
Fixed -----	app B	52
Floating -----	42,app B	17,52
Bridge sites -----	49	20
Bridging considerations -----	42,43,54	17,23
Broad front -----	13,34	7,14
Build up -----	2,19,22-24,100	2,8,10,43
Camouflage -----	3,89,92	2,37,39
Cargo identification -----	78	34
Causeways -----	107	46
Chemical-Biological weapons -----	2,3,5,10,17,19,29, 32,46,82,99	2,3,6,8,12,14, 18,36,43
Chemicals -----	82,85,91,app E	36,38,77
Chemical smoke generator units -----	3,63	2,26
Civil affairs -----	32,104,app D	14,45,73
Civilians -----	3,10,33,78, 104,111	2,6,14,34,45,48
Class I supplies -----	99,100	43
Class III supplies -----	78,99,100	34,43
Class IV supplies -----	99,100	43
Class V supplies -----	78,99,100	34,43
Clearing stations -----	102	44
Cold weather conditions -----	10,42,105	6,17,46
Combat intelligence -----	9,10,31	6,13
Combat service support -----	54,79,99	23,34,43
Combat support -----	51,54,56,99	21,23,25,43
Command and control -----	6,21,34,35,53, 54,68,78,79	3,9,14,15,22, 23,30,34
Communications -----	79-81	34
Communication security -----	6,79,90	3,34,38
Concealment -----	3,17,45-48,53, 90-96	2,8,18,22,38
Concept of:		
River crossing operations -----	12-27	7
Surface movement -----	67	30
Construction time (tables III, IV) -----	---	67,69
Control -----	4,6,21,34,35, 43,54	3,9,14,15,17,23
Corps operations -----	2-4,20,23,24,31, app C	2,8,10,13,71
Cover -----	45,47,48,54,73 84,89	18,19,20,23,33, 36,37
Cover and deception -----	3,26,45,84,89, 90-96	2,12,18,36,37,38
Crossing area commander -----	67,67-71,75,76, 80,81,86,app E	30,33,35,37,77

	Paragraphs	Page
Crossing areas -----	4,70,75	3,31,33
Crossing force -----	3,4	2,3
Crossing front -----	4,13	3,7
Crossing means -----	6,7,9,32,43,app B	3,4,6,14,17,52
Crossing plan -----	32,68,app E	14,30,77
Crossings:		
Broad front -----	13	7
Daylight -----	17,53	8,22
Deliberate -----	8,34	5,14
Equipment -----	36-42	15
Hasty -----	7,35	4,15
Night -----	17,53	8,22
Time -----	17,53	8,22
Crossing sites -----	4,9,44-50,86	3,6,18,37
Data:		
Hydrographic -----	45,app D	18,73
Technical -----	10,31,app E	6,13,77
Daylight crossing -----	17,53,94	8,22,39
Deceptive measures -----	3,32,84,90-96	2,14,36,38
Defense:		
Against air attack -----	89	37
Antitank -----	33	14
Critical areas -----	86	37
Deliberate crossing -----	8,14,15,35,43,85,87	5,7,15,17,36,37
Demonstrations -----	26,91	12,38
Dispersal area -----	75	33
Dispersion -----	3,4,16,33,46,74,89	2,3,7,14,18,33,37
Displaced personnel -----	104,111	45,48
Division operations -----	2-4,20,23,24,31,	2,8,10,13,71
Echelons -----	62-65	26
Enemy capabilities -----	10,28-30	6,12
Engineer:		
Activities -----	app C	71
Amphibious unit -----	63	26
Crossing equipment -----	app B	52
Echelon -----	63-65	26
Employment -----	51	21
Equipment parks -----	77,86	34,37
Plan -----	app D	73
Regulating point -----	72,76	32,33
Supporting units -----	39,45,63	16,18,26
Units -----	3,32,53,80	2,14,22,35
Essential vehicles -----	78,100	34,43
Evacuation -----	38,64,101,102	15,27,44
Exploitation -----	7,25,34	4,12,14
Feints -----	26,39,91	12,16,38
Fire support -----	32,38,63,65,95	14,15,26,28,40
Fixed bridges -----	7,14,34,36,110	4,7,14,15,47
Floating bridges -----	42,50,86,app B	17,21,37,52
Floating mines -----	30,86	12,37
Follow and support units -----	18,27,85-88	8,12,36
Followup echelon -----	63-65,111	26,48
Foot bridges -----	64,104,app B,E	27,45,52,77
Fording site -----	48,110	20,47
Functional grouping -----	62-65	26
Guerrilla forces -----	19,29,32,34,110,111	8,12,14,47,48

