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APPENDICES TO

WEAPONS EFFECTS IN CITIES

December, 1974

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INTREC, INC.
Santa Monica, California 90401

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APPENDIX A

HISTORICAL ASPECTS OF CITY BATTLES

INTRODUCTION

In order to provide insights into the role of city fighting and the differences and similarities between city fighting and rural combat, three related subjects are discussed in this appendix. First, an attempt is made to list some of the major reasons why cities have been fought over in the past and the difficulties encountered. Secondly, the historically combat-relevant physical features of cities and their effects are discussed. Descriptions are given of these features before and after significant combat has taken place in cities. Finally, tne last subject considered is the effect of city-unique features on tactics and organization as seen from past combat experience.

REASONS FOR PAST CITY BATTLES

Overview

In historical accounts of past city battles, an often-stated reason for the battles was that possession of the cities was necessary for purely military reasons. The decision to attack and defend a city was supposedly resolved by military considerations only. However, cities have been fought over frequently for reasons other than military necessity. Politics, economics, psychology and morale, accident, revenge, and egotism of leaders are underlying factors in many city fights. Few cities have been attacked to achieve a single objective; more often, cities have been contested for multiple, often unclear, reasons which often changed during the course

of battle.

An often-stated military reason for attacking or defending a city rests on viewing a city as a road and railroad hub, or in short, as a center of communications. In this view, possession of the city is equivalent to control of a road or railroad net which is considered necessary to further the accomplishment of the overall objectives of the attacking or defending force. When a city is a port, the objective is not only the road and railroad net leading out of the city, but also the port and port facilities.

Another military reason for fighting in cities is to deliberately use cities and towns in the overall defense of a large area. The Russians, during World War II, used this method in the defense of the USSR (221: p. 11).* In many cases, the aim was to slow the attackers; in other cases such defenses were for the purpose of engaging large numbers of the attacking force and of inflicting great losses on them.

A final military reason for fighting in a city is one dictated by terrain. City combat may be forced because the terrain prohibits an attacking force from bypassing the city.

Resolution of political differences between the combatant nations may be one of the prime reasons for the overall conflict and one of its larger objectives (36: pp. 103-115, 413-416). However, political reasons are not considered, by a majority of military leaders, to be good reasons for attacking or defending a city. In spite of this, cities have been fought over to achieve political objectives. Economic reasons have been one

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*This notation identifies references listed in the Bibliography in Appendix H.

of the major underlying causes of war between nations (36: pp. 296-316). Cities are often fought over for the same reasons. Certain cities are thought to be vital to a defender's ability to wage war; it is believed their possession would stop the production of war materiel and the shipment of food or supplies. Psychological and morale reasons are often quoted -- though upon close examination they frequently appear vague and may, in actuality, have contributed little to (or detracted from) the overall war aims.

At least one instance can be found of a city battle where neither of the senior commanders of both sides wanted to fight in the city. City battles of this type can arise from a combination of misunderstandings and are best described as accidents. Battles for cities have been initiated by one combatant in retaliation for earlier actions of the other combatant. A final cause for fighting in cities can be accounted for only by the egotism of political or military leaders.

Examples of Reasons For City Battles

Stalingrad, Russia (August 1942-February 1943)

A number of changes in reasons are present in the German assault and Russian defense of Stalingrad. Hitler's original reason for ordering the capture of Stalingrad was economic in nature. The following quotation of Hans Adolf Jacobsen is from (19: p. 11):

> In explaining the reasons that brought the German High Command to begin an offensive in the direction of Stalingrad, Hitler said,

> 'I wanted to reach the Volga at one specific point, at one specific city. It was happenstance that the city bore Stalin's name. But I did not press forward there for that reason -- the city could have had an entirely different name. I went there because it was an extremely important point. Thirty million tons of freight including almost nine million tons of oil were transshipped in the city. Wheat from the Ukraine and Kuban was gathered here for shipment to the north. Manganese ore was delivered there. There was a gigantic freight center. It was this that I wanted to seize....'*

Schröter also concludes that the original reason for attacking Stalingrad was economic and political in spirit:

> The 'Stalingrad and Caucasus' solution was a victory for the economic and political point of view. This anticipated that the destruction or elimination of the enemy's essential industries and food supplies would so weaken his war potential indirectly, that his army in the field, no matter how strong it might be in theory, would in practice be useless. (28: pp. 22-23).

Paulus recognized the military objectives implied by Hitler's original order for the capture of Stalingrad. The following quotation of Field Marshal Paulus is from (5: p. 13):

> The Commander of the 6th German Army which was advancing on the Stalingrad axis, Colonel General Paulus, later disclosed the far-reaching concepts of Hitler's command. He emphasized that the Stalingrad region 'was a favorable departure position for striking a blow at Moscow and to the east (of Moscow).' This blow in coordination with the simultaneous initiation of

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*The recurring theme that capturing Stalingrad would interdict the heavy Volga River freight traffic plus several railroads naturally raises the question of whether these LOC's could not have been cut with much smaller forces outside the city.

> a German breakthrough on the Central Front, for example in the area east of Smolensk toward Moscow would be a serious threat to the Soviet Armed Forces and to the Soviet Command's total conduct of the war.

