(U) Figure A-1  Use of Directional Mines in Defense

A-12
Figure A-2 Use of Directional Mine Against Helicopters
troop movement. These mines have been used by sapper-engineer elements to clear a path through barbed wire entanglements in lieu of demolition charges. When used to clear barbed wire entanglement, the directional mines are often employed in groups, to ensure overlapping patterns of fragmentation, five to seven meters from the wire. Three UI-10 mines are capable of cutting a path through barbed wire, approximately 2 meters wide by 30 to 40 meters long.

(g) For description characteristics of directional fragmentation mines, see Item 8, Appendix 1.

(4) Reporting and Marking Mined Areas.

(a) General. Mine recording by local and main forces units is the responsibility of the unit commander although there do not appear to be any standard system of mine location recording throughout RVN. Those units which record locations ordinarily use either a verbal or written reporting system.

1. Verbal. The enemy small unit leaders remain in the area being mined to note the various mine locations. A verbal report is subsequently given to the next higher echelon.

2. Written. Most often, main force or specialized unit commanders have written multi-copy reports recording the various mine locations. One copy of the written report is retained by the mine laying unit while the others are passed on to the next higher echelon. This report includes the number of mines, type of mine, number of booby traps, and location of the mines.

(b) Warning Indicators. The enemy has been known to mark mine locations but these markings or indicators tend to vary by area. The enemy usually informs the local village or hamlet chief of mine locations in order to protect innocent civilians, especially in VC controlled areas. Then the local party/front organizations may warn the civilians. Enemy units which are moving through an unfamiliar area are urged to request a guide from a local guerrilla unit. If no guide is available in unfamiliar areas, enemy units do not use the easier, faster routes which might be mined. More difficult jungle terrain, through which no trails pass, is considered safer. In case civilians have been used for laying mines under the supervision of sapper or engineer elements, notification presents little or no problem.

(c) Antitank/Antivehicular Mines

(1) General. Enemy antitank mines are used to immobilize or destroy FMAF tanks and other vehicles, and to cause casualties. Blast type mines are generally employed flush with or slightly under the ground surface. They consist of a charge of high explosive, usually 10 to 100 pounds, in a metallic
Casing fitted with a primary fuse. Often the case provides for attachment of one or two secondary fuses. Ordinarily, antitank mines require a pressure of 150 to 350 pounds to cause detonation, but some have been employed as dual purpose mines (antitank/antipersonnel) by the use of a pressure detonating device which can be detonated by the weight of an individual. Antitank mines are most often employed with pressure, pressure/electric, or command detonation firing systems.

(2) Origin of AT/AV Mines. The enemy have at their disposal many varieties of AT mines; these include captured US AT mines, Soviet and COMM. AT mines, and improvised locally produced mines. Due to increased Allied usage of wheeled vehicles and armor in the Republic of Vietnam, it can be expected that many more antitank mines will be employed, including many new improvisations. If the Allied forces effectively sever enemy lines of communication and render resupply of standard items of ordnance more difficult, the number of improvised mines can be expected to increase. These antitank mines are constructed from the materials readily available. It is possible that the use of non-metallic components has resulted from increased Allied use of electronic metallic mine detection equipment. Enemy training documents are stressing the importance of using non-metallic materials in mine construction to avoid detection by Allied metallic detectors.

(3) Selection of the Mine Site

(a) The selection of the mine emplacement site is determined in conjunction with the firer's location, if the mine is to be command detonated, as the firer must have good observation of the target area.

(b) Standard Detonation. If the mine is to be employed with a pressure firing system it will most likely be employed at one of the following sites:

1. Road Junctions
2. Bypasses and wheel tracks
3. Bridge approaches
4. Rough and newly repaired roads
5. Culverts
6. Narrow roads between mountains, swamps or embanked roads flanked by flooded ricefields.

(c) Common Methods of Locating Mines

1. Road Junctions. Antivehicular mines are often implanted near road junctions or crossroads although no pattern seems to have evolved.
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It can be noted, however, that it is not uncommon to find mines or pressure/electric firing devices planted in the corner of the junction where a tank or APC might cut the corner (Figure A-3). As road junctions are considered critical terrain features, these areas will likely be mined, though not just at the junction itself. Instead, mines have been found about 100 meters from the junction and off the road 5 to 20 meters. This serves in part to counter any effort to detect detonation firing apparatus. A large number of non-metallic type charges are common in these instances especially at the junction. Excessively large charges have been found to include 100 pounds of crystalline TNT, a directional mine on top of this, and with modified BLU-3's as detonators. Pressure type detonators are perhaps the most common. The pressure-electric firing system is also quite popular. The configuration depends on the materials available.

2. Bypasses and Wheel Tracks. The enemy has often been flexible in his response to Allied mine countermeasures. For example, the enemy will use various explosive charges arranged in a number of non-standard patterns to render a roadway unusable. When this occurs, Allied forces ordinarily fill craters to re-establish the line of communication. Observing this repair activity, the enemy will return to these repaired locations and implant antivehicular mines in random arrangements, often mixed with metal fragments, cans, and other metallic objects to thwart mine detection attempts. This procedure is repeated for several days in the anticipation that the mine sweep teams will become careless after repeated "false alarms." If the road has been completely destroyed, it is sometimes easier for the Allies to construct a bypass. These bypasses have been used as recurring mine location sites. Again there has been no specific pattern of emplacement, except that a large number are implanted in vehicle tracks.

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3. Bridge Approaches. While bridges themselves have been mined, more frequently the approaches to those bridges are mined. Mines are quite often implanted on the shoulder of the road generally about 5 to 15 meters from the bridge itself, or under the bridge bulk (Figure A-4).

(1) Figure A-4 Emplacement of Mine on Bridge Approaches

4. Rough and Newly Repaired Roads. In their training documents the enemy has recognized and stresses that, when the surface of the roadway is wet, especially during the rainy season, mud holes develop; holes have often been utilized as mine sites. The mine is enclosed in a water-imperious material and placed in the waterhole with little or no other preparation.

5. Culverts. Mines and explosive charges are often found either in, alongside of, or atop culverts.

(4) Emplacement of Antitank Mines

(a) Once the mine site has been selected, the materials and tools are assembled at that location. Tools usually include shovels, pickaxes, wrecking bars, and bags in which to put excess dirt and refuse.

(b) The method of digging depends on the consistency of the road or ground surface material.

1. Dirt Roads. If the soil is soft, shovels are used. The size of the hole depends on the mine being implanted, but usually
the hole is three to five centimeters deeper than the mine itself while the circumference of the hole is slightly larger than the mine body. After the mine body has been implanted, empty space around it is filled with soil or sand. At this time the safety features are checked to insure that premature detonation will not occur when the detonation apparatus is installed. After the detonation apparatus is applied, the safety features, if they exist, are neutralized and the mine hole is filled with dirt to a level with the road surface. The enemy has been instructed that during the rainy season the camouflage dirt should be at least two centimeters higher than the road surface to allow for soil settlement. In those areas where the soil is hard or rocky, gutters have been employed which drain water away from the mine body. Most often, however, the mine body has been wrapped in materials such as plastic. Boards have been found underneath the mine in spongy soil to keep the mine from sinking.

2. Hard Surface Roads

a. For those roads which are hard-surfaced, the enemy has been instructed to tunnel laterally from the side of the road using a wrecking bar or other similar tool. After having created a small hole to the desired depth, they braid a number of fuzes together or use detonating cord which is inserted the length of the hole and detonated, thus making a small tunnel into which the mine can be fitted after the excess dirt has been removed. The mine is then implanted, readied, and the empty spaces filled with dirt.

b. Where a mine is implanted in an asphalt covered road, a piece of asphalt slightly larger than the mine body itself is removed intact, and the mine is implanted after a hole has been dug. The mine is armed and the empty space filled with dirt or sand. The intact piece of asphalt is repositioned and sand is poured into the cracks. If the removed asphalt section crumbles, then a piece of board or bamboo wattle covered with loose asphalt is substituted.

(5) Antitank Mine Configuration. The configuration of the mine employed is largely determined by the material available in the region and the ingenuity of the mine layer. The following configurations are by no means standard, but merely a sampling attesting to the ingenuity of the enemy.

(a) Artillery Ammunition

1. 105mm Round. Many times 105 rounds have been simply buried in the ground to a depth of approximately three inches and electrically or pressure detonated. One particular configuration utilized an M14 AP mine which was buried slightly under the road surface. Under this M14 AP mine was a 20-pound block of TNT and under that, a 105mm round. Pressure of the M14 AP mine initiated the series of detonations.
2. 155 Rounds. As with 105mm rounds, 155mm rounds are a common explosive device. A number of configurations have utilized an M14 AP mine buried approximately three inches under the road surface. A section of detonating cord buried 18 to 22 inches underground connected the antipersonnel mine with a cluster of 155mm and 105mm rounds. This particular configuration is thus less susceptible to mine detection efforts as the bulk of the explosive device is buried at a greater depth.

(b) Mortar Ammunition. Mortar shells are most often found buried in a roadway or on a road shoulder with the nose pointed upward and pressure-activated. The actuator is usually one to five inches under the road surface.

(c) Bombs. Bombs are usually buried approximately 20 inches under the ground surface. They are most often utilized with a pressure device or detonated by an AP mine connected by detonating cord or boosted by a block of TNT.

(d) Locally Manufactured Items. Unexploded FWMF ordnance provides the bulk of the explosive for locally manufactured mines. The heavier bombs are cut; TNT filler is extracted and utilized in fabricating various homemade explosive devices. Most common is a block of cast TNT, usually about 20 to 40 pounds, having an impression into which a detonator can be fitted. Mines are usually activated by pressure/electric firing systems. The Air Force BLU-3B (pressure detonated) is also used to activate mines.

