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AGO ltr, 29 Aug 1980

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AD855104

OPERATIONS REPORT LESSONS LEARNED

REPORT 1-66



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**DEPARTMENT OF THE ARMY
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IN REPLY REFER TO

AGAM-P (M) (21 Mar 66) FOR OT RD

22 March 1966

SUBJECT: Operations Report - Lessons Learned, 1-66 - Operation CRIME

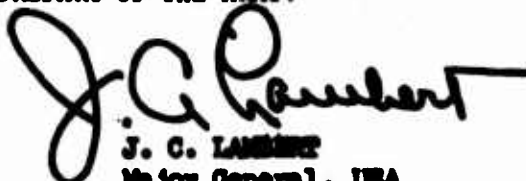
TO: SEE DISTRIBUTION

1. This is the second of a series of reports from combat operations being conducted by US Forces in Vietnam.
2. Information contained in this report is provided to insure appropriate benefits in the future from lessons learned during current operations. Many lessons learned are being derived from operations in Vietnam, the Dominican Republic, major field exercises, and other pertinent sources. The lessons cited in this report have not been evaluated by the Department of the Army and do not reflect official doctrine or approval.
3. It is important this report be placed in the hands of those officers and enlisted men that train our individual replacements and units for RVN. These lessons learned can result in higher enemy kills, better chances of survival for our individual soldiers, and an increased combat effectiveness of our units.
4. Additional lessons learned will be forwarded as they become available. The first report of this series was entitled "Summary of Lessons Learned, Vietnam (U) and was published 2 November 1965.

BY ORDER OF THE SECRETARY OF THE ARMY:

2 Incl

1. Cmdr Combat Note
2. Ltr AVAB-SB, 21 Jan 66


J. C. LAMBERT
Major General, USA
The Adjutant General

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DEPARTMENT OF THE ARMY
HEADQUARTERS, 173D AIRBORNE BRIGADE (SEPARATE)
APO U. S. Forces 96250

AVAB-CG

22 January 1966

COMMANDER'S COMBAT NOTE
NUMBER 91

DUTY IN VIETNAM

Operation CRIMP, the largest U.S. operation, in Vietnam, was launched on 8 January 1966.

The objective of the drive through the Ho Bo Woods region in Binh Duong Province was to destroy the politico-military headquarters of the Viet Cong Military Region 4, which controls VC activities in a large part of South Vietnam. The mission was accomplished; the headquarters was found and destroyed and an enormous quantity of enemy documents and weapons was captured. This operation is a continuation of a string of conspicuous successes for the 173d Airborne Brigade (Separate).

Two brigades, the 173d Airborne Brigade and the 3rd Brigade, 1st Infantry Division, with numerous artillery and other supporting elements were jointly employed in the operational area just west of the Iron Triangle. The 1st Infantry Division was the controlling headquarters for the operation. The 3rd Brigade units operated to the south of our TAOR (Tactical Area of Responsibility).

On D-Day the Brigade fire support base, command and control elements, and support elements moved by motor convoy from Bao Trai before daylight. This movement from the area of the Oriental River terminated Operation Marauder at 080530 January 1966. The road movement was closely coordinated to allow the motor elements of both brigades and the division fire support units to utilize the same road network into the area of operation. Additionally the road movement was timed to the "split second" to permit units to move to the forward troop safety limit as B-52's participated in the prestrike. (See Sequence of Events, Incl #1.)

As the Brigade fire support base closed into its new position the 1st Battalion, 503d Infantry, 2d Battalion, 503d Infantry, and 1st Battalion, Royal Australian Regiment assaulted LZ's March, April, and May. Two battalions of the 3rd Brigade were helilifted into an LZ to the south. (See Chart at Incl #2.) One battalion of the 3rd Brigade moved to Trung Lap by road convoy, and then moved into the operational area by foot.

1/RAR made the initial assault, landing on LZ March at 0930 hours after an intense artillery and air preparation which had followed the B-52 strike. The Australians met light resistance near the LZ and the helicopters received ground fire on the "run in" for the assault. No major contact was made initially. Shortly after mid-day the 1/RAR engaged at least one VC company and a fierce fight ensued which continued till after dark with the Australians overrunning successive positions, extensive bunker systems and trenches constructed in depth. The fortifications were highly defensible and the VC

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22 January 1966

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NUMBER 91

fought tenaciously, obviously in determined defense of something that was of great value to them. The VC employed small arms and automatic weapons, mortars, 57mm RR, command detonated mines and booby traps. As darkness fell, the Australians were in command of the situation and were ferreting out the VC from their positions. 2

At 1200 hours 1st Battalion, 503d Infantry assaulted LZ April, with only minor opposition. The third assault was conducted by the 2/503d when they landed on LZ May at 1430 hours. Ground fire was encountered by the airlift force of the 145th Aviation Battalion on each of the assaults.

In rapid succession, the 1/503d secured the LZ and moved to and surrounded their objective, which was the reported location of the headquarters of Military Region Number Four (MR4). By the end of D-Day it became apparent that the intelligence target was not in the specific location that had been reported within the 1/503d. By that time it appeared likely that the target would be located within and northwest of the area of the 1/RAR.

The Brigade LOC, working triple-time and handicapped by a shortage of resupply aircraft, nonetheless continued their effective and professional job of fully supporting the combat actions without interruption throughout D-Day and for the remainder of the operation. This type support is most essential in keeping the artillery and forward battalions in action.

Company D, 16th Armor departed the Brigade command and support base, Position King, early on D+1 to join and became attached to the 2/503d. Just to the north of Position King they encountered and routed a VC force preparing to attack the artillery base, having their mortars already in position. The armored personnel carriers (APC's) ripped through the enemy position, completely foiling his attack.

The 1/503d made no firm contact on D+1, the 2/503d also encountered very little opposition. The 1/RAR began a careful and systematic search of the elaborate tunnel and bunker system in their area, capturing weapons, ammunition, documents, and supply caches while making only light contact with VC rear guard elements. Among the prizes of the many weapons captured were four new 12.7mm anti-aircraft machine guns. The Aussies began employing tear gas to clear the extensive, multi-level labyrinth of underground tunnels prior to searching them.

Troop E, 17th Cavalry and elements of the Prince of Wales Light Horse began search and destroy operations in the western portion of the Brigade TAOR, capturing numerous VC suspects and several rice caches. This action was to be continued throughout the entire operation. The fast moving, well coordinated actions of the cavalry troop covered a major portion of the Brigade area.

22 January 1966

COMMANDER'S COMBAT NOTE
NUMBER 91

3 During the night of 9-10 January 1966, squad-sized VC forces, supported by mortar fire, made four separate attacks on the perimeter of the 1/RAR, all of which were repulsed with enemy losses. Troop E, 17th Cavalry, occupying a portion of the perimeter of the Brigade command and support base, also repulsed an attack by a platoon-size VC force.

1/RAR and 2/503d continued to search their areas by the use of platoon-size patrols on D+2. Company D, 16th Armor was moved to, and became attached to, 1/503d. 1/503d moved to a new TAOR to the north during the afternoon. Company C of the 1/503d and D Company, 16th Armor, lead elements of the battalion, engaged a VC company as the battalion moved into its new base area, proving that the Viet Cong elements had not left that region. The pressure of the 1/503d attack, supported by air and artillery, forced the VC company to withdraw from contact. Here again the VC utilized another extensive complex of inter-connected tunnel systems to withdraw quickly.

The RAR patrols continued to find a maze of tunnels and mutually supporting positions in their area and captured additional weapons and large quantities of documents, many of extremely significant intelligence value. Contacts with small groups of VC were made throughout the day. The search of the vicinity also revealed a VC command post location, having a three-level tunnel system. The Australians employed a very effective and practical method of searching these tunnel systems. Personnel with a torch (flashlight) and a TA-312 telephone entered the tunnels, using the telephones to report items of significance. By measuring the wire as it was played out, the depth and extent of the tunnel was determined, and of course, the wire served as a guide for the return to the entrance, required in the more elaborate systems. 2/503d also found documents and supply caches in their area, though there was little evidence of recent occupation.

E/17th Cavalry conducted a search and clear operation to the north of Position King on D+2. Contact was made a short distance from their perimeter and maintained throughout the day as the cavalry troop and elements of the PWLH relentlessly pursued the scattering VC elements. Air strikes and artillery were employed to cut off and destroy the dispersing enemy personnel with considerable success.

The major contact made on D+3 was in the 1/503d area as it began operations in the new TAOR north of the Australian positions. The battalion encountered well-laid defenses in depth, bunkers and trenches interlaced by tunnels. Small arms fire from concealed positions and booby-traps took their toll as the battalion swept through and searched the area, capturing weapons, equipment, and ammunition supplies. The enemy positions were overrun by 1230 hours and a systematic search of the complex tunnel system was begun.

The 1/RAR continued the search of their area, continuing to find hidden entrances and hidden chambers in the tunnel systems.

22 January 1966

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NUMBER 91

2/503d neared completion of the sweep of the southern battalion TAOR, making light contact. Trenches and bunkers continued to be discovered.

The 12th and 13th of January were marked by sniper action and the difficult, painstaking task of carefully searching the underground network beneath the infantry battalions. Analysis of the huge quantities of documents captured began to reveal intelligence information of immediate operational value and the organization of the captured headquarters was disclosed. Most of the 13th was spent destroying and contaminating the tunnel and bunker systems. CS-1, a powder contaminant with long-lasting effects, was used for the first time and should prove quite effective. It was placed throughout the tunnel systems by placing a long line of detonation cord where desired. Crystallized CS-1 was then placed along the detonation cord just prior to the explosion. It is hoped that this approach will prove to be a lasting deterrent.