G. K. Zhukov, Marshal of the Soviet Union concluded, after a conversation with Stalin, that Stalingrad had to be defended for military, political and economic reasons:

> ....Over tea, I. V. Stalin briefed me on the situation as of 27 August. He said that the STAVKA had decided to place the 24th, the 1st Guards, and the 66th Armies in the Stalingrad Front. 'The 24th Army is commanded by General Kozlov, the 1st Guard Army by Moskalenko, the 66th Army by Malinovskiy. The 1st Guards Army of General Moskalenko is shifting to the Loznoe area. On the morning of 2 September, it must conduct a counter-attack on the enemy grouping breaking out to the Volga and join with the 62d Army. Under cover of Moskalenko's Army, you bring up the 24th and 66th Armies as rapidly as possible and commit them to battle immediately, otherwise we will lose Stalingrad.' It was clear to me that the battle for Stalingrad was of the utmost military-political significance. If Stalingrad fell, the enemy command would have the capability (while covered by the Volga) of developing an attack to the North, coming out deep in the country's rear. In addition, we could lose the Volga -- that most important artery on which freight from the Caucasus moved in a large flow. (5: p. 16).

The German High Command recognized the possibility of suffering tremendous losses in trying to achieve Hitler's objectives. The following quotation of A. I. Yeremenko is from (19: p. 12):

> While pressing to seize Stalingrad, the German High Command feared that [the engagement] would turn into a long term 'ever increasing focal point which could exhaust the strength of the German Armies.' But despite the will of the Hitlerite Command, Stalingrad became a center of attraction of the

> German-Fascist forces. Marshal of the Soviet Union, A. I. Yeremenko notes that, 'By the will of our Party and nation, Hitler was tied here at Stalingrad to a decisive battle, and his generals had to accept that battle even while understanding all of its import.'

German attempts to capture the small remaining area of Stalingrad not under their control continued despite evidence that their entire 6th Army was facing certain destruction. Paulus tried many times to get permission to halt the offensive and to withdraw before being encircled. Even after the entire 6th Army was encircled, permission to break out of the encirclement was not given. (13: p. 169). To Hitler any proposal to withdraw, whatever its motives, was evidence of defeatism. An absolutely rigid defense of every inch of ground was demanded by him. His decisions during the Stalingrad crisis were characteristic and can be only attributed to his egotism.

The following extract from (19: p. 14) is an indication that the Russian leadership also viewed the Stalingrad battle with the objective of engaging large numbers of the enemy in prolonged exhausting battle.

> Thus despite the initial plans of the German Fascist Command, tremendous forces were dragged into extended and exhausting battles on the Stalingrad axis -- the German 6th and 4th Tank Armies (which were the chief strike force of the German Fascist forces), the 3rd and 4th Rumanian, the 8th Italian Armies -- in all 50 divisions, not including a large number of special units. A fifth of all the infantry and a third of all tank divisions of the enemy were in action here. More than a million enemy soldiers were engaged at Stalingrad.... Each month almost 250,000 soldiers and officers were sent to the battle. The bulk of military technology -- tanks, artillery, and mortars -- came here. And all was burned as if by fire at the walls of the heroic city. (19: p. 15).

The continued defense of Stalingrad was accomplished with little regard for Russian lives. As Ziemke points out:

> At the end of September -- the Stalingrad bridgehead had been extended to a breadth of six miles and a depth of nine miles. Neither side had space to maneuver. The situation favored the defender, as long as he was willing to pay the price in blood, and this the STAVKA was obviously willing to do. (37: p. 43).

In the following quotation, Speer recalls the discussion between General Zeitzler (then the Army Chief of Staff) and Hitler on the situation at Stalingrad:

> Stalingrad was encircled. Zeitzler, his face flushed and haggard from lack of sleep, insisted that the Sixth Army must break out to the west. He deluged Hitler with data on all that the army lacked, both as regards to rations and fuel, so that it had become impossible to provide warm meals for the soldiers exposed to fierce cold in the snow-swept fields or the scanty shelter of ruins. Hitler remained calm, unmoved and deliberate, as if bent on showing that Zeitzler's agitation was a psychotic reaction in the face of danger. 'The counterattack from the south that I have ordered will soon relieve Stalingrad. That will recoup the situation. We have been in such positions often before, you know. In the end we always had the problems in hand again.' He gave orders for supply trains to be dispatched right behind the troops deploying for the counteroffensive, so that as soon as Stalingrad was relieved something could at once be done about alleviating the plight of the soldiers. Zeitzler disagreed, and Hitler let him talk without interrupting. The forces provided for the counterattack were too weak, Zeitzler said. But if they could unite successfully with a Sixth Army that had broken out to the west, they would then be able to establish new positions farther to the south. Hitler offered counterarguments, but Zeitzler held to his view. Finally, after the discussion had gone on for more than half an hour, Hitler's patience snapped: 'Stalingrad simply must be held. It must be; it is a key position. By breaking traffic on the Volga at that spot, we cause the Russians the greatest difficulties. How are they going to transport their grain from southern Russia to the north?' That did not sound convincing; I had the feeling, rather, that Stalingrad was a symbol for him. But for the time being the discussion ended after this dispute. (31: p. 378).

In summary, the battle for Stalingrad illustrates the absence of a single constant reason for attacking and defending the city. Several reasons were present at a given time span and some of these reasons were changed in favor of still others.

To conclude this discussion of the Stalingrad battle, the following extract from Craig is included to give an idea of magnitude -- in terms of human lives -- of the battle.