(e) Foreign Manufactured Items. These explosive devices are usually employed in the standard manner. The weight of explosives may be increased by adding blocks of TNT or antipersonnel mines. The M1A1 and its variations, for example, are often boosted with 8 to 10 pounds of TNT and implanted under the roadway surface to depth of approximately 2 1/2 inches.

(f) Samples of AT Mine Configuration. Figures A-5 through A-10 are typical examples of antitank mine configurations.

(6) Enemy Counter Detection Techniques

Enemy counter detection techniques are very basic and include the following.

(a) Wrapping the Mine Body. Many mines have been found wrapped in various materials to reduce vulnerability to moisture. Enemy forces have been known to use rubber, plastic, rice, and stones. Other mines have been surrounded by stones and wrapped in plastic. These materials have been used with the intent of reducing the possibility of detection with metallic mine detectors.

(b) Decoys. One of the favorite counter detection techniques is the burying of miscellaneous metallic fragments in a mine area, anticipating that mine sweep teams will become careless after many false alarms.
Figure A-5 Sample of AT Mine

- ROAD SURFACE
- WOOD SLAT BRIDGE
- CBX FRAG BOMBLET
- WOOD PEG
- BURLAP PACKAGE
- PULL DEVICE GAP
- BAMBOO SLATS AND BINDING
- 5-40 LBS CHICOM TNT
ROAD SURFACE

- WOODEN PEG
- BUTTERFLY BOMB DETONATOR
- WOODEN BLOCK
- NAIL

- BLASTING CAP
- BURLAP PACKAGE
- BAMBOO SLATS AND BINDINGS
- NITRO STARCH

* FOUR WOOD PEGS SUPPORT THE BAMBOO SLEEVE TO INSURE AGAINST DETONATION BY FOOT OR BICYCLE TRAFFIC

(U) Figure A-6 Sample of AT Mine

A-21
(U) Figure A-7 Sample of AT Mine
ROAD SURFACE

TIN CAN TOP
FLASH LIGHT BATTERY
* WOODEN PEG
BURLAP PACKAGE
BAMBOO

5-50 LB GYPSUM
TNT

ELECTRIC BLASTING CAP
FULL DEVICE CAP

BAMBOO SLAT AND BINDINGS

* FOUR WOODEN PEGS SUPPORT THE TOP BAMBOO SLEEVE FROM FOOT OR BICYCLE TRAFFIC. A VEHICLE WILL BREAK THE PEGS AND PUSH THE TOP BAMBOO SLEEVE DOWN ON THE FLASHLITE BATTERY COMPLETING THE CIRCUIT AND DETONATING THE MINE.

(U) Figure A-8 Sample of AT Mine

A-23
ROAD SURFACE

- WOODEN PEG
- BAMBOO
- WOODEN BLOCK

BURLAP PACKAGE

BLASTING CAP

5.56mm Round
Grimped

PULL DEVICE
CAP.

BAMBOO SLATS AND BINDINGS

5-40 LBS CHICOM TNT

- FOUR WOOD PEGS SUPPORT THE BAMBOO SLEEVE TO INSURE AGAINST DETONATION BY FOOT OR BICYCLE TRAFFIC.

(U) Figure A-9 Sample of AT Mine

A-24
(U) Figure A-30 Sample of AT Mine
(c) Camouflage. Skillful camouflaging has served to thwart many visual mine detection attempts.

(d) Use of non-metallic materials has been noted and this seems to be in response to allied use of electronic detecting devices.

(e) Various electronic metal and density type detectors have certain limitations as to the depth at which they are effective. In certain areas, the explosive charges have been buried at greater depths to render this detection equipment ineffective.

d. Watermines

(1) General. The objectives of the enemy watermining effort include harassment and interdiction of friendly patrol and support craft as well as interdiction of friendly land and water routes by destroying bridges and physically blocking waterways. Methods of achieving these objectives include:

(a) Attacks on moving surface craft by using electrically detonated, command fired bottom, or moored watermines.

(b) Attacks on moored surface craft and bridges by swimmer-placed time-delay or command-fired electrically detonated watermines.

(2) Equipment

(a) Origin of Mines. To date there have been no indications of the use, possession, or planned acquisition of influence type watermines by the enemy forces in South Vietnam. A variation of the 1000-pound Soviet MKB chemical horn contact mine has been retrieved by US Forces (see para 2, Appendix 1). Additionally, a captured enemy document indicated the use of two unknown type contact mines in the Long Tau area in January of 1967; however, no evidence of use other than the document exists to date. With the exception of the Soviet MKB, all captured watermines have been detonated electrically either by command or time-delay firing mechanisms in various degrees of sophistication. In-country production of mines is concentrated primarily within the VC province workshops and district worksites. In one shop, cast iron was heated in a charcoal-fired smelting furnace and was poured into stone molds to form mine casings. Some of the captured mines appear to have been made from sheet metal rolled into cylindrical or conical shapes and sealed by welding, soldering, or riveting. In addition to the relatively superior workshop manufactured articles, the VC are adept at utilizing almost any container as a casing for explosives. Explosive materials used for main and booster charges include: Charges taken from daisy US bomes, mortars and artillery rounds, US C-4 plastic explosives and TNT, CHICOM TNT, Cheddite, Melonite, black powder, and fulminate of mercury. Detonators are usually homemade or CHICOM manufactured electric blasting caps.
(b) Types of watermines used by the VC (see Item 12, para. 2, Appendix 1). All are electrically detonated, command- or time-delay fi red mechanisms. The seven watermines described in Item 12, para. 2, Appendix 1 provide a representative cross section of enemy watermines. Included are a completely VC-manufactured shaped charge mine (Item 12, h), three relatively sophisticated mines utilizing cases that were originally made for mooring buoys (Item 12, a, c, and e), and two crude constructions that failed to function because of defects in construction (Item 12, d and e). Also included is the highly sophisticated Soviet chemical horn contact mine (Item 12, f).

(3) Techniques of Employment

(a) Moored Bottom or Floating Mine

1. The mine is transported to the proposed target position and planted on the bottom or moored to an anchor of at least three times its weight. A float marker is attached which will ride on the surface (preferably some small item peculiar to normal floating debris in the area for daytime detonation, or a clear receptacle containing fireflies or some other phosphorescent material for night detonation). If a float marker is not used, a guiding stake might be placed on the opposite bank.

2. The detonating wire is led from the mine to the anchor (if it is a floating mine) and along the bottom to the firing position. The wire is usually weighted every two or three meters to keep it on the bottom. Various methods of weighting the detonating wire have been used, not only to weight the wire, but also to counter chaindrag mine-sweeping operations by friendly forces. Recently captured documents indicate that the detonating wire may be buried in mud by underwater swimmers where time and bottom conditions permit.

3. Firing mechanisms consist of electric blasting caps inserted into a booster or the main charge. The electric wire is led from a battery pack or hand-held generator. When available, an ohmmeter will be used to test the firing circuit after the mine has been planted, and each time a minesweeper passes. Captured VC training documents contain instructions on how to determine size and number of batteries required for given lengths of detonating wire and various series and parallel detonator circuits.

4. Firing. If a float marker is used, the mine usually detonates when the target is within three meters of the float. If no float marker is employed, then the mine will be detonated when the target passes between the detonating point and a known mark on the opposite bank.

5. Where the depth of the water remains at a level of from two to three meters, a bottom mine may be used; however, the normal situation requires the use of a moored floating mine. When the range of the tide or the draft of the target ship dictates changing the depth of the mine, two courses are open to the sappers:

a. Send out a swimmer to adjust the mine as necessary.

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b. At the outset, rig a "mobile" mine. The mine is made vertically mobile by running the anchor line from the mine, through a fairlead or pulley on the anchor, and then to the bank. Then by pulling or slackening this line from the bank, the mine will be lowered or raised. This type of mine is especially susceptible to chain-sweep minesweeping.

6. When, because of the extreme width of the waterway, it is considered desirable to move the mine laterally in order to detonate it successfully under a target, the following technique may be employed:

a. An anchoring stake is driven into the bank beneath the waterline on both sides of the waterway.

b. A heavy line is stretched taut below the water surface between two stakes, and the wire is suspended beneath the line by means of a pulley which rides freely over the line. By using a guy line from the mine to a man on each bank, the mine may be traversed over the width of the waterway. This, and any similar setup, is particularly vulnerable to chain-sweep mine-sweeping.

7. A recent series of successful minings on the Gia Viet River in Quang Tri Province demonstrated the enemy's resourcefulness in countering mine-sweeping tactics.

a. Initially, chain-sweep sweeps were conducted morning and evening. After several successful mining attacks, it was apparent that the mines were laid after the mine sweepers passed.

b. Boats using the river were organized in convoys and transited the river with mine sweepers stationed 1000 yards ahead of the convoy. Nevertheless, boats of the convoy were successfully mined in mid-channel, indicating that the mines were again laid after the mine sweepers had passed, possibly by the use of sampans. Several sampans were observed crossing and otherwise using the channel between the mine sweepers and the convoy.

c. The convoys were then organized so that the mine sweepers worked immediately ahead of the convoy. One convoy successfully passed. The next convoy had its mine sweepers mined and ambushed close to the river banks. This highly successful series of minings is an excellent example of the resourcefulness of the VC and the use of channel restrictions to their own advantage.

(b) Command or Time-Delay Fired Mines. Command or time-delay fired mines, used against anchored ships, are usually emplaced by a three-man team. The mine is transported downstream and attached by a line with a hook to the anchor chain of the target vessel. The length of the line is such that, when the mine floats down with the current, it will be stopped.
(b) Types of watermines used by the VC (see Item 12, para 2, Appendix 1). All are electrically detonated, command or time-delay fired mechanisms. The seven watermines described in Item 12, para 2, Appendix 1 provide a representative cross section of enemy watermines. Included are a completely VC-manufactured shaped charge mine (Item 12, b), three relatively sophisticated mines utilizing cases that were originally made for mooring buoys (Item 12, a, c, and e), and two crude contraptions that failed to function because of defects in construction (Item 12, d and e). Also included is the highly sophisticated Soviet chemical horn contact mine (Item 12, f).