On D+6, 14 January 1966, the infantry battalions were extracted from the operational area back to the Snakepit at Bien Hoa utilizing both UH1-D and CH-47 helicopters. Elements in the Brigade command and support base returned to base camp by road convoy the same day. It was found that the large, cumbersome CH-47 should be used only in the initial lifts from each extraction zone.

The civilians in the area of operation had lived under VC rule for many years. Consequently, they were thoroughly indoctrinated by the VC and willingly supported them. Due to this condition, the decision was made to evacuate the population to a secure location where they could not interfere with or betray our military operations. Initially after evacuation, all refugees were briefly interned at the Brigade POW collecting point. Here they were fed and given medical attention. 150 pounds of clothing were distributed to the refugees and 394 "T" shirts marked "173d Airborne Brigade, Airborne All the Way" were given to the children. Later, after interrogation, those not confirmed as VC were further evacuated to the refugee processing center located at Trung Lap. After a total of 1,935 refugees had been processed, it became evident that adequate foodstuffs, housing and means of control did not exist at the District and Province level to continue their evacuation; thus the decision was made by the Vietnamese officials to cease evacuation of refugees. On one occasion a herd of cattle, water buffalos, chickens and pigs were herded from a VC redoubt into the district capital, but, as in the case of refugees, adequate facilities did not exist for their care and control to justify continuation of this practice. During this operation over 26,000 pounds of VC rice were extracted and turned over to the District Chief.

In Psychological Operations, seven loudspeaker and leaflet missions were flown over the TAOR with over 200,000 leaflets being dropped. The primary psychological theme used throughout the operation was one emphasizing the overwhelming strength of the Allied Forces and the ultimate destruction of the VC if they continued to resist.

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22 January 1966

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The preparation for deploying to the CRIMP operation area was different in that last minute detailed planning and execution by the Support Battalion was required to terminate one operation and start another from the field. There was the requirement to evacuate refuse artillery brass and unneeded supplies and bring in the exact amounts of necessary items that could be loaded on the vehicles for the initiation of CRIMP.

CRIMP was the second operation that followed on the heels of a previous operation without the Brigade's return to Bien Hoa. This, however, was the first time that the forward support base was established in an area not adjacent to an airfield. Resupply from Bien Hoa to the forward support base was accomplished solely by rotary-wing aircraft. The Support Battalion rigged, loaded, unloaded and distributed more than 450 tons of supplies using 100 CH-47 ("Chinook") sorties in six days. A/82d Aviation Company flew 254 "Huey" missions to provide ammunition, water, rations and other supplies to the forward infantry positions. Our Maintenance Company repaired over 50 weapons, radios and vehicles during the operation.

The practice of moving the Clearing Station from our Medical Company into the forward support base has long before been proved sound. A good number of the wounded have been processed no farther than the forward clearing station, treated and then returned to duty. The major asset, however, is stabilizing the seriously wounded until they can be moved to the well established operating rooms.

The Support Battalion makes the 173d a truly separate brigade. Its performance has been exceptionally fine and represents a major contribution to our combat power by standing behind the infantry and those who support the infantry with supplies, transportation, maintenance and medical support.

The Engineer Company once again proved its versatility by establishing the water point in a relatively unsecure area during daylight hours and closing it back within the support base complex each night. By operating in this manner we can be more selective in choosing a source for water without being restricted to the support base "goose egg."

The headquarters of the VC Military Region 4 was the objective of Operation CRIMP. Our Americans and Australians found, fixed, and destroyed it, thus causing the enemy untold damage by destroying one of his most secure base areas in Vietnam, taking from him many of his weapons, and capturing thousands of documents and records, revealing his plans, his organization, and much of his past activity. (See Inclosure #3 for list of enemy losses and a sampling of documents that indicates how the VC thinks.) Once again we have found that the enemy cannot seriously contest us on the field of battle.

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22 January 1966

COMMANDER'S COMBAT NOTE
NUMBER 91

LESSONS LEARNED:

1. Clearing bunkers and tunnels is a slow and deliberate procedure which can be costly in terms of casualties. All means available, such as tear gas, flame throwers, smoke and demolitions must be employed in order to keep friendly casualties to the minimum.
2. The capture of the enemy documents during this operation possibly hurt the enemy more from a long range view point than did the loss of his personnel and weapons. These documents are contributing significant information about the enemy which will have a great impact on contributing to his complete defeat.
3. The civilians in this area were thoroughly indoctrinated. It will take a long term civic action process to win them over.
4. The price of entry is often costly. We should always plan to stay long enough to finish the job.
5. Firm decisions must be made with respect to treatment of civilians, travel restriction (such as river closures) and actions to be taken with respect to live stock.

AIRBORNE, "ALL-THE-WAY"

Ellis W. Williamson

ELLIS W. WILLIAMSON
Brig Gen, U.S. Army
Commanding

4 Incl

1. Sequence of Events
2. Chart
3. Enemy losses & Documents

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SEQUENCE OF EVENTS

GROUND ACTIONS

<u>ITEM NO</u>	<u>TIME</u>	<u>EVENTS</u>
1	0530	TF E/17 commences movement
2	0600	TF 3/319 crosses SP
3	0630	TF Support crosses SP
4	0815	Last element of motor convoy clears CP-1 (CU CHI)
5	0900	Last elements of motor convoy clears CP-4 (XT594215)
6	ASAP	Artillery registration complete
7	ASAP	Last elements clear RP (XT616226)

HELIBORNE OPERATIONS

8	X-45 to X-15 (0845)	TAC air preparation of LZ MARCH
9	X-30	(0900) TF 1/RAR arrives staging area (LZ WHISKEY)
10	X-18	(0912) 145th Avn Bn (Reinf) arrives LZ WHISKEY
11	X-18	(0912) 1st element TF 1/RAR loads a/c and departs LZ WHISKEY
12	X15 to X-5	(0915) Artillery preparation of LZ MARCH
13	X-5 to X	(0925) Armed chopper preparation of LZ MARCH
14	X-Hour	(0930) Assault landing of 1st element TF 1/RAR into LZ MARCH
15	X+15	(ASAP) 2nd element TF 1/RAR loads a/c and departs
16	X+30	(ASAP) 2nd element TF 1/RAR lands LZ MARCH
17		145th Aviation Battalion (Reinf) refuels at SNAKEPIT (Bien Hoa)
18	Y-45 to Y-35	(1115) Artillery preparation of LZ APRIL
19	Y-35 to Y-5	(1125) TAC air preparation of LZ APRIL
20	Y-30	(1130) TF 1/503 arrives staging area
21	Y-18	(1142) 145th Avn Bn (Reinf) arrives LZ WHISKEY
22	Y-18	(1142) 1st element TF 1/503 loads a/c and departs
23	Y-5 to Y	(1155) Armed chopper preparation of LZ APRIL
24	Y-Hour	(1200) Assault landing of 1st element TF 1/503 into LZ APRIL

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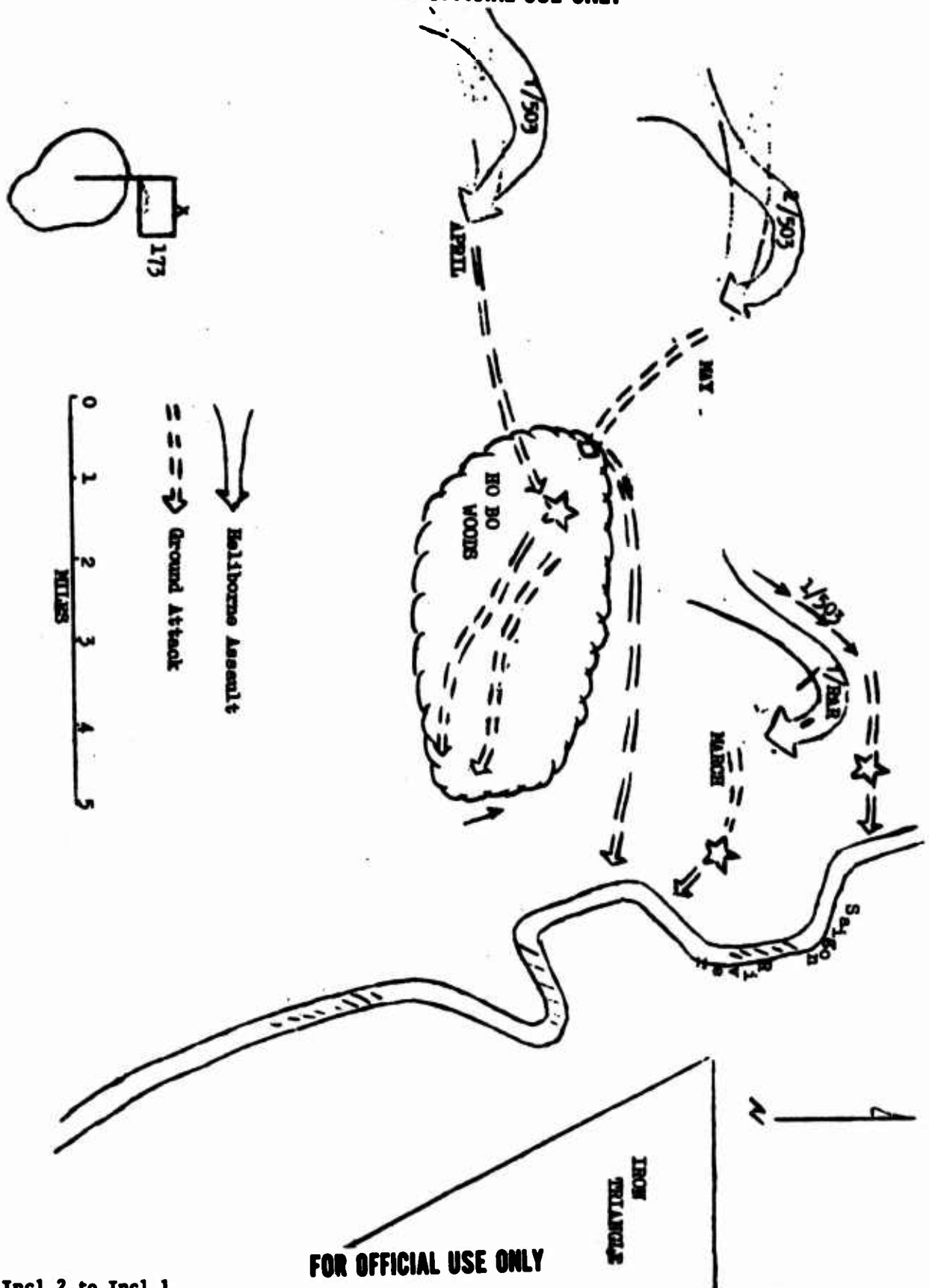
SEQUENCE OF EVENTS (Continued)