> Most appalling was the growing realization, formed by statistics I uncovered, that the battle was the greatest military blood bath in recorded history. Well over a million men and women died because of Stalingrad, a number far surpassing the previous records of dead at the first battle of the Somme and Verdun in 1916. The toll breaks down as follows:
>
> Conversations with official Russian sources on a not-for-attribution basis (and it must be remembered that the Russians have never officially admitted their losses in World War II) put the loss of Red Army soldiers at Stalingrad at 750,000 killed, wounded, or missing in action.
>
> The Germans lost almost 400,000 men.
>
> The Italians lost more than 130,000 men out of their 200,000-man army.
>
> The Hungarians lost approximately 120,000 men.
>
> The Rumanians also lost approximately 200,000 men around Stalingrad.
>
> As for the civilian population of the city, a prewar census listed more than 500,000 people prior to the outbreak of World War II. This number increased as a flood of refugees poured into the city from other areas of Russia that were in danger of being overrun by the Germans. A portion of Stalingrad's citizens were evacuated prior to the first German attack but 40,000 civilians were known to have died in the first two days of bombing in the city. No one knows how many died on the barricades or in the anti-tank ditches or in the surrounding steppes. Official records show only one stark fact: after the battle ended, a census found only 1,515 people who had lived in Stalingrad in 1942. (33: p. xvi).

Cherbourg, France (June-July 1944)

Cherbourg was attacked by American Forces with the military objectives of securing the right flank of U.S. forces to obtain a lodgement area for further operations on the continent and capturing the port and its facilities (18: pp. 180-183). At first, German defense of the city was based on the military objective of gaining time for demolition experts to destroy the port and port facilities. Complete destruction and closing of the Cherbourg harbor occurred on 22 June (18: p. 430). The city was surrounded and no possibility existed for the encircled German troops to break out. On 25 June, the German commander asked for permission to surrender but was denied this permission by Hitler's order to continue to the last man (18: p. 434). The city was secured on 26 June and illustrates, from the German side, the change from a purely military reason for defense to an egotistical one. From the American side, it represents a failure to obtain a viable port (though Cherbourg was later rebuilt).

St-Lo, France (July 1944)

The necessity to take St-Lo stemmed from the larger objective of the U.S. First Army, namely, the need to break out of the Cotentin peninsula after establishing the Normandy beachhead. Bradley's advance out of the beachhead area had been stalled in front of St-Lo for several weeks. The military significance of St-Lo was based on the city being a hub of main roads that led in every direction (34: pp. 1-8). To counter the American attack, the Germans, though considerably outnumbered, put up a very determined defense by concentrating their defenses well outside the city. When their position became untenable, the Germans were able to withdraw most of their forces and avoid a costly fight in the city. This is one

of the few cases where the original military objective of major German defensive engagement was not changed by Hitler's egotism.

Brest, France (August-September 1944)

The American military objective to be satisfied by the capture of Brest was to obtain use of the extensive port and port facilities of the city. Reasons for German defense of Brest were initially the same as for Cherbourg and became altered in the same way to egotistical ones (15: pp. 121-150).

Aachen, Germany (October 1944)

The military value of Aachen has always been based on the many roads radiating from it in all directions (22: p. 19). In addition, "In 1944, the city had an added military significance as a key to the second most heavily fortified portion of the West Wall" (22: p. 19). The American attack on Aachen thus had two military objectives as reasons. Initially, German reasons for defending Aachen were to prevent American forces from accomplishing their two objectives. This initial German objective no longer made military sense after Aachen was completely encircled by American forces. In spite of this fact, the German commander of Aachen exhorted his troops to fight to the last man, in accordance with Hitler's orders. The German situation at Aachen thus illustrates a change in the reasons for defense, from purely military reasons to reasons satisfactory to Hitler's ego (22: pp. 215-317).*

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*See also S. L. A. Marshall's narrative of the Aachen battle in Appendix B.

Schierwaldenrath, Germany (October 1944)

An example of an attack on a town for retaliatory reasons is described by Marshall* and is known as the raid on Schierwaldenrath (15: pp. 154-161; 22: pp. 267, 268). Almost an entire company had been annihilated during an earlier attempt to capture the town. The raid was staged for the unmilitary purpose of revenge for this defeat. The plan called for surprise attack, recovery of prisoners captured by the Germans during the first attack, demolition of the houses in the town and then withdrawal. The revenge raid came off badly with substantial losses, though the town was held for a few hours.

Manila, Phillipines (February 1945)

The battle for Manila is the outstanding example of a battle where neither the American commander (Gen. MacArthur) nor the Japanese commander (Gen. Yamashita) wanted to fight in the city. There were no Allied plans for military operations in the metropolitan area. Plans had been prepared by GHQ SWPA for a great victory parade MacArthur was to lead through the liberated city. (30: p. 247). Every Allied headquarters expected the city to be cleared quickly and with little damage. Intelligence did not clearly indicate whether the city would be strongly defended by the Japanese. An appreciation of the nature and extent of the defenses became apparent only when American troops ran into the principal strong points. Tactical plans were improvised on the spot by the XIV Corps and its

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*See the narrative in Appendix B.

divisions. At first, to protect civilians and the city, stringent restrictions were imposed on artillery fires and on air support operations. (30: pp. 247, 248). Artillery restrictions were lifted later but the restrictions on aerial bombardment stayed in effect (30: pp. 263, 264).