(3) Techniques of Deployment

(a) Moored Bottom or Floating Mine

1. The mine is transported to the proposed target position and planted on the bottom or moored to an anchor of at least three times its weight. A float marker is attached which will ride on the surface (preferably some small item peculiar to normal floating debris in the area for daytime detonation, or a clear receptacle containing fireflies or some other phosphorescent material for night detonation). If a float marker is not used, a guiding stake might be placed on the opposite bank.

2. The detonating wire is led from the mine to the anchor (if it is a floating mine) and along the bottom to the firing position. The wire is usually weighted every two or three meters to keep it on the bottom. Various methods of weighting the detonating wire have been used, not only to weight the wire, but also to counter chain drag mine-sweeping operations by friendly forces. Recently captured documents indicate that the detonating wire may be buried in mud by underwater swimmers where time and bottom conditions permit.

3. Firing mechanisms consist of electric blasting caps inserted into a booster or the main charge. The electric wire is led from a battery pack or hand-held generator. When available, an ohmmeter will be used to test the firing circuit after the mine has been planted, and each time a minesweeper passes. Captured VC training documents contain instructions on how to determine size and number of batteries required for given lengths of detonating wire and various series and parallel detonator circuits.

4. Firing. If a float marker is used, the mine usually detonates when the target is within three meters of the float. If no float marker is employed, then the mine will be detonated when the target passes between the detonating point and a known mark on the opposite bank.

5. Where the depth of the water remains at a level of from two to three meters, a bottom mine may be used; however, the normal situation requires the use of a moored floating mine. When the range of the tide or the draft of the target ship dictates changing the depth of the mine, two courses are open to the sappers:

a. Send out a swimmer to adjust the mine as necessary.
b. **At the outset, rig a "mobile" mine.** The mine is made vertically mobile by running the anchor line from the mine, through a fair-lead or pulley on the anchor, and then to the bank. Then by pulling or slackening this line from the bank, the mine will be lowered or raised. This type of mine is especially susceptible to chaindrag minesweeping.

q. **When, because of the extreme width of the waterway, it is considered desirable to move the mine laterally in order to detonate it successfully under a target,** the following technique may be employed:

a. An anchoring stake is driven into the bank beneath the waterline on both sides of the waterway.

b. A heavy line is stretched taut below the water surface between two stakes, and the wire is suspended beneath the line by means of a pulley which rides freely over the line. By using a guy line from the mine to a man on each bank, the mine may be traversed over the width of the waterway. This, and any similar setup, is particularly vulnerable to chaindrag minesweeping.

Z. **A recent series of successful minings on the Ong Viet River in Quang Tri Province demonstrated the enemy’s resourcefulness in countering mine sweeping tactics.**

a. Initially, chaindrag sweeps were conducted morning and evening. After several successful mining attacks, it was apparent that the mines were laid after the mine sweepers passed.

b. **Boats using the river were organized in convoys and transited the river with mine sweepers stationed 1000 yards ahead of the convoy.** Nevertheless, boats of the convoy were successfully mined in mid-channel, indicating that the mines were again laid after the mine sweepers had passed, possibly by the use of sampans. Several sampans were observed crossing and otherwise using the channel between the mine sweepers and the convoy.

g. The convoys were then organized so that the mine sweepers worked immediately ahead of the convoy. One convoy successfully passed. The next convoy had its mine sweepers mined and ambushed close to the river banks. This highly successful series of minings is an excellent example of the resourcefulness of the VC and the use of channel restrictions to their own advantage.

(b) **Command-or Time-Delay Fired Mines.** Command-or time-delay fired mines, used against anchored ships, are usually emplaced by a three-man team. The mine is transported downstream and attached by a line with a hook to the anchor chain of the target vessel. The length of the line is such that, when the mine floats down with the current, it will be stopped.
at a point alongside or under the engine compartment. The mines are generally buoyed by means of pneumatic rubber tubes of a quantity sufficient to maintain the desired depth.

1. Where the mine is to be fired by a timing device, the above action completes the emplacement. If it is to be command fired, then the swimmers will stream the firing wire from the mine and detonate as soon as they are clear of the ship and in a safe position. The command wire is then reeled in and the sappers withdraw.

2. Where there is heavy samparan traffic in the vicinity of the anchorage, the mine may be transported to the target by boat. This is accomplished by slinging the mine under the keel of the boat and proceeding as close to the anchor chain of the target vessel as is necessary to attach the hook. After the hook is attached, the mine is cut free from the boat and allowed to float with the current to the desired position under the target.

3. A third technique of mining an anchored ship is to attach the mine directly to the target. In a recent mining attempt, the weapon was attached to the side cleaner staging and a boat fender.

4. Placing the mine directly on the target is necessary for bridge demolition, since most strategic ideas in Vietnam are protected against free floating contact or command detonated mines by metal deflection structures which are built approximately 15 meters out from both sides of the main columns of the bridge.

5. The above techniques are representative, but by no means exclusive. Factors which can and do result in variations of techniques of employing mines are:

a. Size of the mine
b. Target location
c. Antitank security measures
d. Time of day
e. Weather
f. Avenues of escape
g. Braving or temerity of the VC sappers

(4) Tactical Employment of Watermines

(a) Planning and Preparation. Meticulous planning and detailed rehearsal precede the employment of a VC watermine. Because of the limited
effective range of the command-detonated watermines used by the enemy against moored ships, the location of the mine is of paramount importance. The average mine must be detonated within three to five meters of the target in order to achieve satisfactory results. For this reason the VC are limited to planting their mines in areas where they can assure the target's passing in close proximity to the mine. Preparation for a watermining may begin months prior to the attack. Careful studies are made of traffic patterns of possible targets, plus times and frequency of friendly US/VNN patrols and mine sweeping operations in the chosen target area. Ideal mining sites are in restrictions or bends in waterways that tend to channel traffic over definite routes. Areas with natural and man-made obstructions are also suitable. In short, any phenomenon which funnels watercraft over a narrow path provides the enemy sapper with a good chance for success. The time and depths of low and high tide must also be studied in order that the mine may be placed at a depth suitable for destruction, yet not so high as to be detected from the surface. A wide range in tide will necessitate the use of a vertically mobile mine. In addition, the sappers are concerned with the terrain in the vicinity of the mining site. Heavy foliage on the banks is desired for concealment of:

1. Sampan to transport and/or lay the mine
2. The command detonating post
3. Lookout stations up and down stream
4. Escape routes
5. Positions of fire teams if ambush is planned to coincide with the mining.

(b) Timing. VC sympathizers in the area are sometimes used to provide some of the intelligence required, as well as to assist in the actual work and after-action evasion. After the reconnaissance and preparation phases are completed, the actual placing and detonating of the mine is accomplished as quickly as possible. Captured VC documents state that the sappers are capable of planting 50-kilogram command watermines in about 10 minutes. Thus it would seem that the ideal tactic is to wait until just prior to the target's arrival before laying the mine. This allows little or no time for mine sweeping.

(c) Tactics used against moored ships and rivercraft are dependent upon several factors:

1. Location of the target
   a. Isolated
   b. Close proximity to other anchored ships
1. If a target vessel is loosely guarded, darkened, and fairly isolated, it is a relatively simple matter for a VC sapper cell of two or three men swimming on or just under the surface (using breathing tubes) to transport a buoyant mine to the target and return to the detonating position for firing. If there are other junk or sampans about the vicinity of the target vessel, then the mine may be transported part way or entirely by boat. If concussion grenades are being dropped at regular intervals, then the sappers may take a chance and go in between grenades.

2. Another tactic used by swimmer/sappers is to mine an empty berth before the target arrives. Then, after the ship is moored, the mine is detonated. This was done successfully at a US LST ramp in 1967; however, it has not been determined whether the mine was command- or time-detonated.

(e) Tactics as well as techniques will change according to the equipment being used and the men employing the equipment. Viet Cong swimmer/sapper schools are known to exist in South Vietnam. The curriculum at these schools is not yet known, but it can be safely assumed that the graduates will be more adept at underwater demolition than his unschooled compatriots. Physical evidence has been found of the introduction into enemy equipment stores of self-contained breathing apparatus. As yet there has been no indication of the use of sophisticated limpet mines by the enemy, but, if these are provided by Communist Bloc countries, the watermine threat to anchored ships will be greatly increased. A recent interrogation suggests that limpet mines are not presently used only because of a shortage of attachment magnets.
SECTION II. (C) ENVIRONMENTAL, ORGANIZATIONAL, TACTICAL, AND TRAINING
ASPECTS OF ENEMY MINE WARFARE

4. (U) DESCRIPTION OF THE AREA OF OPERATIONS

a. General

The Republic of Vietnam (RVN) occupies a crescent-shaped area of
about 67,000 square miles on the southeastern edge of the Indochina
Peninsula. Although only 45 miles wide at the 17th parallel, its
demilitarized northern border with North Vietnam, it has a seacoast of
1,500 miles on the South China Sea and Gulf of Siam, and western borders
with Laos and Cambodia of about 900 miles. The land borders are poorly
defined and drawn through difficult and inaccessible terrain.

b. Characteristics of terrain

(1) There are four distinct geographical regions: The Highlands
located in the North and Central portion, the plateaus of the Central
Highlands, the Coastal Plain, and the Mekong Delta in the South.

(2) The northern two-thirds of the RVN is dominated by a chain of
broken mountains and rugged hills extending in a northwest-southwest
direction and terminating on the northern edge of the delta plain about
50 miles north of Saigon, the capital. The maximum elevations range
from 4500 to 7000 feet in the vicinity of Dalat and from 3000 to 8000
feet in the area west of Quang Ngai. The area is characterized by steep
slopes, sharp crests, narrow valleys, and dense vegetation. It is
sparsely populated, mainly by primitive and nomadic tribes, and it con-
tains few roads or trails.