<u>ITEM NO</u>	<u>TIME</u>	<u>EVENTS</u>
25	Y+15	(1215) 2nd element TF 1/503 loads a/c and departs
26	Y+30	(1230) 2nd element TF 1/503 lands LZ APRIL
27		145th Aviation Battalion (Reinf) refuels at SNAKE PIT (Bien Hoa)
28	Z-45 to Z-35	(1345) Artillery preparation of LZ MAY
29	Z-35 to Z-5	(1355) TAC air preparation of LZ MAY
30	Z-30	(1400) TF 2/503 arrives staging area.
31	Z-18	(1412) 145th Avn Bn (Reinf) arrives LZ WHISKEY
32	Z-18	(1412) 1st element TF 2/503 loads a/c and departs
33	Z-5 to Z	(1425) Armed chopper preparation of LZ MAY
34	Z-Hour	(1430) Assault landing of 1st element TF 2/503 into LZ MAY
35	Z+15	(1445) 2nd element TF 2/503 load a/c and departs
36	Z+30	(1500) 2nd element TF 2/503 lands LZ MAY

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Incl 2 to Incl 1

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VC LOSSES FOR OPERATION CRIMP

KIA: 128 Confirmed

KIA: 190 Possible

Captured: 91
Suspects: 509
Refugees: 1031
Ralliers: 1

TOTAL: 1950

WEAPONS:

4 Chicom 12.7mm AA MG
2 60mm mortars
2 Chicom K50 SMG
4 French MAT 49 SMG
1 French 7.5 LMG 1924
1 Czech 7.92 LMG KB30
6 French MAS 36 rifles
4 Russian Model 1891/30
2 Chicom AK47
31 Chicom M44 carbines
2 Home-made carbines

1 Home-made shotgun
13 German Mauser M-98
1 US 57mm RR
1 US BAR
3 US M-3 SMG
4 US M-1 rifles
1 US Enfield M-1903 rifle
2 US Enfield M-1917
2 US cal 45 Thompson SMG
2 US M-1 carbines
1 US M-2 carbine

AMMUNITION:

600 rounds 12.7 mm MG
22,543 rounds of assorted small arms ammunition
300 grenades
10 rifle grenades
5 recoilless rifle rounds
51 mortar rounds
1 - 105mm round

Documents: 7,488 (over 100,000 pages)

Communications: 3 altered transistor radios, 2 field telephones

Transportation: 9 sampans, 8 bicycles

Medical: 760 medical items

Food Stuffs:

57 tons of rice
60 pounds of salt

Miscellaneous:

151 pounds of clothing
miscellaneous packs
miscellaneous gas masks
3 accessory kits for 12.7mm
1 helmet liner
1 duplicating machine
4 typewriters
1 telescope

12 BAR magazines
1 50 cal tripod
2800 pounds of fertilizer
1,300 pounds of peanuts
2 gasoline engine
2 dynamotors
1 tape recorder

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TRANSLATION REPORT

ENEMY DOCUMENTS

Large Sign at Village Entrance:

"Who causes the scene that burns houses, makes the suffering, slaughter to our population. That is America enemy, and puppets, we swear that we don't live with them in the same place. Though we are in misery, we will unite together. Determine to clear out the resented we will drive out the imperialist until our population, and country are peaceful for ever and after".

12

Diary - 11 January 1966:

Have spent four days in tunnel. About 8 to 9 thousand American soldiers were in for a sweep-operation. The attack was fierce, in the last few days. A number of underground tunnels collapsed. Some (of our men) were caught in them and have not been able to get out yet. It is not known what have become of sisters BA, BAY, HONG HAN and TAN HO in these tunnels. In their attempt to provide security for the agency TAM and UT were killed. Their bodies, left unattended and deteriorated, have not been buried yet. In the afternoon, one of our village unit members trying to stay close to the enemy for reconnaissance was killed and his body has not been recovered.

Fifteen minutes ago, enemy jets dropped bombs: houses collapsed and trees fell. I was talking when a rocket exploded 2 meters away and bombs poured down like a torrent.

We should fight them, we should annihilate them, you (US soldiers) will have no way out.....

It is always dark before sunrise. After cold days, warm days will come.....

The most tiresome moment is when one moves up a hill. One must rise up disregarding death and hardships, determined to defeat the American aggressors.

Oh! What hard days, one has to stay in tunnel, eat cold rice with salt, drink unboiled water! However, one is free and feels at ease.

This is the last entry, dated 1445 hours, 11 January 1966, of TRAN BANG's diary.

Document was captured the day following the entry.

DEPARTMENT OF THE ARMY
HEADQUARTERS 173D AIRBORNE BRIGADE (SEPARATE)
OFFICE OF THE INTELLIGENCE OFFICER
APO U.S. Forces 96250

13
AVAB-SB

21 January 1966

SUBJECT: VC Fortifications—Operation "CRIMP" (8 Jan to 14 Jan 66)

TO: See Distribution

1. Enclosed are schematics of VC fortifications encountered by elements of the 173d Airborne Brigade during "Operation Crimp". (Inclosures 1-through 11)

2. The types of fortifications found were extensive trench systems, reinforced bunkers, and several tunnel complexes. Most notable are the tunnel complexes, some of which were three levels deep with underground rooms containing arms, ammunition and food caches. The average size of the tunnels was 2 feet wide and 2½ to 3 feet high. Tunnel entrances were camouflaged with grass and brush. There was evidence of multiple entrances and ventilation systems in several instances. CS gas blown into tunnel entrances often emerged from four or five other widely dispersed apertures. Air shafts were found to be conical shape, from about 12 inches at the base to approximately two inches in diameter at the top. The complexity of the tunnel systems, and the weapons and documents confiscated from them, confirm the fact that the majority of the sections subordinate to the SCDSS committee were located within the Brigade TAOR. Several tunnel entrances were covered with form-fitted prefabricated slabs of concrete approximately 12 inches wide, 18 inches long, and 2 inches thick. The pre-cast slabs had small twigs etc. cast in them to assist in concealment. The covers fitted into receptacles especially designed and produced for them in much the same manner that a man hole cover fits its receptacle. A wire loop cast in the cover was used for rapid removal. The VC added additional camouflage after they were in place. These entrances were extremely difficult to locate unless artillery had ruptured the covers or a soldier stumbled over the protruding wire loop. The type of vegetation found in the area immediately around the tunnel entrances confirms the fact that many of the tunnel complexes were completed many years ago. Evidence was obtained that construction of new fortifications was in progress immediately prior to the beginning of operation "Crimp".

3. A document containing instructions for constructing fortifications was found in the 1/503 Infantry Battalion TAOR. The positions discovered in that area generally did conform with these instructions. A portion of that document has been reproduced as inclosure 1 to this letter.