On the Japanese side, Gen. Yamashita did not plan to defend Manila. His decision was to contest Luzon by fighting in the mountainous region east of the city. The Central Plains -- Manila Bay area was to go by default to the Allies and this decision made the defense of Manila meaningless. (30: p. 240). After his troops had been evacuated, Yamashita planned to leave in Manila a small Army force to maintain order, protect supply movements, and to finally destroy the bridges over the Pasig and Marikina rivers. The bridges were to be destroyed to delay Allied occupation of the city and to slow the Allied drive against his main force east of the city. No plans were made for the last-ditch stand at the bridges.

As Smith describes the situation:

> Yet, as the XIV Corps and 11th Airborne Division approached the city it became obvious that Manila was strongly defended. There had been a change in Japanese plans. The change reflected no reversal of Yamashita's policy. Rather, it mirrored a picture of disagreement and confusion existing among the lower-level headquarters under Yamashita's nominal control, and especially between the Army and Navy echelons of his command. Contrary to Yamashita's expressed desires, these conflicts led to a decision to give battle within the city -- a development that was a cancerous growth on the 14th Army's plan for the defense of Luzon and that stemmed from a series of compromises among Japanese Army and Navy commanders in the Manila area. (30: 240, 241).

The cost of the unwanted fight for Manila was high. The three American divisions and supporting Corps troops suffered 6,575 casualties, 1010 killed and 5,565 wounded. Out of the 17,000 Japanese troops in the Manila area, 16,000 were killed and the remainder escaped to the east.

Manila itself was almost totally destroyed and an estimated 100,000 Filipino civilians lost their lives during the battle.*

Seoul, Korea (September 1950)

At the end of August 1950, all of South Korea was under the control of the North Koreans with the exception of the Pusan beachhead. An amphibious landing at Inch'on was the military solution adopted by General MacArthur to relieve this situation and to regain initiative for United Nation forces. The first objective, after the landing, was the recapture of the capital city of Seoul. The military importance of regaining Seoul to the larger military objectives is best explained by the following extract from a message MacArthur sent to the Joint Chiefs (who feared and opposed the Inch'on landing) on 8 September:

> There is no question in my mind as to the feasibility of the operation and I regard its chance of success as excellent. I go further and believe that it represents the only hope of wresting the initiative from the enemy and thereby presenting an opportunity for a decisive blow. To do otherwise is to commit us to a war of indefinite duration, of gradual attrition, and of doubtful results.... There is no slightest possibility... of our force being ejected from the Pusan beachhead. The envelopment from the north will instantly relieve the pressure on the south perimeter and, indeed, is the only way that this can be accomplished.... The success of the enveloping movement from the north does not depend upon the rapid juncture of the X Corps and the Eighth Army. The seizure of the heart of the enemy distributing system in the Seoul area will completely dislocate the logistical supply of his forces now operating in South Korea and, therefore, will ultimately result in their disintegration. This, indeed, is

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*See Smith (30: pp. 211-306) and the essay of Marshall in Appendix B for more detailed discussions of the battle.

> the primary purpose of the movement. Caught between our northern and southern forces, both of which are completely self-sustaining because of our absolute air and naval supremacy, the enemy cannot fail to be ultimately shattered through disruption of his logistical support and our combined combat activities.... For the reasons stated, there are no material changes under contemplation in the operation as planned and reported to you. The embarkation of the troops and the preliminary air and naval preparations are proceeding according to schedule. (1: p. 495).

The recapture of Seoul also had political, psychological, and morale objectives, at least in the minds of the Koreans, because of its symbolic position as the ancient capital of Korea.*

Hue, Vietnam (February, 1968)

The particular objectives the NVA had for the capture of Hue are intertwined with their reasons for the Tet holiday uprising, i.e., to create an impression of widespread strength and political support in order to shift U.S. and world public opinion. However, their immediate military objectives were to destroy the headquarters of the 1st ARVN Division, located in the Citadel, and to destroy the MACV compound south of the Perfume River in the new part of the city. The first military objective of the American and South Vietnamese forces was to prevent the NVA from accomplishing these two objectives. A second military objective was to eliminate the threat posed by the 16 NVA battalions (about two divisions) committed to capturing Hue. There were also psychological and morale reasons for the recapture of Hue; these revolve around the symbolic position of Hue as Vietnam's religious capital. Finally, the need to minimize the political impact of the

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*For further details of the Seoul battle, see Appleman (1: pp. 488-540), and Marshall's essay in Appendix B.

initial NVA successes added urgency to the recapture of Hue.*

The NVA were, in fact, at least partially successful in hardening U.S. public opinion against the war through the capture of Hue and the other Tet operations. The U.S. eventually dislodged the NVA with heavy losses on both sides, but not fast enough to prevent a powerful NVA impact on Vietnamese and U.S. opinion. The U.S. also suffered the opprobrium of having destroyed most of those parts of Hue that had special religious significance.

COMBAT-RELEVANT FEATURES OF CITIES

Physical Description of Cities

Two main features distinguish the city environment from the rural environment and determine the nature of combat in cities. The first feature is the presence of regular street patterns and the second is the presence of large numbers of different types of buildings and other man-made terrain features or fortifiable positions. Certainly, streets, buildings and other structures occur even in small villages -- but the streets and buildings are less numerous and their pattern is simpler.

Adequate description of the city as a place of combat encompasses descriptions of the city at three points in time. First, the undamaged city's street network, buildings, and structures needs to be described along with methods of moving troops through the city. Second, is a description of changes made in the city to prepare it for defense. Third,

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*See Marshall's essay, in Appendix B, for details on the battle for Hue.

is the alteration in city micro-terrain and structural hardness after combat damage.