(3) The Central Highlands adjacent to the Laos-Cambodian border
contain extensive plateau areas. Here, the mountains give way to more
gently rolling terrain. The northern plateau is covered by almost
impenetrable tropical forests and jungles, which often have 2 dense
overhead layers of foliage at heights of about 40 and 125 feet. The
southern portion is typical savannah country, with large open expanses
covered by tropical grasses and open forests. This region is more
heavily populated than the Northern Highlands and has more roads and
trails.

(4) The Coastal Plain east of Annam Range, varying from 10 to
25 miles in width, extends from the 17th Parallel to the Mekong Delta.
At several places mountain spurs jut out to the sea, cutting the plain
into a series of compartments roughly at Mui Dinh, Mui Ke Ga, Quang
Ngai, Da Nang, and Hue. The area is characterized by sandy beaches and
dunes, backed up by rice fields, fertile areas, and marshes extending
to the mountains. It contains many small cities.

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The southern third of the country is part of the large delta plain formed by the rivers Hau Giang, Mekong, Vam Co, Saigon, and Dong Nai. The Hau Giang flows directly to the South China Sea. The huge Mekong splits into four branches, and the Vam Co and Dong Nai enter the Saigon before reaching the sea. In addition to these major tributaries, the area is cut by a number of smaller streams and a dense network of canals. The plain is quite flat, with few points exceeding an elevation of 20 feet above sea level. It is a very fertile area with more than 9,000 square miles under rice cultivation. Drainage is effected chiefly by tidal action, with the difference between ebb and flood as much as 10 feet in some areas. The southern most tip of the delta, known as the Ca Mau Peninsula, is covered with dense jungles and mangrove swamps. The eastern portion of the Delta Plain is heavily forested. The Plain of Reeds, a large marshy area covered with tall reeds and scrub trees, is located in the center of the delta region adjacent to the Cambodian border. During the rainy season, a major portion of the entire area is inundated.

c. Climate and Weather

(1) The climate is hot and humid, subtropical in the north and tropical in the south where the monthly mean temperature is about 80 degrees Fahrenheit. The annual rainfall is heavy in most regions and torrential in many. It is heaviest at Hue which has an annual average of 128 inches. The low of 28 inches at Mui Ding, a small cape on the eastern coast some 62 miles south of Nha Trang, results from the presence of hills in the area. At Saigon, rainfall averages 80 inches annually.

(2) Seasonal alternation of monsoon winds profoundly influence the weather throughout the year although geographical features alter patterns locally. The winter monsoon blows generally from the northeast early November to March and often brings floods to the northern portion of the RVN. This is the period of the dry season in the Delta which usually lasts from December through March. The winds begin to shift in March and, with the exception of the Coastal Plain, high temperature and humidity prevail in all of the RVN from April to June. The summer monsoon blows generally from the southwest from June to late August or early September, bringing to the Delta region heavy and frequent rains, high humidity, tropical temperatures, and maximum cloudiness. Mountains cause clouds to pile up and deposit moisture before the clouds reach the Coastal Plain or the Northern Highlands, which are dry during this period. In September the winds begin to shift again and the Coastal Plain receives maximum amounts of rain and cloud cover, including severe tropical storms and typhoons.

d. Movement

(1) The movement capability of the FWMAF is drastically reduced by rugged terrain, dense jungle vegetation, swamps, and rice paddies.
Roads throughout RVN are poorly cared for and narrow; however, the basic main network, although limited, is good. The major routes, except for unusual flooding, are not seriously affected by the monsoon rains as are the loose surfaced, rural, intraprovincial roads. A major program in effect since mid-1967 has greatly improved the major road network and by 1971 is expected to be completed and will account for 2300 miles or about one-half of the national and interprovincial roads. These roads will be two lane, 20 feet to 24 feet wide, all weather, bituminous surface, class 50. Replacement and/or repair of bridging is included in the program. The major highways are now, for the most part, passable, except where major bridges have been destroyed, but are not suitable for sustained heavy convoy traffic. In the Delta region, 2500 miles of navigable inland waterways ease somewhat the communications burden placed on the 1200 miles of primary and secondary roads in the region. A single track, narrow gauge railroad connects Saigon with the northern provinces by way of the Coastal Plain; there are frequent interdictions by the VC. Sections amounting to about 500 kilometers or a little more than one-third of the total network are useable and in good condition. Old equipment is being updated and progress is being made to repair damaged sections of the railroad and eventually link-up with the now operable sections.

(2) There is no wire telephone communication among the major centers of population. What radio telephone service is available is at the mercy of the often unstable atmospheric conditions over the RVN. Telephone equipment used in major cities is antiquated or makeshift.

(3) In effect, rural areas are virtually isolated. It is not unusual for a VC act of terrorism or sabotage to take place in an outlying Delta area and be reported in Saigon a week or more later. Most incidents accounted for take at least two or three days to get into the situation reports in Saigon.

5. (C) ENEMY TACTICS AND TACTICAL EMPLOYMENT OF MINES AND BOOBY TRAPS

a. General

(1) Combat operations in the Central Highlands differ greatly from those conducted in the Delta and Coastal Plain because of the differences in terrain, weather, and density of population. Despite environmental differences between areas of operation, enemy forces have successfully conducted both static as well as mobile operations in all of the four Corps Tactical Zones (CTZ) from the Demilitarized Zone (DMZ) to the Mekong Delta.

(2) Although the enemy has been capable of mounting and logistically supporting offensive operations with forces of division size, the war in South Vietnam today is characterized by small unit operations and guerilla tactics.
b. Tactics Used by the Enemy

(1) Offensive Tactics
(a) Ambushes

1. General. The VC rely heavily on the ambush as a means of initiating contact with opposing forces. The ambush makes maximum use of their knowledge of terrain, cross-country mobility, good intelligence, careful planning, and camouflage techniques. The ambush takes advantage of the dependence of the opposing forces of roads and heavy equipment. It also provides the VC with a means of partially coping with the opposing forces' greater firepower and mobility which have made attacking a fixed installation increasingly hazardous. The enemy consider the ambush as a major tactic in their conduct of mobile warfare. This allows them to inflict heavy casualties and damage to opposing forces and gains the support of the local populace through psychological effects and show of strength. If these factors are not achieved by the VC, the ambush is considered only partially successful. This thinking is reflected in captured VC document which stated: "Adequate dealing with the people is very important because we cannot defeat the enemy without the support provided by the people or, if we could defeat him without such support, it would be of only limited value in the military field."  

2. Planning. Ambushes are meticulously planned with special emphasis placed on intelligence, secrecy, reconnaissance, preparation, and withdrawal. Intelligence information is of utmost importance. Without it, the risks are considered too great and do not comply with VC doctrine concerning fighting, namely, that VC guerrillas fight only on their terms. Intelligence gathering, which is done by infiltrators, sympathizers, PW interrogators, agents, and reconnaissance elements of the VC unit, is a continuous process. The planning stage prior to actual conduct of an ambush is all-encompassing and entails all aspects and contingencies that may arise during such an action. Careful compilation of data of the enemy, terrain, and status of the local populace is of utmost importance and is the most prominent characteristic of VC planning. Terrain reconnaissance covers the sketching of road networks, rivers, bridges, populated areas, routes for both movement into the area and withdrawal, prominent terrain features in the area, and location for crew-served weapons and mines. Analysis and study of the local populace include the attitudes of people toward the VC themselves, the NLF, political parties and "reactionary religious groups." In addition, the local economic situation is studied in detail, to include availability of laborers, foodstuffs, and supplies. When considering the military situation in the local village and hamlets, the Viet Cong study the availability and reaction capability of such units

1. Reference 9.
as Regional Forces (RF), Popular Forces (PF), and Civilian Irregular Defense Groups (CIDG). Also considered are the location, range, and movement capability of opposing fire support elements. After compilation of all available information, the VC commander prepares an operation plan, formulates his operation order, and briefs his subordinate commanders. Usually a few days prior to the planned date of ambush, the unit moves to a well-hidden location within one day's march of the ambush site. This is done to avoid detection by aircraft.

3. Preparations. If time is available, the subordinate commanders will conduct rehearsals for their units with the use of sand tables. While in the base camp, time will be allocated to the individual VC soldier to collect his equipment, and if it is anticipated that the unit will be in the area for a period of time, rice balls will be prepared for field rations, since cooking is strictly forbidden in the ambush area.

Usually the supply of food and ammunition is coordinated and conducted by the local force or guerrillas in the area. This is accomplished through the use of conscripted civilian laborers or ox carts that have been obtained from the rear services element of the unit. Upon the delivery of the required supply items, the transportation means used are made available to the unit. The recon element left at the ambush site is conscripted from the local populace or from the Province Party Committee to assist in digging trenches and weapons positions.

4. Movement and Disposition. After all rehearsals and preparations have been completed, the guides lead the unit into the planned ambush site. The march formation is determined by the terrain and the cover available along the route to ambush site. The lead element is usually followed by the recon element, which provides forward and flank security for the main body. A rifle company is next, followed by the available fire support weapons and the combat support unit. The battalion headquarters and a protective rifle company are the next elements, followed by a third rifle company which provides rear security for the column. Units smaller than battalion follow the same general concept. Movement to the ambush area is over a concealed route, and maximum effort is made to avoid villages and roads in order to preserve secrecy. When the terrain does not offer the secrecy and concealment desired, the VC occasionally will choose not to occupy positions until the last moment.