Raymond E. Marshall

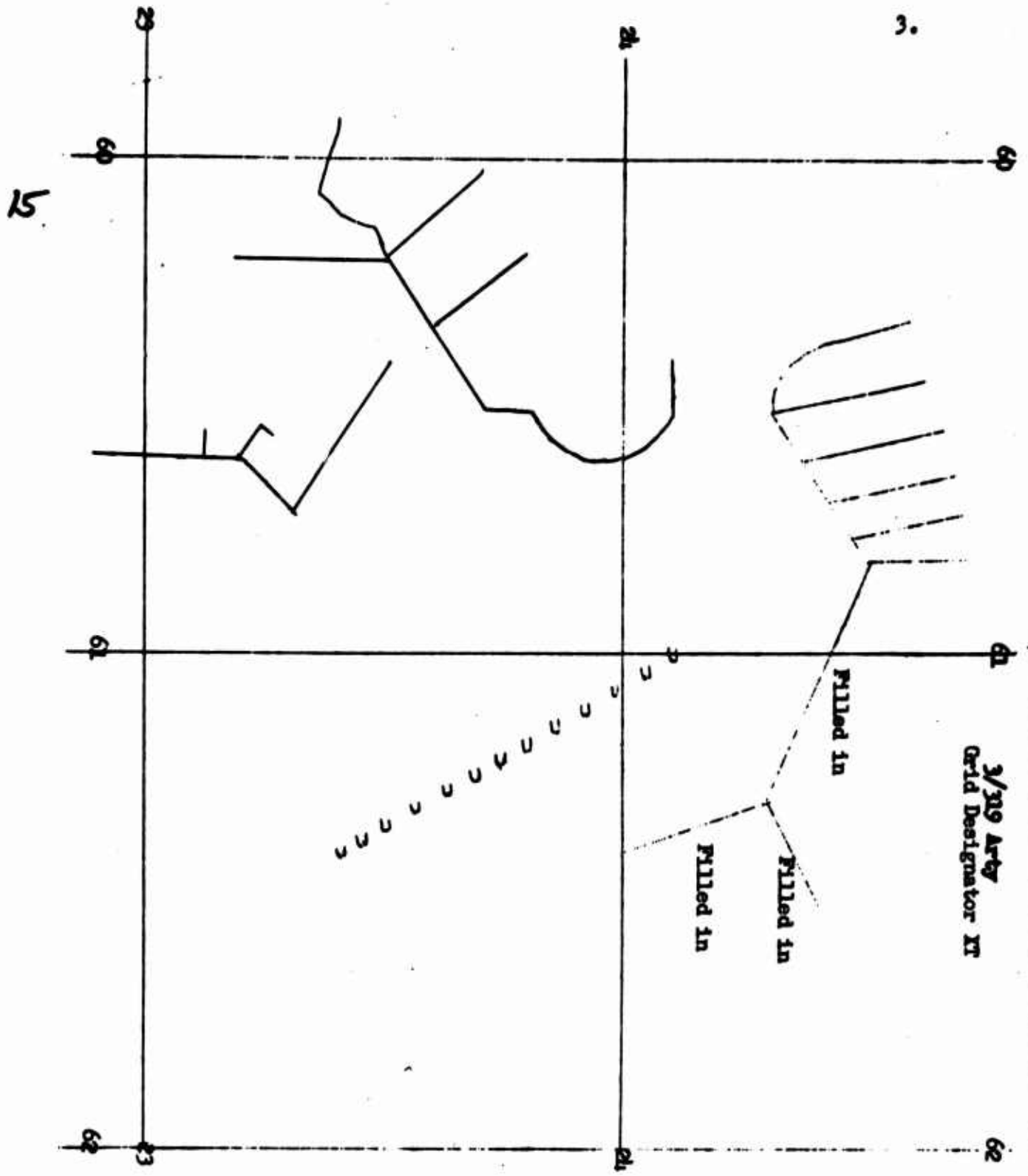
RAYMOND E. MARSHALL
Major, Infantry
C2

Kf

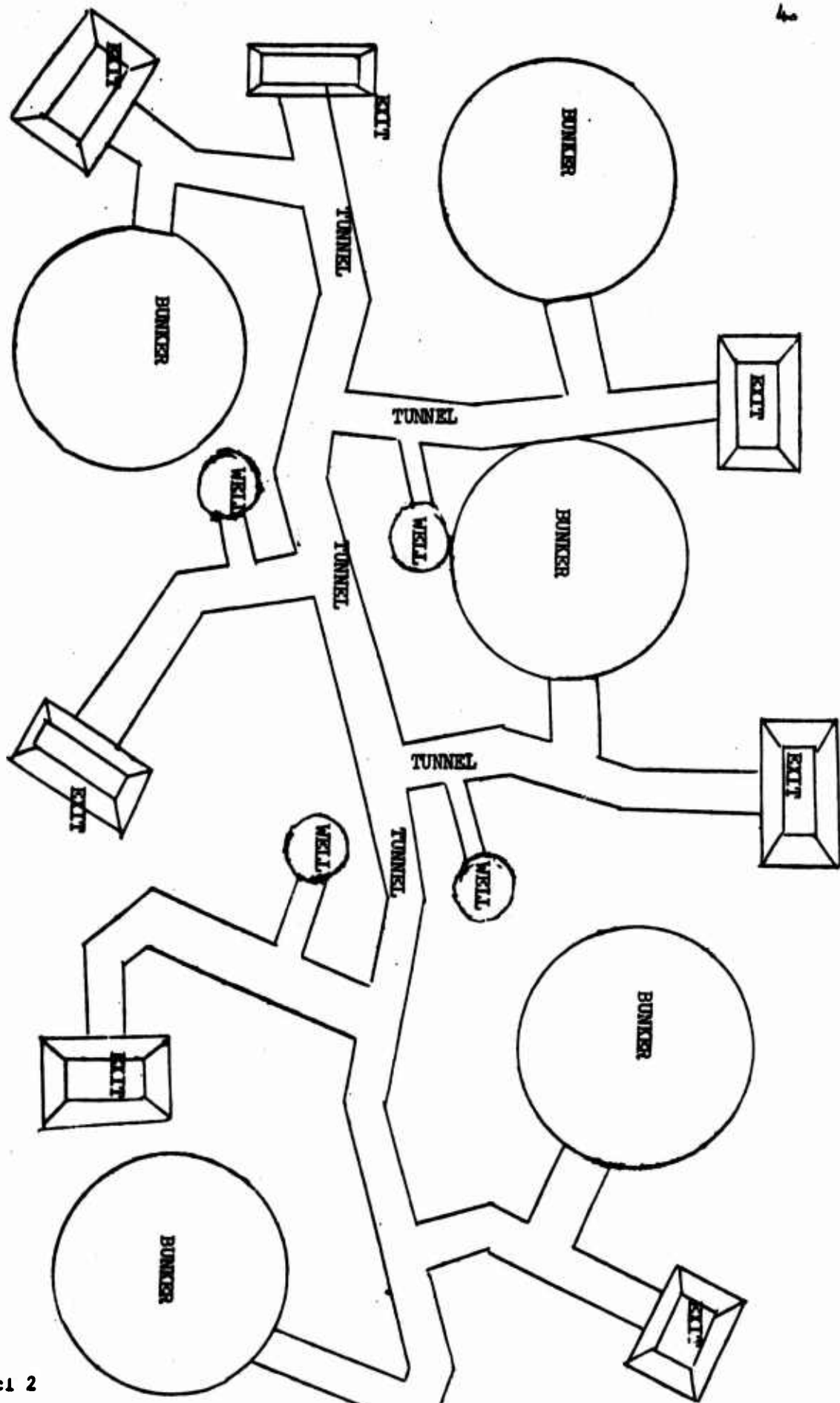
This legend is used on the following diagrams depicting VC installations encountered by elements of the 173rd Airborne Brigade during operation "CRIMP."