The City Before Significant Combat Damage

There are two basic street patterns in cities; the "radial-concentric" plan and the "gridiron" or rectangular plan.

The radial-concentric plan originated with the construction of a defensive wall completely enclosing a populated region. As the number of inhabitants grew and the number of converging roads increased, addition surrounding territory was included in the city by a new and larger concentric defensive wall. Within the city, the main radial streets divided the enclosed territory into major blocks and these in turn were somewhat irregularly subdivided into smaller blocks and individual lots. In general, radial-concentric plans restrict movement more than rectangular plans; confusion and disorientation of troops is more likely in the short, winding streets of the radial-concentric pattern.

The old city patterns continue to exert influence in all cities. This persistance of form is more noticeable in cities laid out in the radial-concentric grid. Even when the old defensive walls enclosing the city were torn down, they continued to have an effect. Roads, subways and green belts were built following the old wall path. Modern examples of street pattern persistence is, for example, furnished by Stalingrad (now Volgograd) and Aachen. Both cities suffered extensive damage during WWII and have been almost completely rebuilt. The new cities have the same streets as before with only changes in the names of some of the streets.

Typically, in European cities, the older part of the city occupies the center of the city. In these older areas, buildings not destroyed

during WWII exhibit massive masonry or stone construction. Streets are very numerous, narrow, and winding.

Surrounding the center of the city are the newer portions of the city. Pressure caused by growth in population forced cities to expand, and created a need for transportation. The development and growth of transportation, with its centralizing and decentralizing tendencies, was a major contributor in effecting changes in cities. Cities expanded along the routes of newly created tramways and railroads and began to take on the spidery shape they have today.

In these newer parts of the city, streets are wider, straighter, and not as numerous. Most industrial and residential development take place here and the buildings are less densely packed and use the lighter construction methods of recent times.

Effects of Streets and Buildings on Engagement Ranges

Very few explicit statements are found in the literature on city fighting giving firing ranges and line-of-sight range. Engagement ranges are said to be very short, streets narrow and the street pattern confusing. Typical of the general remarks made is the following quotation of Chuikov:

> A battle within a city is a battle of fire power, a battle at close quarters, in which close-range firing is carried out not by automatic weapons only, but by powerful artillery systems and tank armaments also, all firing over a few score meters only. (9: p. 184).

One of the few explicit estimates of firing range is given by a Marine Corps battalion commander during the Hue battle: "The extreme firing range for the 106, the 3.5 and for machine guns was 175 meters. Most of the firing ranges were between 35 to 50 meters." (162: p. 17).

These estimates are consistent with those arrived at by city map analysis in Appendix E.

Unusual Methods of Movement Through A City

A defender or attacker of a city has to be aware of methods, peculiar to cities, for moving troops from one point to another. Unusual methods of movement within a city fall into two broad categories; above ground and under ground.

In densely populated areas of a city, particularly in the older parts of European cities, buildings abut against each other. A method, often used in city and town fights during World War II, to get from one building to another was to blow holes through the wall separating the two buildings. A similar method was used by the Jews during the Warsaw uprising of April 1943. Prior to the uprising, they constructed passageways connecting the attics of adjoining buildings. They were able to use the attic passageways to move their combat units from one position to another and as assembly areas. (3: pp. 92-97).

Extensive underground structures found in modern cities offer opportunities for use by the defenders or attackers of a city. These structures include sewer, subway, tunnel and utility conduit systems. Such systems can be used for moving troops, shelter, and concealment. However, to use these systems effectively and safely requires a detailed knowledge of their layout, best obtained through experienced local guides.

Sewer systems were used in a number of World War II city battles. In Stalingrad, as Schröter points out:

> . . . the sewer system presented a particular hazard. These emptied into the Volga and were used by the Soviet Command for

> bringing up reserves. Thus, it often happened that Russian soldiers would suddenly appear behind the German front line, without anyone knowing how they had got there. Later this method of infiltration was discovered and the sewers were blocked with iron girders thrust down through the manholes. (29: pp. 22, 23).

The sewer system in Warsaw was extensive and complex. The Jews used it during the Warsaw uprising in 1943. They had difficulty in locating the few people who knew the sewers and routes through them. Entering the sewers was not enough, the way through them to an exit also had to be known. (3: pp. 78-81).

Subways are among the largest and most extensive underground passages. For instance, West Berlin has 43.9 miles underground and 95 stations, and Hamburg has 15.7 miles underground and 78 stations. It is possible to enter and leave a subway system through ventilation or maintenance shafts as well as through stations.

Other tunnels can be found in cities, including building-to-building connections, and railroad tunnels. These also can be entered through ventilation and maintenance shafts.

Large modern cities require big networks of electrical, gas and telephone conduits. Many of these are large enough to allow moving troops. In all cases, these systems have maintenance areas large enough to provide room for a number of people.

Effective use of unusual methods of moving in a city by underground passages rests with the combatant who knows the layout of the passageways best. The combatant who wants to prevent their use at least has to know the points of entry and exit to block them successfully. The combatant who wants to use these underground structures has to know a lot more. Difficulties encountered by the Jews in using the Warsaw sewer system

apply to the use of any underground passage. Detailed knowledge of the layout is absolutely essential.