VC doctrine calls for the use of good camouflage and concealment, observation, fields of fire, and sufficient maneuver room. Their mission is primarily to capture or destroy friendly equipment, inflict maximum casualties, and gain the propaganda value of a victory; seldom is it designed to gain real estate. Toward the end, every effort is made to position their troops so as to gain the initiative right from the outset of the ambush and cause friendly forces to retreat or flee in panic. Some of the most common concepts of ambush include L-shaped, U-shaped, or
V-shaped patterns or simply luring friendly elements into prepared ambush positions. Fortified positions for crew-served weapons are prepared and employment of AT and AP mines to include directional mines are incorporated into the plan to stop the column and prevent its personnel from escaping destruction. In a typical highway ambush of a truck convoy, AT mines are exploded at both ends of the convoy to stop the vehicles, block retreat, and break the convoy into sections for easier destruction. AT mines and booby traps are often used on the sides of the road to kill those who run for cover in the ditches or roadside foliage. In addition, mines and booby traps may be placed between the attackers and the convoy to impede a counterattack and to cover the withdrawal. When ambushing watercraft, the enemy may use watermines and other weapons against the vessel and AP mines on shore in places where the crew might beach the craft or try to land for a counterattack. Watermines are usually concealed underwater, and detonated electrically from the shore. If the channel is wide, the mine may be attached to a rope and pulley rig so that it can be moved directly into the path of the oncoming craft. In addition to the main assault force, the enemy disposition includes elements assigned to block the front of the friendly column, the rear of the column, and reinforcements rushed to the scene. The techniques of laying mines has been discussed in paragraph 3 above. Enemy ambushes have been conducted at all hours of the day and night; however, as would be expected, the majority of ambushes occur during daylight hours because of the lack of lucrative targets available at night.

5. Execution. According to VC doctrine, the ambush must be conducted rapidly and aggressively with coordination between all elements of the unit. Upon receiving the warning from the security element, the commander gives the signal to commence the engagement after the friendly column has entered the killing zone. The use of radios prior to opening fire is forbidden in order to maintain secrecy; however, the use of telephone is feasible and is permitted. After opening fire and conducting a short but destructive firefight, an aggressive assault is made to split and segregate the column in order to annihilate it. Upon initiation of the attack, fire support units lift and shift their fire to cover avenues of escape and to fix the target in place. Upon completion of the battle, designated units police the battlefield for usable material such as weapons, equipment, and ammunition. An important phase of the ambush is the withdrawal. Without a successfully conducted withdrawal, the attacking force may sustain high casualties because of the quick reaction time of US and Allied forces. The techniques of withdrawal follow the concept as in any other withdrawal operation. The subject of withdrawal is discussed in paragraph 5b(3) below.

6. Ambush Indicators. Based on observation and past experience, the following list of indicators has been compiled to assist small unit leaders in determining the likelihood of ambush sites in their area of operations:
a. Tied-down brush. May be a firing lane for an ambush site.

b. Villages with no people present. May conceal ambushes, but it should be remembered that the presence of civilians in an area does not preclude the possibility of ambush. The VC often make themselves appear "innocent" civilians in order to deceive friendly commanders into thinking the area is free of enemy.

c. Large herds of cattle and well-tended crops in a sparsely populated area.

d. An unusual amount of activity in a specific area. Activities which should be noted are reports of unknown units in the area and sightings of enemy reconnaissance elements.

e. A steady delivery of small arms fire from one position. While this may appear to be aimed at checking or delaying movement, it may actually be designed to encourage pursuit.

f. Sniper fire. The enemy will use snipers to draw friendly forces into ambush positions. The snipers will fire harassing rounds and, upon pursuit by friendly forces, they will fall back to draw the force into an ambush.

(b) Raids

1. Planning and Preparations. Raids against outposts and fixed installations are another favorite enemy offensive tactic. Targets are usually reconnoitered thoroughly and carefully. Sometimes this reconnaissance may take a year to be considered sufficient for a successful operation to be conducted. During this period, reconnaissance elements prepare sketches and gather information from covert and semi-covert agents working within the objective area. All defensive positions, communication trenches, blockhouses, CPs, OPs, unit strengths, and dispositions as well as size, location, and reaction time of reinforcements are obtained and studied. After the period spent for collection and studying of information concerning the objective, a period of very thorough attack planning and exercises takes place which includes sand-table demonstrations and, if possible, actual replicas of the target area which have been constructed to scale for rehearsal purposes. The amount of time and effort expended is directly dependent on the significance of a potential target and its system of defense.

2. Size and Composition of Raiding Force. The size of force necessary to accomplish the mission, of course, varies with the prevailing conditions. The general rule followed by the VC is that the attacking forces should outnumber the defenders in a sustained operation.
by at least a 2 to 1 ratio, and preferably a 3 to 1 ratio. Therefore, 
the usual strength of the raiding force varies from platoon to regiment 
depending on the strength of the target. There are no indications that 
the enemy commander would retain a strong reserve at his disposal in case 
the raid should be unsuccessful. As a general rule, fire superiority 
is considered mandatory for a successful assault. Maximum use is made 
of engineer support, either organic or attached, to the raiding force. 
An even more effective method is to place especially trained and equipped 
sapper units in support of the raiding force. The primary mission of 
sapper units is to precede the infantry in the attack and to create a 
breach in the defenses of the enemy installation to permit an assault to 
reach its objective.

3. Scheme of Maneuver and the Fire Plan. The scheme 
of maneuver includes the usual command and control techniques (objectives, 
unit boundaries, routes of advance and withdrawal, communications, lo-
cation of command posts, and time of attack). The criteria for choosing 
a combat formation are determined by the opposing force's defense system, 
visibility conditions, and terrain. The column, wedge, and echelon for-
mations are the most frequently used. The fire plan is well established. 
During the preparation phase, registration rounds mark center of sector 
and pinpoint targets, but this method is being used less often. Instead, 
the VC sometimes use reconnaissance elements or civilians to pace off 
the actual distance between targets and weapons locations. This enables 
gunners to deliver heavy volumes of fire with accuracy and little or no 
time lost in adjustment. The time to open fire is usually decided by 
the commander. Duration or preparatory fires depends on many things. 
Usually, dominating fires to gain fire superiority last from 5 to 10 
minutes and then slow down to a regular rate. Enemy fire-support units 
with 70 and 75mm howitzers are usually deployed from 500 to 1,000 meters 
behind the assault element. Units with 57 and 75mm recoilless rifles and 
light mortars are 300 to 500 meters behind the assault elements.

4. Execution of Attack. Movement to the objective is 
usually made at dusk unless the terrain offers exceptionally good con-
cealment. Movement is made on predesignated routes, following a prede-
termined plan. Constant contact is kept between units by runners. Once 
movement from the secure area has begun, the VC use radio only when it is 
impossible to use messenger. Spearheading the raiding force, a sapper 
element moves to make the initial penetration. In a typical attack of 
this kind, the sappers approach the outer perimeter while the infantry 
and heavy weapons support wait in concealment. They use sticks, prongs, 
or C-hooks to raise or spread the barbed wire, or may use wire cutters 
on the least taut portions of the lower strands. The least preferred 
method is to climb over the fence, either by climbing the posts along the 
wire or by flattening the wire with boards. If the fence is patrolled 
they may close up the holes in the wire temporarily while clearing a path 
through the minefield, setting bangalores, and placing boards and ladders.
over trenches and punji pits. Passages through minefields are marked with pegs or other means of identification. The final task in preparing a way for the following infantry assault is to destroy blockhouses, watchtowers, machineguns, and other key positions with satchel charges and grenades and, at the same time, to detonate any explosives they have planted along the fences or in the minefields. The sapper element making the initial penetration is followed by infantry assault troops who exploit the penetration. Heavy weapons support is employed in conjunction with grenades, satchel charges, automatic weapons, and, occasionally, flamethrowers to destroy resistance. Each element in the assault unit has been assigned a specific objective. Main objectives are usually the command post, communication center, artillery or mortar positions, and key fortifications. Secondary objectives may be personnel quarters, supply shelters, non-vital blockhouses, and other defenses. The penetrating sapper unit has the mission of driving deep into the installation's defense system, isolating the main objectives, and splitting and encircling the secondary objectives. Taking advantage of disrupted communications, and isolated pockets of resistance, the exploiting infantry assault force moves in to destroy the enemy. Usually, the secondary objectives are annihilated first followed by the destruction of the main objectives.

5. Commencement of Fire. Sometimes the first explosion detonated by a sapper signals the start of the attack. Other times, the sappers wait for the infantry and supporting weapons to open up, on command, with a heavy volume of suppressing fire before they make an assault of their objectives.

6. Withdrawal. Upon completion of the attack or in case the attack has been repulsed by the defender, the enemy attack force will conduct an orderly and swift withdrawal from the battle area following the same operational concept as described in paragraph 5b(3) below.

(c) Harassing Operations. Harassment is one of the tenets of VC guerrilla warfare. Small combat elements, patrols, mortar or rocket fire, or any combination of these forms of activity are frequently used by the VC to frighten forces from vulnerable VC target areas. Harassing activities always include a reconnaissance mission. Reaction by friendly forces to the harassing attacks often provide valuable intelligence information to the enemy. One of the characteristics of the harassing operations is to place mines and booby traps in the target area prior to the withdrawal of the harassing elements.

(d) Infiltration. The VC are experts in infiltration tactics. Particularly important is their habit of infiltrating friendly positions during periods of reduced visibility and adverse weather, usually combining the infiltration with a feint or ruse. Objects of VC infiltration tactics are sabotage, assassination, and demoralization of friendly forces and populations friendly to the FWNMF cause. Detection

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of infiltrators, specifically agents disguised as friendly civilians and blending with the local populace, has proved an extremely difficult task. In addition, the enemy has conducted large-scale infiltration operations from North Vietnam by moving entire divisions through the DMZ or Laos.

(2) Defensive Tactics

(a) General. The enemy generally avoids an area defense as it is described in US doctrine. The enemy cannot withstand superior friendly firepower for an extended period of time. Moreover, his organization, size of units normally employed, light equipment, and cross-country mobility through the jungle terrain favor harassing operations. It appears that VC defensive tactics are centered around ways and means of escaping from ambushes, raids, meeting engagements, and surprise attacks. However, the enemy has tenaciously defended vulnerable base camps, safe areas, and installations of various types for short periods of time.