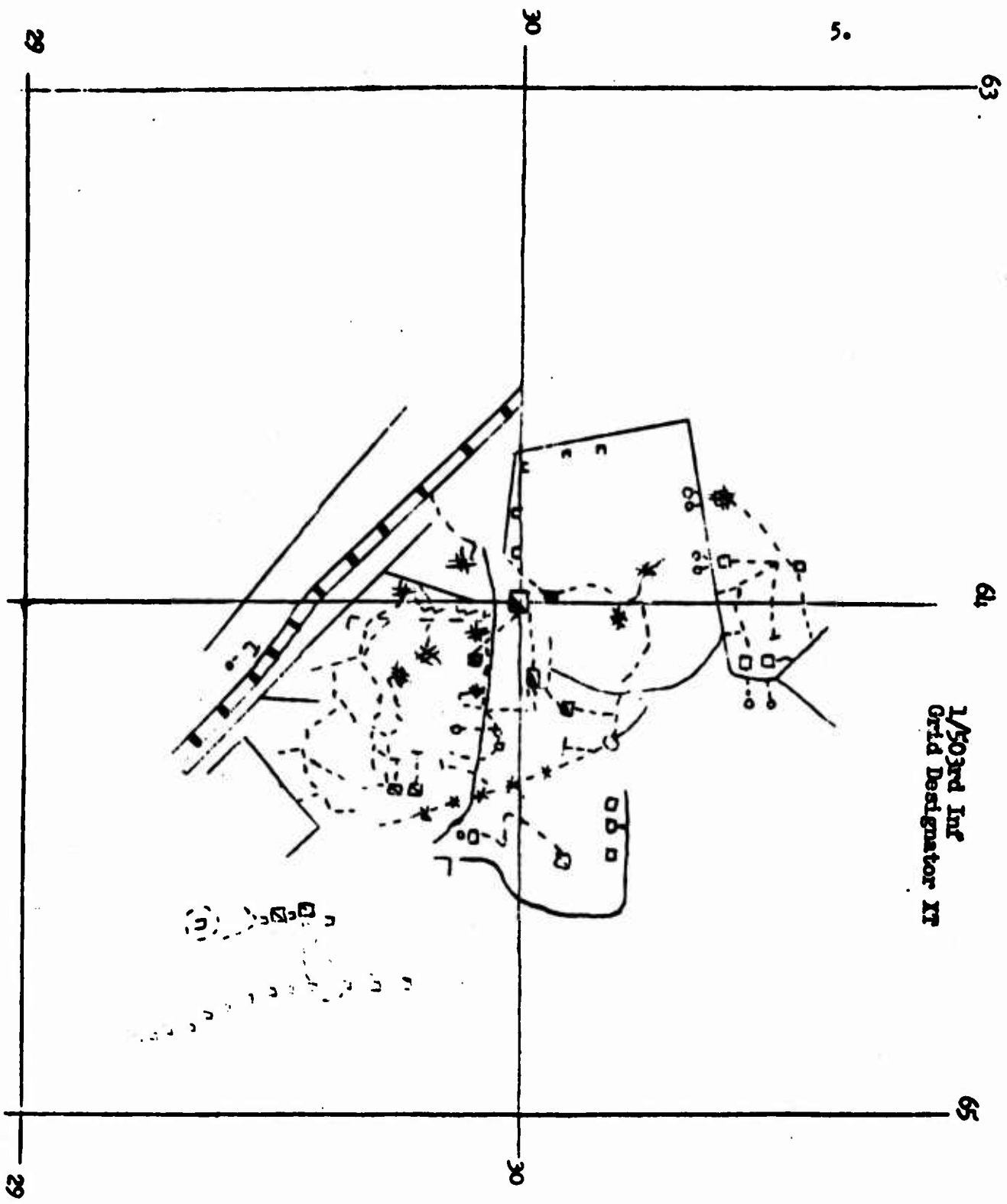
LEGEND

-  Hut
-  Bunker
-  CP Bunker
-  Fortified Hut
-  Trench
-  Tunnel
-  Trap Door
-  Tunnel Entrance
-  Airvent
-  Destroyed by Demo
-  Contaminated with CS
-  Foxhole
-  Plantation
-  Road



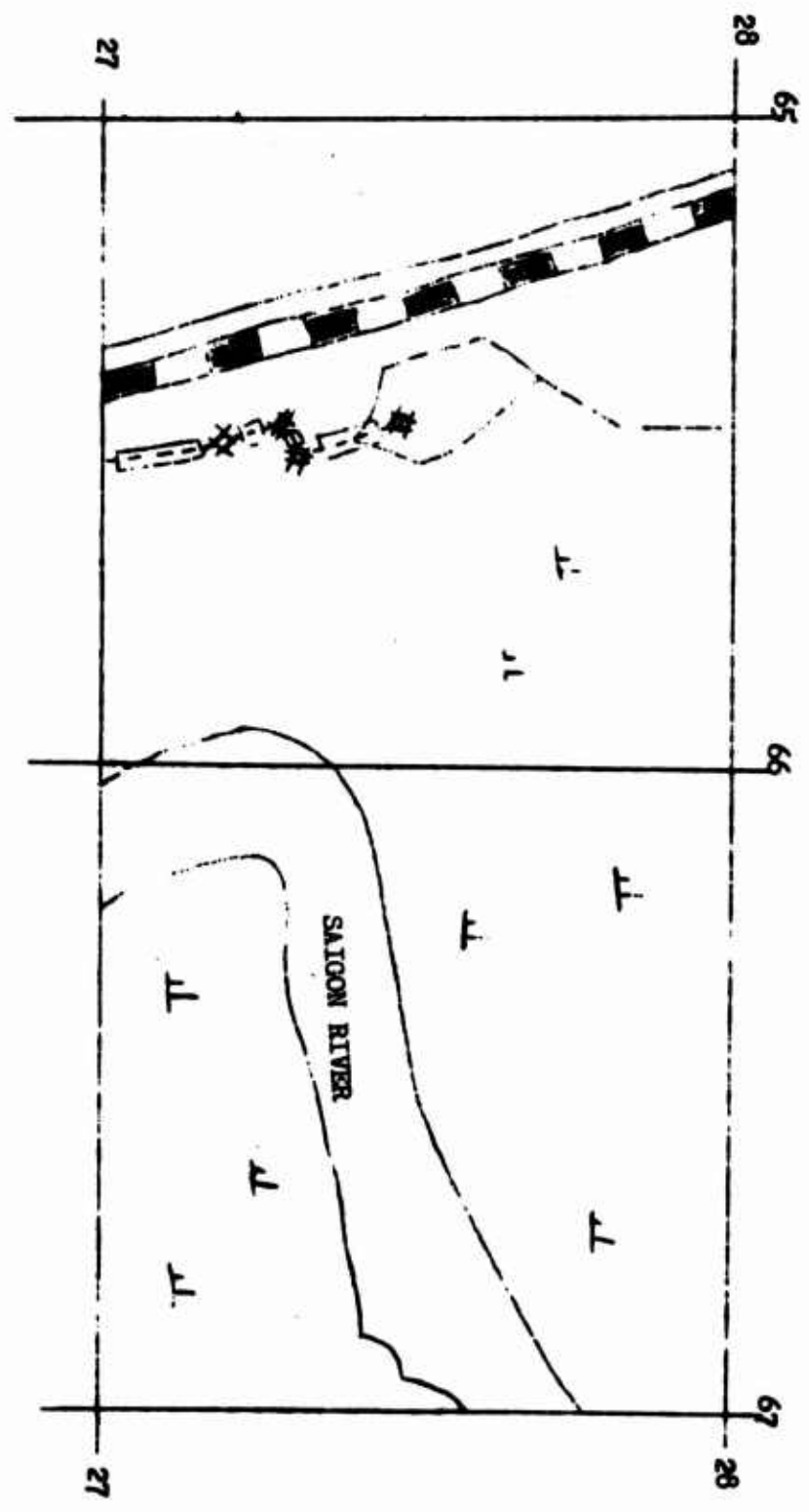
VC GUIDE FOR FORTIFICATION CONSTRUCTION



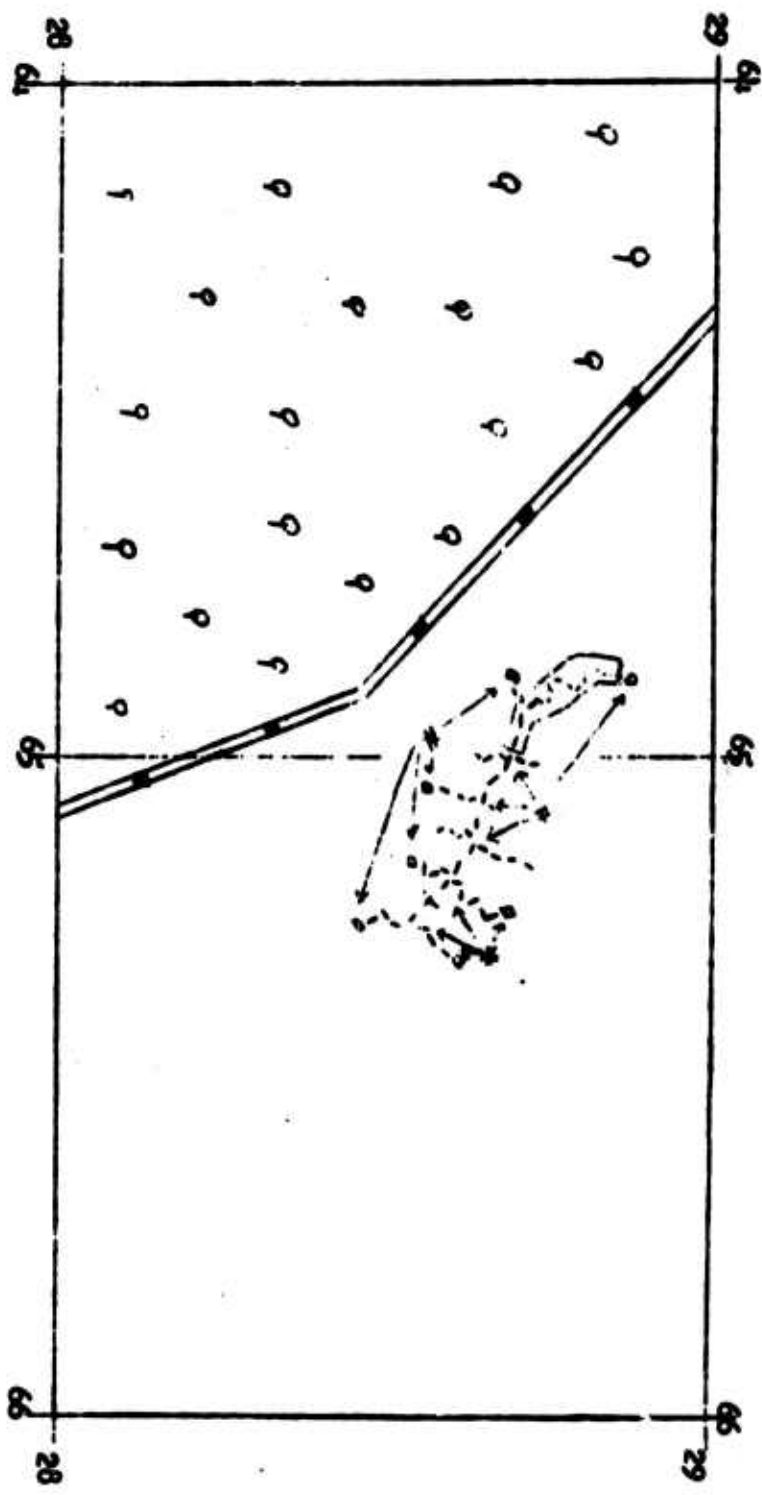


6.