Preparing the City for Defense

Techniques used to prepare the defense of a city depends upon the amount of time available for the preparation of the defenses and upon the available material. Historically, streets and street intersections have been blockaded with many different kinds of obstacles and usually tied into existing solid buildings. Some of the materials used, both singly and in combination have been:

- o Barbed wire entanglements
- o Rails embedded in the pavement
- o Ditches and craters
- o Oil drums filled with dirt and sandbags
- o Logs and telephone poles
- o Automobiles, trucks and trolley cars
- o Heavy machinery from factories
- o Rubble

Rivers and canals passing through cities have been made difficult to use by sinking ships and boats, and by destroying bridges.

Examples of materials that have been used to blockade the entrances to buildings include:

- o Sandbags
- o Solid containers filled with dirt
- o Heavy timbers bolted across entrances

- o Piled up furniture wired together
- o Barbed wire

Passageways in buildings, halls, corridors, and stairwells have been blocked with all of the materials used to blockade building entrances. In addition, brick and masonry walls have been specially constructed to block passages. Stairs have been removed and the empty stairwell space filled with barbed wire.

Rooms used as infantry firing positions were usually extensively modified. Walls were strengthened against breaching with sandbags. Fragment and spall damage was minimized using sandbags, mattresses and furniture around the firing positions, which were usually well inside the room rather than at the windows.

Other methods used in preparing the defense of cities included enlarging and strengthening cellars and basements to serve as shelters. New tunnels and underground rooms have been built for the same purpose.

Physical Description of Cities After Significant Combat Action

Preparations made to defend a city, construction of strong points and road blocks, for example, are the initial steps in altering its appearance. Aerial bombardment, artillery fire of all types, and mortar fire complete the process of changing the appearance of the city. Demolition charges and mines contribute to the process.

A city can be almost totally destroyed without the use of aerial bombardment. For example, during the battle for Manila, severe restrictions were imposed on air support operations. The massive destruction that took place was produced by artillery and mortar fire. (30: pp. 294-

297, 303-306). A total of 7487 rounds of artillery were fired just to support the assault on Intramuros, the old walled city in Manila.

Aerial bombardment was used by the Germans in their assault in Stalingrad. On 24, 25 August 1942, the Germans attacked Stalingrad with over 600 planes. This attack, causing 40,000 civilian deaths, was the first step in changing the city's landscape. The major part of the downtown section, almost one hundred blocks of buildings, was completely flattened. Ground weapons contributed to the continued destruction of the city. In September alone, the German 6th Army fired 750,000 rounds of artillery, 500,000 anti-tank rounds, and 25,000,000 rounds of small arms ammunition. (37: p. 46). Schröter's description of the German Factory district is typical of changes in the battleground produced by air and artillery munitions.

> The Cannon Factory district was a place of huge and awful desolation. The ruins of the factory buildings were partly standing with their steel framework and their walls of corrugated iron. Cellars and roofs had been turned by the enemy (the Russians) into pillboxes and strong points. Piles of rubble, iron girders, parts of guns (which lay scattered about in their thousands), broken tank transmissions and shell craters made the whole terrain impassable; tanks could never cross it. (28: p. 38).

The following quotation of Seth adds to the above description:

> . . . by mid-September the streets and squares, for the most part, had been plowed up by bombing and artillery bombardment, until craters appeared within craters, and piles of earth and debris from the destroyed buildings blocked the unpitted parts. In addition to this, both sides had heavily mined the craters and piles of rubbish to deter attacks at night. (29: p. 89).

Aerial bombardment and artillery fire reduced Aachen to ruins. On 11 October 1944, soon after the military commander of Aachen refused to surrender, about 300 planes attacked the city. In addition, twelve battlions of VII Corps and 1st Division artillery delivered 169 tons of artillery fire (4900 rounds) on the city. (22: p. 309). The bombing and artillery was accurate but did not lessen German fire. The city was a scarred shell prior to 11 October as a result or repeated bombings by the British. The combined effects of all aerial bombardment and artillery fire created a vast area of rubble and shells of buildings. MacDonald (22: p. 320) includes the following quotation from an American observer describing Aachen after the battle for the city ended:

> . . . burst sewers, broken gas mains and dead animals have raised an almost overpowering smell in many parts of the city. The streets are paved with shattered glass; telephone, electric light and trolley cables are dangling and netted together everywhere, and in many places wrecked cars, trucks, armored vehicles and guns litter the streets. . .

After extensive fighting in a city, the rubble produced from the destruction of buildings is found everywhere; in the streets, in open areas near buildings, and in areas formerly occupied by undamaged buildings. Rubble is composed of chunks of everything found in a city. These chunks vary in size from dust particles to massive pieces of reinforced concrete. Examples of the constituents and rubble are:

- From the building frame -- bricks, stones, cement, lumber, iron beams, glass, reinforced concrete, metal.
- From the interior of the building -- furniture, office equipment, contents of stores and shops, machinery from industrial buildings.

- Objects external to buildings -- automobiles, trucks, streetcars, busses, telephone poles, store signs, trees and limbs from trees and wires of all types.

Throughout the fighting, new rubble is created and some of the old rubble is broken into smaller chunks or into different shapes. The air is filled with dust produced by explosives and smoke from fires of all types.