(b) Organization of Defense. Although the enemy does not organize his defense in the usual manner of three echelons (security echelon, forward defense forces, and reserves), he employs an effective network of observation posts capable of providing security and early warning of an approaching friendly force. A series of defensive positions are located throughout the operational areas, primarily prepared to cover the natural avenues of approach into his positions. These positions, especially the base camps, are characterized by:

1. All-around defense
2. Defense in depth
3. Extensive use of field fortifications to include foxholes, bunkers, tunnels, and communications trenches
4. Mutually supporting defensive networks
5. Concealed escape routes
6. Extensive use of camouflage
7. Employment of mines and booby traps in conjunction with natural and artificial obstacles.

(c) Field Structures and Fortifications. It is becoming more apparent that the Viet Cong are emphasizing the use of field structures to cache weapons and equipment, as well as to provide hiding and fighting positions for personnel and units involved in guerrilla warfare.
These structures which have become a vital part of the enemy war effort fall in three categories: surface structures, sub-surface structures, and fortifications.

1. Surface Structures. The VC utilize locally constructed civilian dwellings as well as the buildings of their own design for purposes which are as varied as the construction itself. Types of surface construction include: supply structures and depots consisting of three to ten separate cottages; ordnance shops of four to eight thatched-roofed houses; and base camps consisting of groups of thatched houses built under thick foliage.

2. Sub-Surface Structures. The use of caves and tunnels by the VC as hiding places, caches for food and weapons, headquarters complexes, and as protection against air strikes and artillery fire has been characteristic of guerrilla warfare in South Vietnam. Extensive tunnel systems containing conference, storage, and hiding rooms as well as interconnected fighting points have frequently been encountered beneath fortified villages. They measure from three meters long to a complete tunnel network many kilometers in length, with an average width of one meter. Several villages may be connected by such a network. Tunnels are constructed from two to four meters below the earth's surface, depending on terrain features. There is a partition at each turn of the tunnel to retard snakes, gas, or explosives. The entrance is just large enough for one man to enter at a time. A tunnel complex, as well as all surface structures, have superb camouflage. Tunnels are carefully secured by traps, pits, and mines. On the perimeter of tunneled areas, the enemy organizes combat structures and trenches to impede searching. In the event that attackers are stronger than the VC force, the VC will remain outside the tunnel and fight without betraying the tunnel's location.

3. Field Fortifications. Fortifications play a very important role in both conventional and guerrilla warfare in that they provide security and allow surprise. They are also excellent shelters for troops, weapons, and equipment and increase the combat capabilities of the unit. The VC field fortifications have the following general characteristics:

   a. Fortifications are basic in their construction, using material which is readily available.

   b. Camouflage, natural and artificial, is a primary concern.

   c. Fortifications are well sited, with regard to overall operational requirements, terrain, and natural obstacles.

1. Reference 10.
d. Mines and booby traps are employed in conjunction with fortifications, tunnels, and surface constructions.

e. The types of enemy field fortifications include foxholes, trenches, bunkers, weapons emplacements, obstacles of various types, tank traps, and roadblocks. The VC have not standardized their designs or methods of construction. Great emphasis is placed on using whatever construction materials are available and, whenever possible, use of local installations. Civilian labor is used in addition to engineer units.

(3) Withdrawal Tactics

(a) General. The VC/NVA always include a withdrawal plan in all offensive and defensive operations. They characteristically conduct rapid withdrawals along preplanned, concealed escape routes. Control for breaking contact with opposing forces and withdrawal tactics are similar to those employed by US forces.

(b) Methods of Withdrawal. Platoon and company rally points are used. Assembly areas are always selected in a secure area where rest and regrouping can take place, as well as after-action critiques, and renewed political/military indoctrination. They are normally at least one day's march from the company rally points. Upon completion of an ambush or raiding mission, there is a predetermined sequence of withdrawals: security elements, wounded, dead, captured material, infantry elements, and the rear guard elements.

(c) The amount of FWMAP pressure determines the withdrawal tactics. If time permits and the contact is moderate, the enemy forces may withdraw along the axis of advance, or portions of it. If pursuit is light, units may withdraw intact. Previously prepared positions may have been dug along the way. Sometimes the withdrawal along the axis of advance may be made in conjunction with preplanned supporting fires covering the movement and by employing hasty mine-laying techniques. If the VC unit has been surrounded, forced to fight, and has used up its ammunition, or, if the withdrawing unit is under heavy pressure including air and artillery strikes, the tactics which are more common for evasion and escape are also applicable for withdrawal. Characteristics of the withdrawal under heavy pressure and difficult conditions include fragmenting, dispersing, hiding, deceiving, and delaying.

1. Fragmenting. In most cases when the enemy unit has been surrounded and its annihilation is likely, the unit splits into small groups and attempts to break through the encirclement and exfiltrate the battle area.
2. Dispersing. Another favorite technique used by small VC forces in danger of an unfavorable, close-range contact is to abandon all their equipment, mostly hand-carried, and run. Friendly forces have been inclined to slow pursuit in order to inspect the abandoned equipment.

3. Hiding. Hiding places available in the jungle environment are innumerable. They include concealed safe areas, base camps, and surface structures as well as underground caves and tunnels. Dispersed formations, per se, assist in hiding small elements of the withdrawing unit.

4. Deceiving. The enemy has used deception to draw friendly forces away from base camps. Small enemy units will harass and withdraw in an attempt to swing the friendly forces direction of movement away from a valuable area.

5. Delaying. The enemy has made extensive use of personnel and units assigned to rear guard forces to delay pursuing forces in successive positions until withdrawal of the main force is accomplished. The enemy has increased the effectiveness of his delaying action by conducting ambushes and harassing tactics as well as extensive use of mines and booby traps along the routes of withdrawal.

(a) Antiheliborne Tactics

(b) Warning Systems. The following are some of the simple warning systems used by the enemy against impending heliborne operations:

1. Reconnaissance squads positioned on high grounds, in trees, and near landing zones (LZ) to watch for helicopters. Wire communication from these OPs to an OP several hundred meters from the landing zone provides the commander an early warning system and enables him to make his decision to attack, remain in place, or withdraw.

2. Assignment of personnel to observe aircraft when their units are bivouaced or on the move.

3. Use of cow bells, whistles, and conical-shaped holes in the ground. The purpose of the conical-shaped holes is to pick up and amplify vibrations of approaching helicopters.
1. Monitoring radio messages being passed among friendly units enroute to LZs.

2. Employment of local guerrillas, peasants living near, or civilians working at FMMAF bases as informers.

3. In addition, several preparatory measures preceding a heliborne operation tend to give an advance warning to the enemy. Some of these "indicators" are as follows:

   a. Detailed reconnaissance of the area by an observation/reconnaissance type aircraft (especially Mohawk) before a heliborne assault. This is usually accomplished 24 hours before the assault.

   b. Artillery preparation or use of tactical air on the LZ before the heliborne assault. The enemy estimates that friendly troops will arrive on the landing zone approximately 10 minutes after this preparation.

   c. Use of flares over the intended area during the night.

   d. Generally, a heliborne operation is expected to take place during daylight hours, in fair weather, and on exposed and even terrain.

(c) Selection of Areas for Defense. The enemy bases his decisions on whether or not to defend a potential LZ from attack on several variables. The enemy will choose to defend a probable LZ if they are able to meet some, but not necessarily all, of the following conditions:

1. The enemy unit is numerically superior to any opposing force that may be lifted into the LZ at any one time.

2. The LZ offers the enemy good cover and concealment from air and ground observation.

3. The terrain is favorable for defense in that the LZ is at the base of a hill or in a valley or surrounded by dense jungle or forest. In addition, the area has good fields of fire.

4. The area surrounding the LZ provides good routes for withdrawal and reinforcement that cannot be detected from the air.

5. The LZ is near a major enemy installation or unit location.
(d) Preparation of Defensive Site. Once a particular site has been selected as a probable LZ, the enemy units go to great lengths to prepare primary, alternate, and supplementary positions so that they can defend the LZ regardless of the direction of the attack. In areas where the enemy unit has decided to defend the LZ and is entrenched, all-around defense can be expected. Within this circular or elliptical, modified strong point, the enemy will utilize prepared positions in several places, where his fires can be mutually supporting and interlocking. Modified strong points are usually in a triangular pattern around the potential LZ as illustrated in Figure A-11.

![Modified strong point diagram]

(C) Figure A-11 Defense of Landing Zone

When organizing the defense of the modified strong points primary emphasis is placed on fields of fire and construction of field fortifications and obstacles. Depending on time available, foxholes are dug first, then weapons emplacements, communications trenches, and shelters. Captured VC have indicated that some of their units have waited at a LZ as long as three months which is much more than adequate time for preparations. Obstacles are used by the enemy to restrict potential LZs to those where he is at an advantage to defend. This does not mean, however, that the enemy would not employ obstacles on LZs they have decided to defend. Some of the obstacles used by the enemy against heliborne attacks are as follows:

1. Grenades wrapped in paper are placed in the LZ. As the helicopter lands, the prop-wash forces the paper into the air, releasing the pressure of the grenades and setting them off.

2. Pieces of sheet metal are placed in the LZ. The prop-wash from the landing helicopter presses the sheet metal down, exploding mines placed beneath it.
3. Hardwood stakes and bamboo stakes 1 to 20 feet high are placed in the LZ. The poles pierce the skin of the helicopters and sometimes disable them.

4. Communication wire is strung across the LZ. This is very difficult for the pilots to see and is capable of downing helicopters.