	Paragraphs	Page
Hasty crossing -----	7,14,15,34,43 85,87,91	4,7,14,17,36,37,38
Helicopters -----	10,38,65,101, app C	6,15,28,44,71
H-Hour -----	17,39,42,53,92,94	8,16,17,22,39
Holding area -----	74	83
Hydrographic data -----	45,app D	18,73
Ice -----	10,42,105	6,17,46
Illumination -----	53,83	22,36
Independent units -----	3,111,app D	2,48,73
Insurgents -----	9,29,110,111	6,12,47,48
Intelligence -----	9,10,28-30,63,90	6,12,26,38
Internal defense -----	2,3,33,101, 104,111	2,14,44,45,48
Landing craft -----	108,app B	46,52
Light conditions -----	17,30,53,54, 65,83,95	8,12,22,23,28,36,40
Local resources -----	10,36,104,111	6,15,45,48
Marshes -----	106,107	46
Medical support -----	101,102	44
Military police units -----	3,32,52,63,67-78	2,14,22,26,30
Minefields -----	17,30,53	8,12,22
Missions:		
Airborne units -----	26	12
Airmobile units -----	26	12
Assault echelon -----	64,65	27,28
Engineer echelon -----	64,65	27,28
Fire support echelon -----	64,65	27,28
Followup echelon -----	64,65	27,28
Rear echelon -----	64	27
Mobile assault bridge, raft -----	49,51,110, app B	20,21,47,52
Mopping up -----	27,87,88	12,37
Movement plans -----	67-78,110,app E	30,47,77
Naval support -----	61,app B	26,52
Night operations -----	3,33,53	2,14,22
Noise -----	37,app B	15,52
Nuclear chemical-biological weapons considerations -----	2-5,10,17,19,29, 82,46,99	2,6,8,12,14,18,43
Objectives -----	5,20-25	3,8
Operation plan, order -----	32,app C,E	14,71,77
Operations:		
Board aspects -----	12	7
Concept -----	13-27,67	7,30
Phases -----	20-25	8
Panel bridge -----	app B	52
Phasing -----	21-25	9
Planning:		
Combat service support -----	99-104	43
Contingency -----	34,35	14,15
Considerations -----	10	6
Cover & deception -----	90-95	38
Enemy considerations -----	28-30	12
Fire support -----	33,55-61	14,25
Guidance -----	31,33	13,14
Phases -----	21,25	9,12
Preliminary -----	32,app C	14,71

	Paragraphs	Page
Planning—Continued		
Sequence -----	32	14
Surface movement -----	66-78	30
Precipitation -----	31,32,app D	13,14,73
Preparatory fires -----	29,57,59,64,65, app E	12,25,27,28,77
Priority convoys -----	66,67,78	30,34
Prisoners of war -----	52,64,103	22,27,45
Purpose of crossing -----	5	3
Psychological operations -----	10,33,104,111	6,14,45,48
Rafts -----	41,47,53,54,78,	17,19,22,23,34,52
Rear echelon -----	app B 62-65,111	26,48
Reconnaissance:		
Aerial -----	38,45,app D	15,18,73
Boat -----	app B	52
Detailed -----	31	13
Ground -----	45,64,93,app B	18,27,39,52
Of crossing sites -----	26,45	12,18
Route -----	10	6
Underwater -----	45,65	18,28
Vehicles -----	37	15
Rehearsal -----	98	42
River characteristics -----	10,53	6,22
River crossings:		
Broad aspects -----	12	7
Deliberate -----	8,14,15,35, 43,85,87	5,7,15,17,36,37
Hasty -----	7,14,15,34,43,91	4,7,14,17,38
Rivers:		
Characteristics -----	10,53	6,22
Less than 100 meters -----	54	23
More than 100 meters -----	54	23
Very wide -----	108	46
Road nets and approaches -----	10,13,45,app B	6,7,18,52
Safety -----	app B,C	52,71
Salients -----	46	18
Security:		
Communication -----	6,79	3,34
Critical areas -----	86	37
Flank -----	85	36
Near bank -----	86	37
Serials -----	66,67,78	30,34
Short fixed spans (table V) -----	----	78
Sites:		
Assault -----	46	18
Floating bridge -----	49	20
Fording -----	49	20
Raft -----	47	19
Site selection -----	44-50,app E	18,77
Small arms -----	3,89	2,37
Smoke -----	7,33,53,64,86, 89,90,94	4,14,22,27,37,38,39
Soil trafficability -----	10,109	6,47
Special considerations -----	105-108	46
Speed -----	7,17,26,39,53,65	4,8,12,16,22,28
Staging area -----	73	33
Stream-crossing equipment -----	36-42,app B	15,52
Surface movement -----	6,32,67-78	3,14,30

	Paragraphs	Page
Surprise -----	7,17,30,39,53,	4,8,12,16,22,25
	56,83,90	36,38
Swamps -----	106,107	46
Tables:		
I. Assault boats -----	----	54
II. Rafts and ferries -----	----	59
III. Floating bridges -----	----	67
IV. Short fixed spans -----	----	69
V. Evaluation of assault crossing sites -----	----	78
VI. Evaluation of float bridge and raft sites -----	----	79
VII. Vehicle raft requirements -----	----	80
VIII. Available crossing means -----	----	81
IX. Estimated vehicle crossing capability -----	----	82
Tanks -----	56,63,65,app B,C	25,26,28,52,71
Technical data -----	10,31,app E	6,13,77
Terrain -----	4,6,10,13,15,20,	3,6,7,8,10,18,36
	23,24,45,84	
Timing -----	17,53,95	8,22,40
Traffic:		
Control areas -----	7,73-76	4,33
Control posts -----	72,80	32,35
Emergencies -----	78	34
Headquarters -----	67,69	30,31
Regulating line -----	71	32
Regulation and control plans -----	65	28
Returning -----	78,89	34,43
Training -----	97,app C	42,71
Transportation -----	69,99,app C	31,71
Vehicles:		
Aerial -----	7,34,66	4,14,30
Ammunition -----	78,100,app E	34,43,77
Amphibious -----	30,36,39,47,63,	12,15,16,19,
	100,app B	26,43,52
Bridge -----	77	34
Civilian -----	104	45
Command -----	78	34
Essential -----	65,100	28,47
Fording -----	19,36,63,105,110,	8,15,26,46,47,52
	app B	
Supply -----	78,100	34,43
Surface -----	7,19,66	4,8,30
Swimming -----	34,app B	14,52
Visibility -----	53,94	22,39
Weather -----	10,17,21,33,42,94	6,8,9,14,17,39
Wide rivers -----	108	46
Wire laying -----	6,80,81	3,35

By Order of the Secretary of the Army:

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

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-11 requirements for River Crossing Operations.

☆U.S. Government Printing Office: 1966—250-577/6153A





3000017466

FM 31-60 RIVER-CROSSING OPERATIONS—1966