Experience has shown that rubble forms defensive firing positions that provide better cover and are harder to destroy than the initial strongpoints in buildings. In the major battles described above, Stalingrad, Manila and Aachen, the rubble created by the attacker's artillery proved to be a serious impediment to advance -- both because of the obstacles to vehicular movement and because determined defenders invariably reoccupied the rubble which then provided improved firing positions.

TACTICAL ASPECTS OF CITY FIGHTING

Overall Effects of City Physical Features

The organizational structure of armies and the tactics they employ have traditionally emphasized mobility and fighting in rural terrain. The physical combat environment of cities modifies the basic small unit tactics of rural combat less than one might expect. In both environments, infantry naturally seeks to achieve surprise, make best use of cover, assault at the shortest possible range, disperse to decrease vulnerability, etc. Some of the major physical features of a city that do influence the tactics and organizational structure of both the attacking and defending forces are:

- A dense and often complex network of streets.

- o A great number of buildings of varying heights and structural thicknesses.
- o Isolated open areas such as highway interchanges, railroad yards, zoos, athletic fields and air fields.
- o Underground passages such as subways, sewers, and utility tunnels.
- o Poor communications and lack of long range observation points.

Tactics are modified by the network of streets and concentration of buildings in several ways. Lines of sight to first mask are even shorter than in rural combat, where tactical use of terrain and vegetation already lead to very short engagement ranges.* Limitations on the line of sight and building mask are also limitations on weapon fields of fire and, in fact, on the choice of weapons that can be usefully employed. Smoke from burning buildings and dust from explosives add to the difficulty of observation and further restrict accurate weapon delivery. Debris produced by the fighting piles up in masses in the areas surrounding buildings and hinders both foot and vehicular movement, while providing excellent defensive firing positions.

Both tactics and organizational structure may be modified by the fragmentation of troop formations associated with city fighting. Buildings act like breakwaters to attacking troops by splitting their normal formations and forcing them to go along streets and through open areas.

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*See Appendix E for examples of line-of-sight distributions.

Control of troops is limited by the difficulty of observing their movement and the poor communication caused by intervening buildings.

Defending force formations establishing strongpoints in buildings to oppose the use of the streets by the attackers become fragmented and have difficulty in establishing overlapping fields of fire around each position. If the attackers cannot bypass or overcome the defenses overlooking the streets, they are compelled to enter buildings to dislodge defenders, causing further fragmentation of their formations. Partitioning of the defensive units is accelerated if they contest the use of buildings by the attackers. The streets become lethal to both attackers and defenders and fighting occurs within buildings and from building to building.

Because the troop formations of both combatants are fragmented, the battle for a city develops into a collection of small actions taking place over a large area. Control of troops is even more difficult under these circumstances than in rural combat.

Another factor accentuated in city fighting is the ease of getting lost and the difficulty in knowing the location of one's own troops and those of the enemy. Even during peacetime conditions, the only people who know their way around sizeable portions of a large city are cab drivers, policemen, and firemen. All other residents have detailed knowledge of only small areas in a city. Sufficiently detailed city maps can alleviate some of the location problems in cities and are, in fact, essential to effective city fighting. However, more specialized knowledge of a city is more difficult to get and is possessed by only a small group of people. For example, the physical properties of large numbers of buildings and their interiors are most likely known only to fire and building inspectors.

The detailed layouts of underground systems are probably known only to their maintenance personnel.

Modification of Tactics and Organization During The Battle of Stalingrad

The necessity to modify some aspects of organizational structure and tactics is present in fighting within any large city. It is well documented in the battle for Stalingrad.* Before he actually assumed command of the defense of Stalingrad on 11 September 1942, General Chuikov studied the tactics and operations of the Germans during their advance towards the city. The German air force, during this early phase of the battle for Stalingrad, had complete air superiority and is reported to have caused extensive casualties among the Russian ground forces. In the following quotation, Chuikov recalls his preliminary ideas for countering this superiority.

> Analysing the enemy's tactical and operational methods, I tried to find counter-measures and counter-methods. I thought a great

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*Two reasons account for the attention given to Stalingrad in this report. The first is because the battle involved a great number of combatants, lasted (in the city proper) for about four and a half months, and was one of the bloodiest battles of modern times. Vasilevsky (in Two Hundred Days of Fire, Progress Publishers, Moscow, 1970, p. 14) states that the battles in and around Stalingrad lasted six and a half months and involved over 2 million men, about 26,000 guns and mortars, and over 200 tanks and about 2000 aircraft. He divides the battle into two phases: defensive (the approaches to Stalingrad and the fight in Stalingrad, lasting from July 17 to November 17, 1942) and offensive (from November 19, 1942 to the surrender of the 6th German Army on February 2, 1943). Fighting in the city started around September 13, 1942.

The second reason for the emphasis on Stalingrad is because it is the only city battle that has been described adequately in any detail. A large literature exists on the battle, ranging from the memoirs of senior generals to the recollections of privates.

> deal, in particular, about how to overcome or reduce the importance of German superiority in the air, and its effect on the morale of our troops.... I came to the conclusion that the best method of fighting the Germans would be close battle, applied night and day in different forms. We should get as close to the enemy as possible, so that his air force could not bomb our forward units or trenches.... It seemed to me that it was precisely here, in the fighting for the city, that it was possible to force the enemy into close fighting and deprive him of his trump card -- his air force. (8: p. 72).