5. Captured US 3.5-inch rockets placed on improvised firing tubes and set off remotely by electric firing device.

6. Grenades hung from communication wire and activated by being released from the wire.1

7. Punji stakes placed in LZs to obstruct helicopters and troops.

8. Directional mines employed in the manner discussed in paragraph 3a above.

9. Grenades placed on boards 60cm² covering holes dug 60cm in diameter and 3/4 meter deep in funnel shape in the LZ, and explosive charges of approximately 3 lb are placed in the bottom of the holes. When the helicopter is about 120 meters from the launcher, the charge in the bottom of the hole is electrically detonated, the boards fly into the air, and strings anchored to the side of the hole pull the safety pins off. The grenades in turn will be tossed from 120 to 250 meters into the air within a perimeter of 120 meters and explode near the incoming helicopters.1

(e) Conduct of Defense. The enemy forces deploy to defend against heliborne attacks depending upon the terrain conditions and the enemy situation. On occasion, the enemy will employ their entire force in prepared strong points immediately around the LZ, and at other times he will keep most of his forces in a mobile reserve status. In the latter case, supposing that the enemy will use a battalion size unit, elements of a reconnaissance unit are placed in the vicinity of the LZ to observe and report by wire communication to the battalion commander responsible for the defense of the LZ. The three companies of the battalion may be deployed at one hour's walk (half an hour's run) from the LZ in a triangular formation. The battalion command post would be a one hour and 20 minutes walk from the LZ, behind the rear company as illustrated in Figure A-12. As the friendly force lands, the recon unit reports to the battalion commander who, in turn, orders the companies to deploy to the attack positions. Another tactic used by the enemy is to wait until night to engage the FVMAF heliborne forces. The night provides the enemy

1. Reference 3.
with concealment under which to close with and engage friendly forces more effectively. In cases where the enemy elects to occupy the positions around the LZ prior to the landing operation, a heavy volume of firepower is directed against the approaching aircraft to prevent the assault. Currently the enemy employs several methods of firing at helicopters:

1. The area of fire method. The gunner aims at the lead helicopter in the formation. He fires at this point and as the formation passes by. He does not shift his fire or lead any of the aircraft.

2. The point target method. The gunner computes leads on aircraft and fires.

3. The curtain of fire method. The gunner fires a predetermined direction and height. The formation flies through this line and the ships are hit.

Enemy stresses that all firing at aircraft must be started simultaneously. However, he has not solved the problem of determining when an aircraft is in effective range. Many times the enemy has revealed his position by firing too soon and at greater than effective range.

As the friendly force deploys, mortar fire may be called for on the LZ. Priority targets include radio operators, commanding officers, advisors, and machinegunners. As the helicopters take off, the volume of fire is further increased until the ships are out of range, and then the fire is
returned to the troops on the ground. The enemy soldier is generally well
disciplined, and trained to fire on command. After a heavy volume of
fire is delivered on the landing force, the enemy commander launches an
attack to annihilate the friendly force on the ground. If the VC commander
estimates that he is not capable of destroying the friendly force by
launching an assault, or if the assault has been repulsed, the enemy unit
initiates a swift withdrawal operation by leaving smaller elements behind
to keep the friendly force pinned down.

c. Tactical Employment of Minen and Booby Traps

(1) General. During the French and Viet Minh conflicts, the Viet
Minh used improvised explosive mines and booby traps effectively to harm,
slow down, and demoralize the French forces. The Viet Cong have greatly
improved their predecessor's techniques and tactics in employment of
mines and booby traps, and the results obtained by the enemy are subject
great concern to US and Allied Forces. An example of the effectiveness
of these enemy tactics is the percentage of casualties sustained by US
Forces during a recent operation; 90.5% of our casualties were caused by
mines and booby traps.

(2) Methods of Employment. Although enemy engineer units have
been trained to install large defensive minefields closely paralleling
CHICOM mine warfare doctrine, extensive enemy minefields have not been
encountered in South Vietnam. Large scale employment of mines requires
considerable time, manpower, and logistical effort. Even though the VC
have had time and manpower to employ mines in large scale, the lack of
hardware in quantities and transportation problems involved have pre-
cluded this type of operation. Instead the current practice of the
enemy is to make use of numerous isolated mines or groups of mines for
their nuisance value and to create casualties, fear, and overcautiousness
resulting in delay of operations. Therefore, the deliberate method of
mine laying, normally used to support major tactical operations, is not
applicable to enemy mine warfare. The hasty method of mine laying,
which is usually done without the assistance of engineers and which
does not necessarily follow a standard pattern, is typical of the
enemy. In addition, special mining techniques, such as mining of streams
and canals against friendly vessels, and probable landing sites against
heliborne operations, characterize the enemy mine warfare in South
Vietnam.

(3) Types of minefields. Enemy minefields can be classified
as follows:

(a) Protective minefields are simple, shallow in depth,
and narrow in frontage. This type of minefield is used in local close-in
protection of units or installations. The enemy favors laying mines as
part of a perimeter security system. The purpose is to prevent infil-
tration, detect an approaching force, and temporarily halt it in the
areas covered by preplanned supporting fires.

(b) Muisseance minefields are employed to delay and dis-
organize the US/Allied Forces, and to hinder their use of an area or
route. The enemy has mastered the use of mines along lines of communi-
cations such as roads, trails, railroads, and bridges, and makes a great
effort to employ satchel charges against airfields, and parked aircraft
on flight lines. All types of mines and booby traps have been used for
nuisance purposes, however, directional mines appear to be most commonly
used for this purpose.

(c) Phony mines are harmless objects designed and located
to portray live mines. For example, a buried enemy tin can causes a mine
detector to indicate a possible mine and requires action to remove or
identify the object. If ample supplies of mines and booby traps are
available, the enemy prefers to use live rather than phony mines. However,
there are many instances reported where the enemy has used these devices
in conjunction with his live mines and booby traps.

(4) Pattern of Minefields

(a) Miming of Roads. Typical patterns for mining of dirt
roads, trails and hard surfaced roads have been described and illustrated
in detail.¹

(b) Standard Pattern Minefield Design. Extensive, deliberately
laid minefields have not been encountered in RVN. Only one returnee report²
is available providing information of a standard pattern minefield having
been installed. This information is based upon returnee's learnings at
the Dong Ciao Training Camp, Ninh Binh Province, North Vietnam. The report
provides the schematic pattern of the antipersonnel minefield, as shown in
Figure 4-13. The minefield illustrated did not contain antitank mines.
The size and density of AP mines in the minefield depends upon the amount
of mines available. In this training exercise an open field with grass
was considered to be an ideal location. The near edge of the minefield
was located 50 meters forward of the enemy defensive positions. The mine
positions were camouflaged with dirt, leaves, rocks, etc. The minefield
was marked by plain uncolored wooden stakes, 20 cm in height. The stakes
were implanted to outline the minefield at its four corners. Other stakes
were used on the sides as required by the size of the minefield. All of
these stakes were then connected by vines.

(5) Selection of Mine Targets. Neither selection of targets nor
order of priority used by the VC in targeting follows any specific criteria.

¹ Reference 3
² Reference 11

A-50

CONFIDENTIAL
(C) Figure A-13 Pattern of Enemy AP Minefield (Not to scale)
Both depend on the situation and the mission. Based upon information obtained from captured enemy documents and interrogation reports, the enemy continues to give high priority to targets deep in the FWMAF rear areas.

(a) The most probable targets in these areas include:

1. Compounds, consisting of headquarters buildings, billets, communications facilities, motor parks, etc.

2. Supply depots and storage areas

3. Ammunition and fuel dumps

4. Airfields, parked aircraft on flight lines, bomb and aviation fuel storage areas

5. Harbors, docking facilities, and vessels.

(b) In forward areas occupied by FWMAF, enemy sapper and guerrilla units have concentrated their activities against the following targets:

1. Ground lines of communication such as roads, road junctions, trails, streams and canals, crossing sites, and off-loading facilities.

2. Truck convoys or river craft transporting troops and supplies

3. Camp sites, compounds, fortifications, and other defensive field installations

4. Artillery positions, air strips, landing sites, and parked aircraft

5. Towns, villages and hamlets. In towns, congested areas such as bus stations and markets, specific single buildings such as hotels, BOQs, police headquarters, city halls, government administrative facilities, and residences of prominent individuals are priority targets.

6. Individuals are selected for assassination, such as mayors, hamlet and village chiefs, key administrators, policemen, officers, CI agents and other intelligence personnel, suspected informers, Ch'ieu Ho returnees and others who have collaborated with Allied Forces, or individuals who will be killed at random.

(c) There is no information available as to the ideal target for command detonated mines. Most likely the decision in each case is left to the firer's judgement.

1. Reference 12
(6) Mine indicators. Enemy mine indicators are described in detail in a booklet given wide distribution to all US and allied forces in South Vietnam.

(7) Areas of NVN affected by enemy mining activity. The two areas of highest mining incidents are the Da Nang - Hoi An - Bien Hoa triangle and the wide area surrounding the Saigon - Bien Hoa complex. The enemy has also employed large quantities of mines and booby traps in a general area north and east of Tay Ninh City near the Cambodian border, around the town of Tho in the Delta, along coastal highway #1, and along Highway #4 (The Peoples Highway) in the Delta. A definite correlation can be drawn between the locations of major mining activities and known enemy storage areas (see Figures 4-12 and 4-13). The extent of distribution from production sites to surrounding areas has not been determined. A detailed listing of mine and booby trap incident locations in 1967 is found in CICV "Enemy Incident, Mine Plot" (Job #22-022) Overlays to 1:500,000.

  d. Enemy Mine Detection Capability

(1) The enemy is trained in the detection and removal of US mines. However, training documents indicate that reliance is placed on the old and simple methods of detection, such as the use of picks, pick mattocks, and various types of issued or locally manufactured probes. In addition, various types of Soviet equipment have been provided to Communist Bloc countries since World War II. Some of these mines have been acquired by the NVA and possibly by the VC. The CHICOM equipment listed below is known to be in the possession of the NVA.