2/503rd Inf
Grid Designator XT

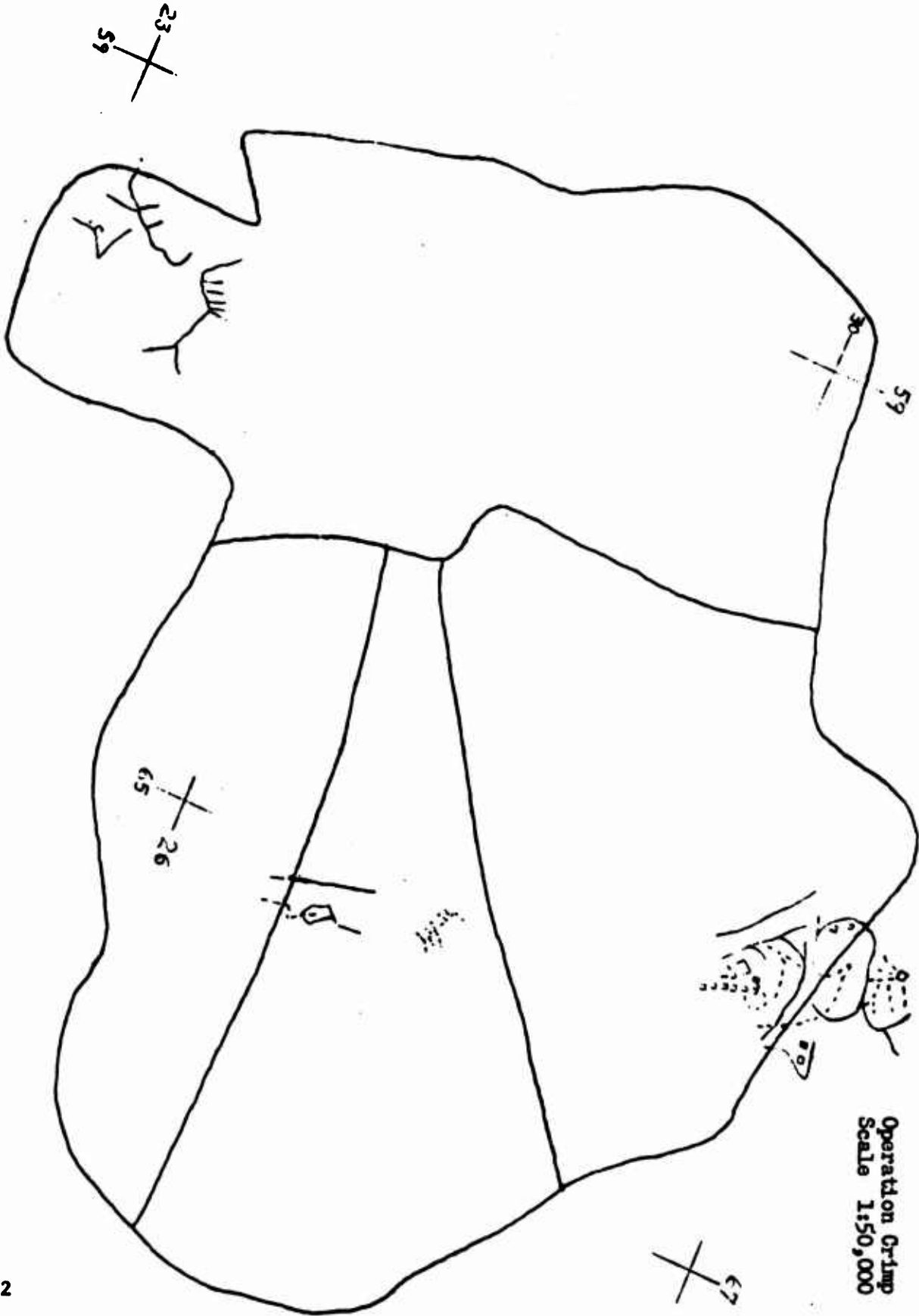


2/2AR
Grid Designer II



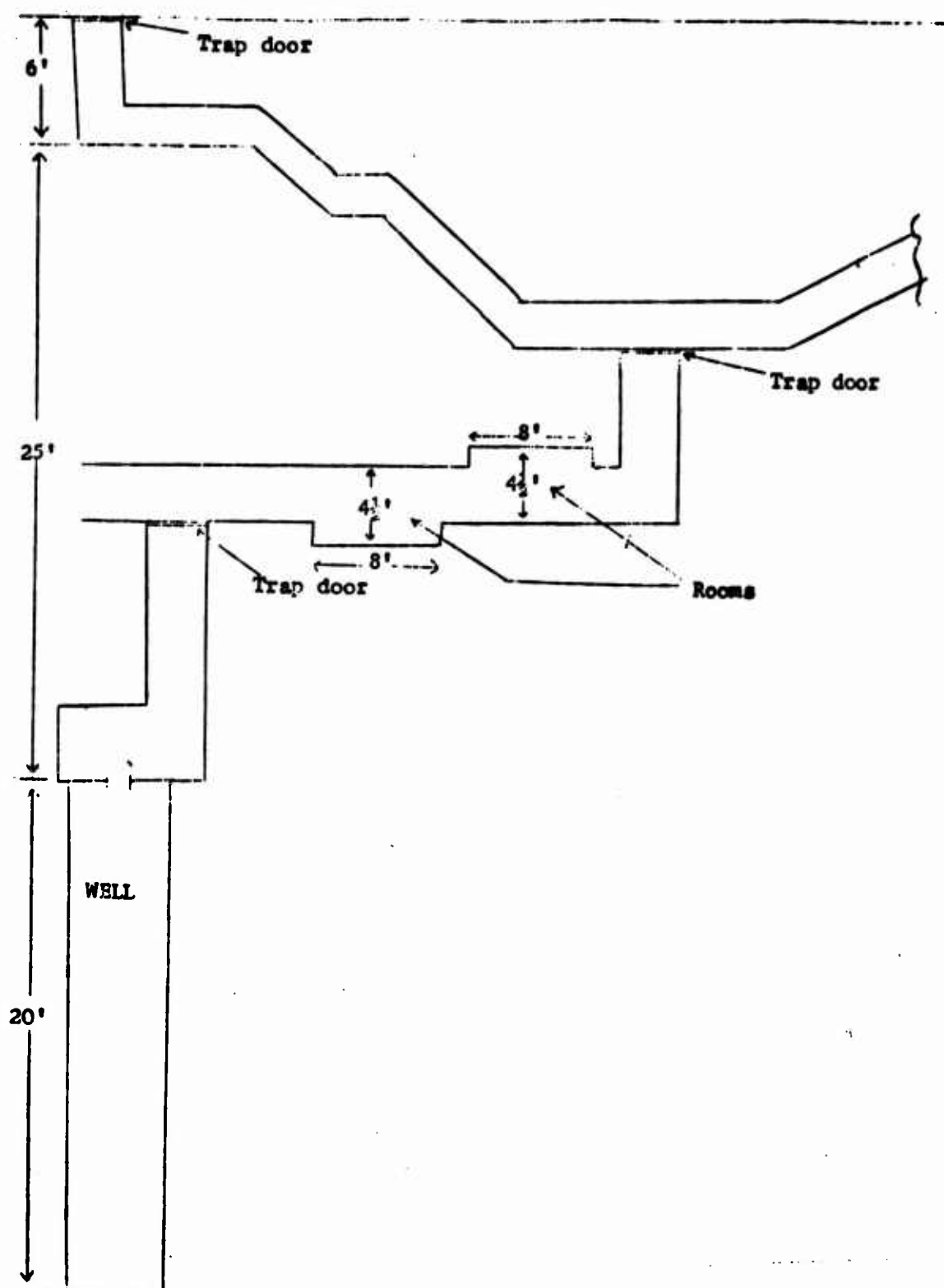
8.

26



Profile of Tunnel System (1/5034 TACR)

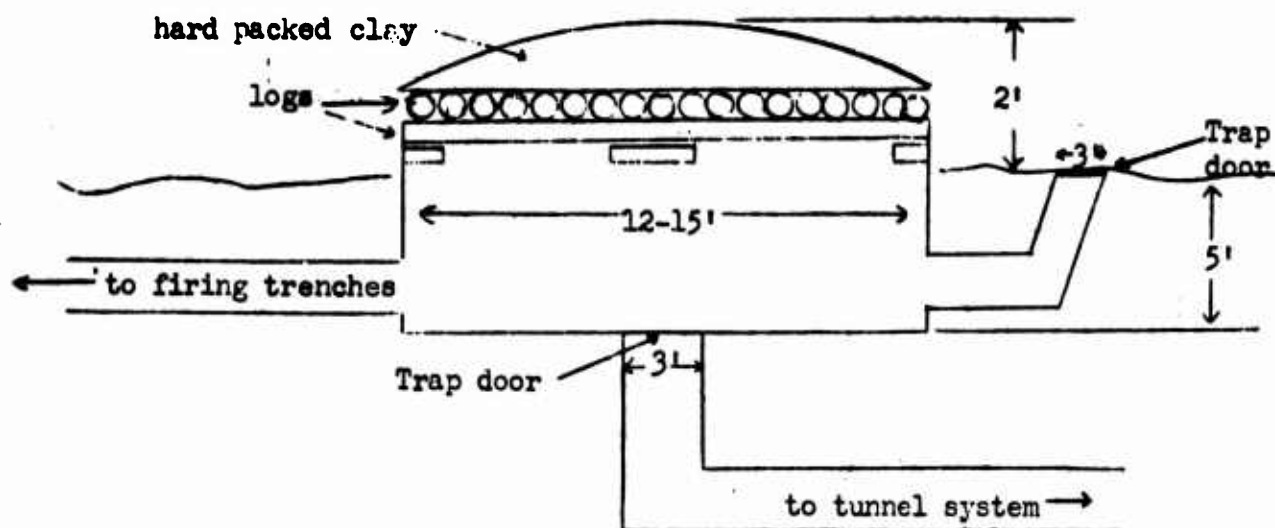
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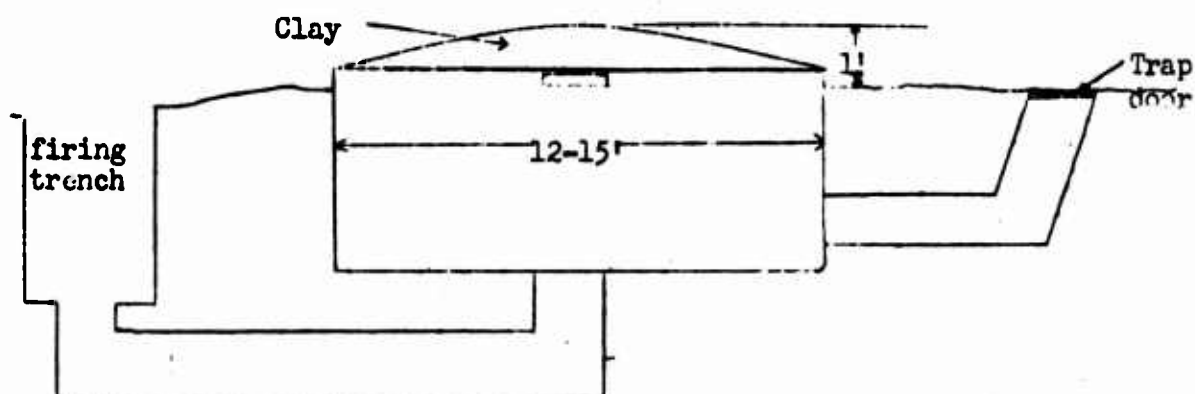
BUNKERS

Bunkers found in the 1/503d Infantry Battalion TAOR were of three¹⁰ types:

- a) Raised three feet with four firing ports



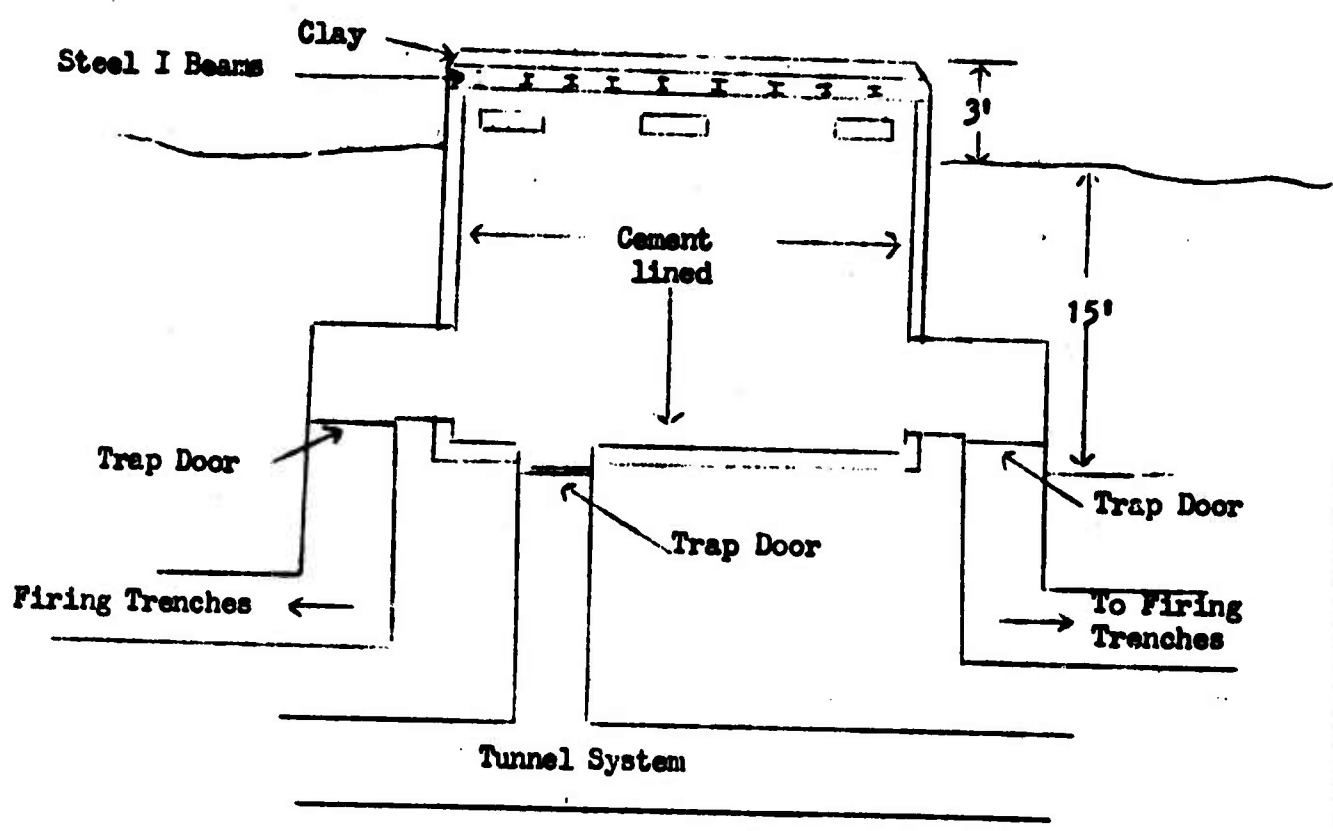
- b) Raised approximately one foot with one firing port



INSTALLATION CONTINUED

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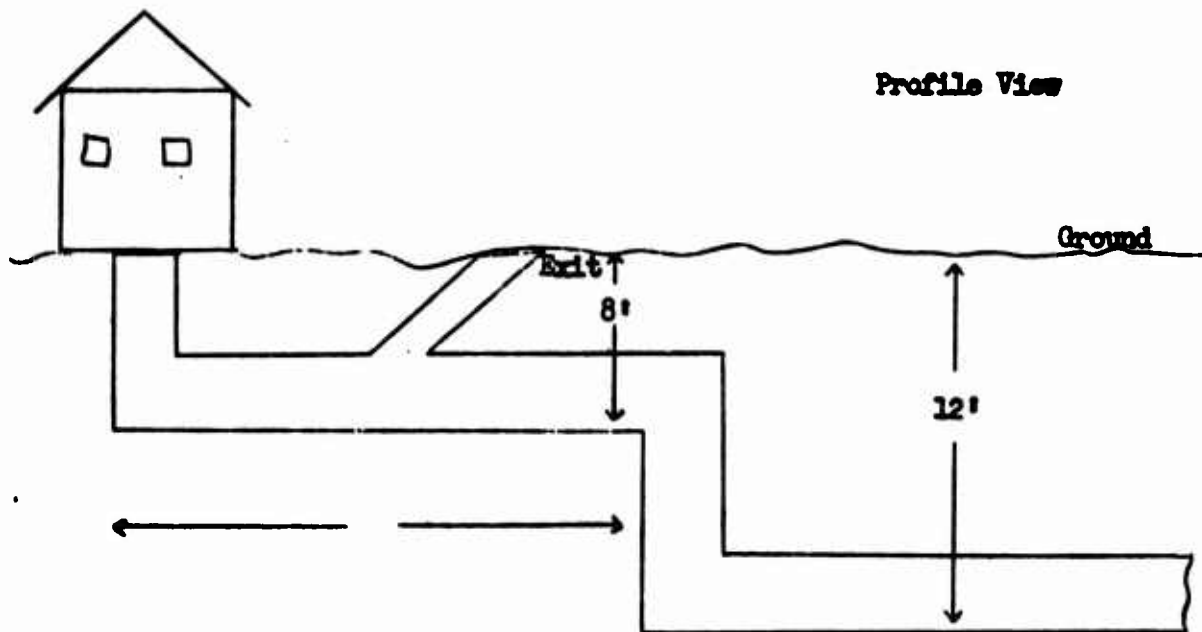
C) Command Bunker



SAMPLE TUNNEL SYSTEM (1/RAR TACR)

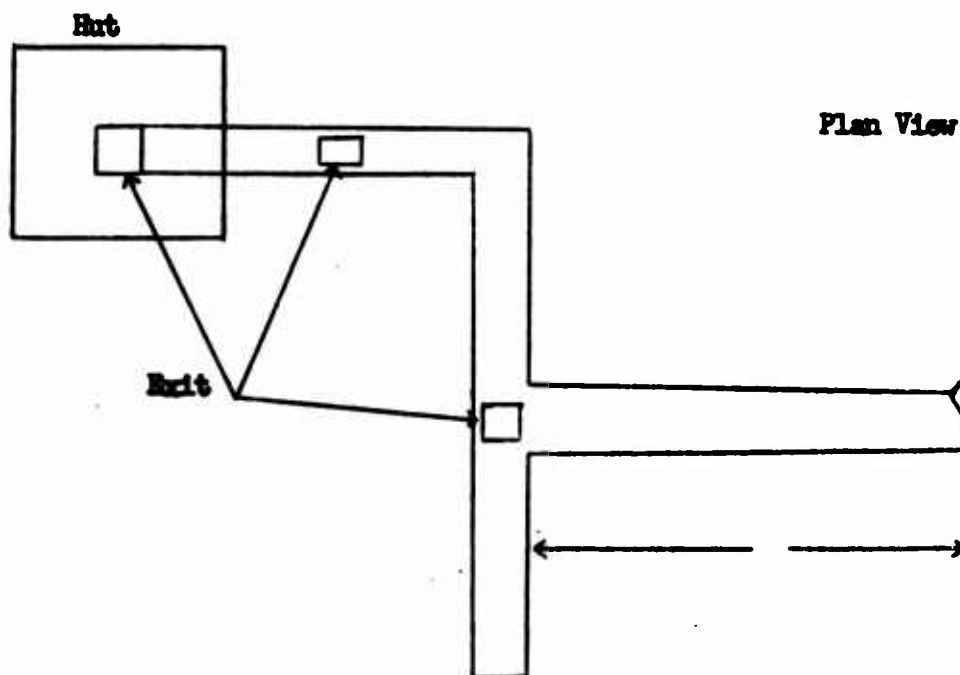
12.