(2) Types and Capabilities of Equipment. The following types of mine detectors are available to the enemy:

  a. US JCM 625: Possibly captured from the French. Capable of detecting buried metallic mines to a depth of 13.8 inches.

  b. CHICOM Type 55-625: Operation and physical characteristics similar to the Soviet VDI 203M.

  c. Soviet VDI 203M: Reported detection range up to 12 inches for metallic mines.

  d. Soviet VDI 625 and VDI 695: Estimated detection range of 10 to 12 inches.

1. Reference 8
2. Reference 9
Figure A-14 Location of Major Mining Activities

LEGEND
- 5-10 MINE INCIDENTS PER SQ KILOMETER
- 2-5 MINE INCIDENTS PER SQ KILOMETER
- 1 MINE INCIDENT PER SQ KILOMETER
(e) Soviet VDI 210 (Models 1939 and 1940): Depending on type of mine, detection range is from 9.5 to 17.5 inches.

(f) Soviet Three-Solenoid-Coil Type: Capabilities unknown.

(g) Soviet Line Detector with Search Spade: Capabilities unknown.

(h) Czechoslovakian L-10 and L-11: Claimed detection range of approximately 5 feet.

(i) Bulgarian V12F: Capable of detecting metallic mines up to 8 inches.

(j) Bulgarian V12F: Capable of detecting metallic mines up to 12 inches.

(3) The detectors of Soviet manufacture have been imported to Vietnam in limited quantity only, and there are no known manufactures of electronic mine detectors in North Vietnam.

(4) To determine the presence of mines or a mine field the enemy looks for the following indicators: small plots of grass; freshly dug earth; footprints; wire laid on the ground or tied to trees; presence of detonating caps, empty containers, labels, picks or other digging tools; and signs with warning symbols. If a mine is discovered, then the search is continued to find others. Captured documents indicate that upon locating a minefield, the enemy may remove the mines, explode them, or simply mark them with a sign if there is an alternative to crossing through the minefield.

6. (C) ENEMY ORGANIZATIONAL STRUCTURES FOR LINE ACTIVITIES

a. General.

1. Reference 13
(1) The responsibility for employment of mines and booby traps within the enemy organization rests on sapper and engineer units. In addition, the local guerrilla units are qualified in employment of mines and booby traps in harassing friendly forces or conducting terrorist activities against the civilian populace. In order to achieve a better appreciation of enemy mine warfare activities one must understand the organization, mission, and capabilities of enemy sapper/engineer and guerrilla units.

(2) The enemy's deployment and assignment of engineer, sapper, and guerrilla units in South Vietnam is characterized by a lack of standardization. The guiding principle in the assignment of engineer and sapper units to an organization or area is based on requirements rather than on TOE. Likewise, the arms, equipment, and strength provided these organizations are determined by the specific mission of each unit.

(3) Transportation, which is virtually restricted to foot movement, severely limits the amount of engineer equipment that can be transported. Since their mission is combat-oriented, the enemy must remain partly self-sufficient and mobile. These requirements force him to give priority to arms, ammunition, demolition materials, individual equipment, and food. The transportation of additional equipment is limited to those items which cannot be confiscated or obtained by other means from the local populace but are needed to accomplish the mission.

b. Overall Military Organization

(1) Political-Military Concept

The VC military organization is an integral part of the apparatus which controls all aspects of VC activity throughout RVN. Each political headquarters at hamlet, village, district, and province levels includes a military component which exercises some control over VC military units assigned to its area of jurisdiction.

(2) Area Control System

The Central Office, South Vietnam (COSVN) is the highest level VC headquarters in RVN. Under COSVN are nine VC military regions. Subordinate to these Military Regions (MRs) are 33 VC Provinces (in contrast to 44 GVN) and approximately 230 Districts, each with its own party organization. Below district level there are approximately 2,500 villages and 12,000 hamlets. Each military region, province, district, and village has its own political/military headquarters which directs military components of VC units subordinate to it. COSVN has overall responsibility for VC military operations in RVN and exercises direct control over certain units. At province and district levels, the VC political and military structure closely parallels that of the Government of South Vietnam.
c. Military Units

(1) Military units fall into three general categories: Combat, Combat Support, and Militia. The combat units consist of three distinct types of military forces:

(a) People's Army of Vietnam (PAVN), the North Vietnamese Regular Army units infiltrated into South Vietnam.

(b) VC Main Forces which are those units directly subordinate to COSVN or to the Military Regions in RVN. They may be found as regimental, battalion, separate company, and platoon size units and may include sapper elements.

(c) VC Local Forces which are organized up to battalion size and are normally subordinate to an individual VC Province or District. These forces may also include sapper elements.

(2) Combat Support Forces is the category used by the RVN military authorities to indicate all VC headquarters personnel and special combat support units such as engineer, communication, reconnaissance, and food production units, which are not assigned to a particular combat unit.

(3) Irregular Forces (Militia) commonly known as Guerrilla Forces. Guerrilla units are used to harass and conduct assassinations and sabotage on a full-time basis. They support and participate in actions in conjunction with Local and Main Force units when the latter operate within their areas. Guerrilla units rarely exceed a platoon size.

d. Sapper and Engineer Units

(1) Mission

(a) Sappers. The typical enemy sapper unit specializes in explosives and demolitions during combat operations. Its primary mission is to precede the enemy infantry in the attack, breaching barbed wire and mine fields that impede the infantry's advance. The sapper unit is responsible for placing satchel charges against fortified positions and is often required to secure the first objective within a defensive perimeter before the infantry assault forces rush through the breach to overrun the position. Additional missions normally performed by sapper elements include terrorism and sabotage, especially in the larger cities, and water demolitions including bridge destruction, watermining, and protection of their own water routes of communications. Battalion size sapper units located near major ports are reported to have a frogman capability complete with underwater breathing apparatus and the equipment necessary to swim into shipping channels and attack explosives to oceangoing vessels.
(b) Engineers. The missions of enemy engineers units are also predominantly combat oriented. However, when the situation demands or permits, the engineer units engage in support activities such as the construction of camps, base areas, trails, hasty roads, improvised fixed and floating bridges, and agricultural work. The combat-oriented missions assigned to engineer units include placing mines and demolitions, constructing fortifications, breaching obstacles, and fighting as infantry when required.

(2) Organization

(a) Sappers. The organization of a sapper unit is dependent on the location and mission of the unit. Generally, each Military Region has a sapper battalion and each Province, larger town, or area containing a US base, has a sapper company under People’s Revolutionary Party Committee operational control. Each battalion usually consists of two to four companies, each company consisting of three to four platoons or teams, and each platoon three squads or cells. As an exception to this general rule, in the vicinities of the major cities, airfields, and harbors, complete sapper battalions have been found with strengths up to 500 men. These units may operate in small groups, primarily involved in sabotage, assassinations, and kidnapping. The larger units normally include a heavy weapons element and an underwater demolitions capability. There are separate sapper companies that specialize in mine warfare and the destruction of lines of communication (LOC). Friendly forces encounter units from battalion to platoon size with double designations, such as the sapper reconnaissance battalion or the sapper engineer company. These doubly designated units will be divided into smaller elements, some responsible for sapper activities, and others responsible for reconnaissance or engineer tasks. At the lower levels (VC district and province), there are often separate sapper platoons with missions of interdicting land and water LOCs and performing infantry missions. Sappers are considered direct combat units and do not fall under combat support or rear service elements.

(b) Engineers. Within the enemy divisions there is some degree of standardization in the engineer structure. With some exceptions, there is one engineer battalion per NVA division and one engineer company per NVA infantry regiment. In separate independent regiments, the allocation of engineer units becomes inconsistent. Occasionally there is an independent engineer battalion subordinate to a military region and separate engineer mission companies or platoons under provinces or districts. Apparently the engineer mission in units, provinces, and districts which lack organic engineer support is assigned to sapper and engineer units. A special water demolition engineer battalion is found in the coastal areas of III CTZ with the primary mission of intercepting shipping on the Saigon area waterways. Engineers are considered combat support units but are often utilized in direct combat missions.
(3) Weapons and Equipment

(a) Sappers. There is no standard Table of Organization and Equipment (TOE) for sapper units. However, sappers usually have more automatic weapons, especially submachineguns, than an infantry unit of the same size. Some of the larger sapper units have organic heavy weapons support elements, equipped mainly with 81mm AT grenade launchers, mortars, heavy machineguns, and recoilless rifles. Especially characteristic of sappers is the emphasis on mines, grenades, and explosives in their arsenal. Small tactical radios appear often on lists of sapper equipment. Units operating on rivers and waterways have motorboats and sampans.

(b) Engineers. The enemy engineer units in SVN have a limited ability to maintain and transport large items or inventories of engineer equipment and supplies. The items of engineer equipment in the hands of the troops are normally easily portable; only items needed for the immediate mission or for future missions and unavailable either in supply channels or through confiscation are carried. Although the enemy occasionally has items of heavy engineer equipment such as bulldozers in their possession, the majority of this equipment is obtained from the local resources for a specific mission, and permanent possession is not contemplated. The construction practices of enemy engineers are characterized by their dependence on human labor (troop labor, volunteer, and conscripted civilian labor) and the maximum utilization of locally available resources.

(4) Transportation and Construction Materials

(a) Transportation. The enemy engineer units in SVN have no organic vehicles with which to transport heavy items of engineer equipment and supplies. The battlefield situation in SVN has forced the enemy to maintain a capability to move by foot at a moment's notice. This requirement seriously limits the items of engineer equipment that the enemy is able to retain in his TOE inventory. Each soldier must carry his individual field equipment, clothing, food, weapons, and ammunition. This leaves a very small capability to transport engineer tools and equipment. The unit will attempt to carry certain items that cannot be readily obtained from the country side, such as mine detectors, demolition kits, and voltmeters. However, the vast majority of construction materials, carpenter tools, and excavating tools are obtained from the countryside through loan, rent, purchase, or confiscation.

(b) Construction Materials. Enemy engineers make maximum use of native materials. Experience has shown that the enemy is a master of improvising with whatever material is on hand. Standard construction