Profile View



24

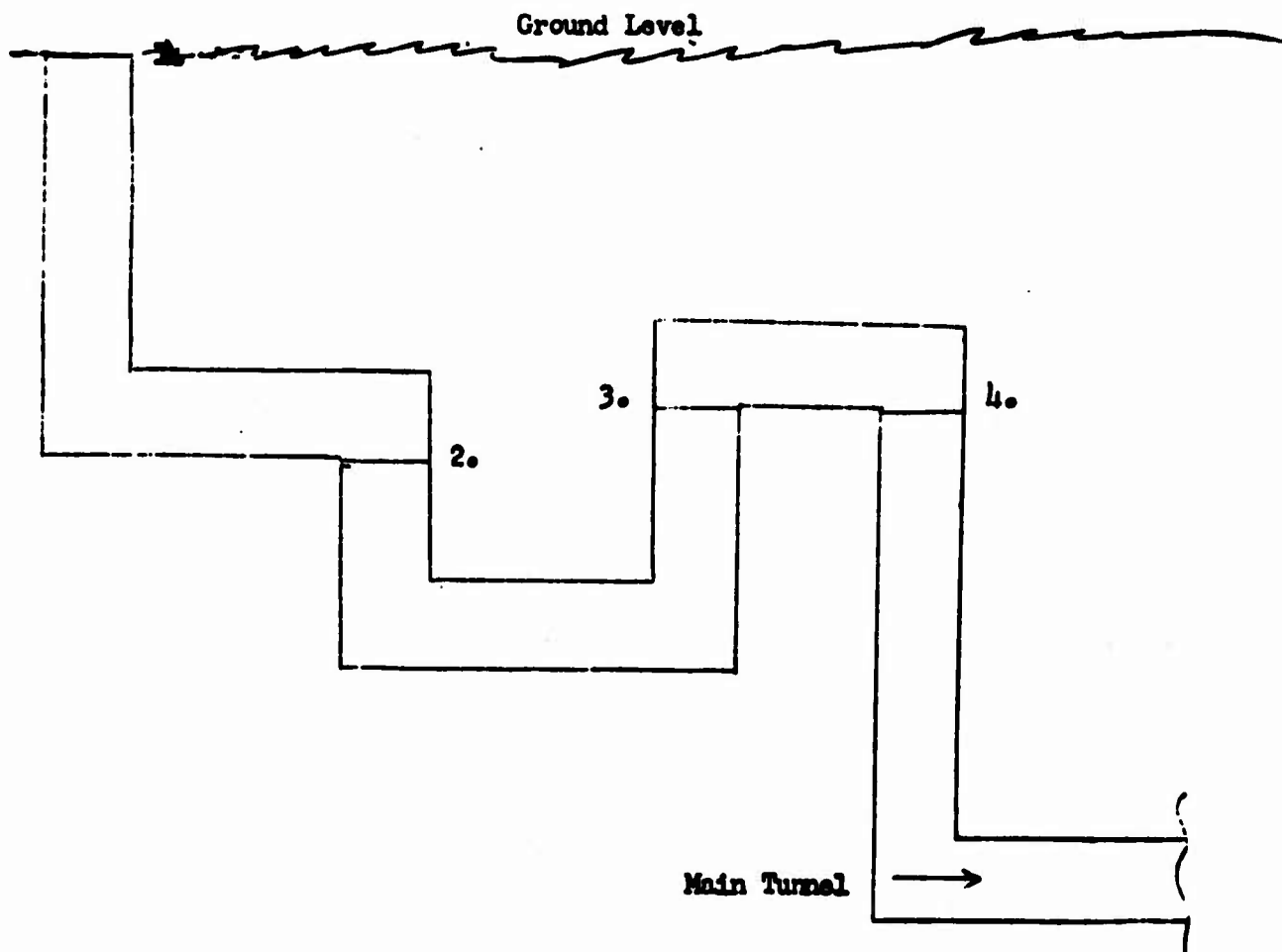
Plan View



Two of the tunnel systems discovered were very similar to the diagram illustrated above. Tunnel exits were found to terminate in a house or hut as well as being concealed in open terrain.

PROFILE OF TUNNEL EXITS

25



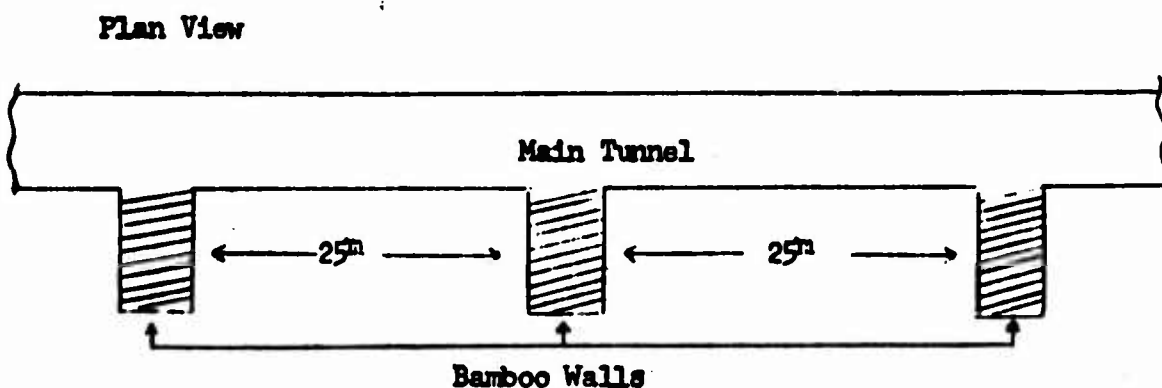
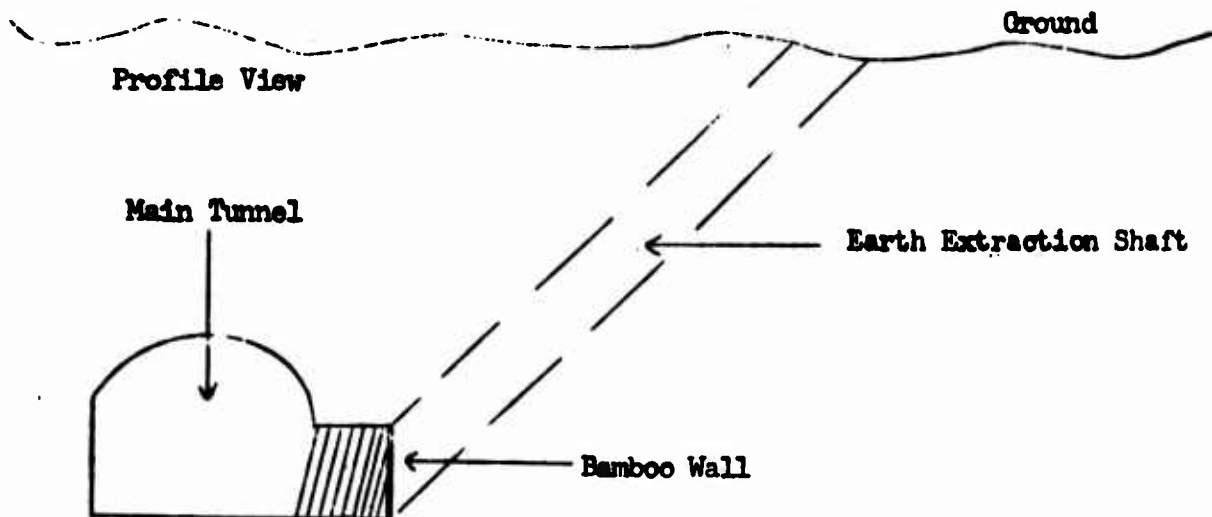
The exits from the main tunnel followed the pattern as illustrated above.

1. From the exit to a tunnel
2. From that tunnel to a tunnel down through a hidden trap door
3. From that tunnel up through a trap door
4. From the next tunnel down through a trap door to the main tunnel

EXTRACTION SHAFTS

14.

26 ()



Holes 2' x 2' x 2'6" were dug in the tunnels approximately every 25 to 30 meters. At the far end of the holes were bamboo walls. Shafts had possibly been dug into these extensions to extract the earth. A bamboo wall was then inserted and the shaft was refilled.