On September 18, 1942, after one week of first hand observation of the fighting in Stalingrad, Chuikov's ideas on how to fight the Germans crystallized. Basically, he recognized that much of the fighting in the city was done by small groups of Russian soldiers and even by individual soldiers. He thus saw that the individual was, on many occasions, his "own general." He describes the loss of troop control in city fighting as follows:

> For the 8th Guards Army an end had now come to the period of fighting under normal conditions in the field, when troop control functions according to all rules of military art. Fighting in a city, even more so in a city like Berlin, where the enemy is determined to defend himself to the last, is much more involved than fighting in the field. Here the 'big chiefs' have practically no influence on the course of operations, since the initiative passes into the hands of the officers commanding units and sub-units, and into those of the soldiers themselves. (9: p. 141).

In a later passage, Chuikov again emphasizes the decentralization of control found in city fighting.

> The direction of troops in a city battle is founded primarily on deep faith in the ability of officers and all ranks, in every unit and sub-unit; these are men who know the general object for their regiment and their division, but who are obliged to solve their own particular problems independently. The main job of officers and staff workers in a city battle is to organize the closest possible cooperation between all

> arms, on the level of the platoon, the company and the battalion -- the units from which the assault groups and detachments are composed. (9: p. 184).

Based on the performance of the Russian soldier, as a member of a small group and acting alone, Chuikov concluded that the individual soldier was capable of thinking on his own and was able to assess a situation and the intentions of the enemy. These observations caused Chuikov to give serious thought to the problem of revising the tactics of his subordinate units under conditions of street fighting.

> You cannot be a commander if you do not believe in the soldier's abilities . . . we decided to change our tactics. We were going to break down the formations that existed in the Army: alongside platoons and sections in our companies and battalions appeared new tactical units -- small storm groups. (8: p. 109).

The new basic troop formation was called a "shock" group (i.e., a stripped down and specially tailored platoon) and consisted of a "storm," "reinforcement," and "replacement" group (i.e., three specially tailored squads). In attacking a fortified building, the storm group (6 to 8 men) broke into the building, the reinforcement group followed to widen the initial gains made by the storm group, and the replacement group furnished replacements as well as protection against lateral attacks while the first two groups were occupied. The entire shock group was under the leadership of the storm group commander. The shock group worked on the assumption that they would remain in the building once control of it was gained. Routes of communication, trenches, weapon positions and food and ammunition supplies were established immediately along with improving the fortification of the building. The shock group technique devised in the defense of

Stalingrad was also used by the Russians in their assault on Berlin. (9: pp. 127-133, 8: pp. 284-303).

The storm group was lightly armed with tommy gun, grenade, dagger and spade. The Stalingrad spade had sharpened edges and was used in hand-to-hand fighting as an ax. When entrance to the strongpoint was gained the storm group commander fired a flare. This was the signal for the reinforcement group to enter the building. They occupied firing points, made new ones and, in general, tried to prevent the defenders from being rescued or from escaping. The reinforcement group was heavily armed with heavy and light machine guns, antitank weapons, mortars, picks, crowbars, and explosives. The group sometimes included sappers for special tasks. Men of the shock group were found to fight better when they were trained to perform the tasks of all three subordinate groups.

A great deal of emphasis was placed on preparing the storm plan. The objective of the storm group was studied intensively and the storm plan formulated in minute detail. Reconnaissance was basic for the preparation of the storm plan. Information was obtained, for example, on the nature of the defenses, the location of normal and unorthodox entrances and exits, the thickness of walls, the approaches to the objective, the location of firing points and their fields of fire, and the location of nearby strongpoints. Seth summarizes the major problems to be resolved in preparing a storm plan:

> In drawing up his plan the commander had six main problems to solve: (1) the composition and structure of the storm groups, (2) the composition of the reinforcement groups, (3) the size of the reserve groups, (4) the tasks of all groups at all stages of the operation, (5) the degree to which supporting fire should be given, and (6) signals and communications. Until he had the answers to all these questions set down in the smallest detail

> the commander would not consider launching his attack. But though the plan had to be worked out beforehand, the tactics of the shock group had still to be flexible, for although a reconnaissance might be well-nigh perfect, it could be perfect only within limitations. That is to say, there was always a part of the enemy terrain which could not be surveyed by reconnaissance. This was generally the interior of the building, and although knowledge of its former condition might be complete, there could well have been structural alterations caused either by bombing or made by the enemy themselves. (29: pp. 92-93).

Toward the end of September shock groups appeared in all regiments and attacks by entire units or even sections of units were abandoned. From about 13 September, the fighting in Stalingrad took on the character it was to retain for the next two months. Every building had to be fought for; single buildings and single blocks became major military objectives. Often both German and Russian troops occupied parts of the same building.

In the following rather lengthy quotation, General Colonel I. I. Lyudnikov describes the method of defense he calls <u>active defense</u> used by his division (the 138th Rifle Division) in the Stalingrad battle. The shock group technique was part of the active defense and was used for all counterattacks.

> . . .The <u>active defense</u> method was basic to the Stalingrad battle. Attacks were made on the advancing enemy both from the front and from the flanks which caused him to split his forces.
>
> The tactics of close combat in the city had a characteristic in which we cut the "no man's land" to a minimum. Our close proximity to the enemy hindered or made it impossible for him to deliver artillery and mortar fire on our forward edge because he could thereby destroy his own troops. Aviation bombardment was out of the question.
>
> The regimental commanders thoroughly prepared their regimental sectors for defense remembering that the vitality of defense in a city is ensured not by the quantity of fire systems,

but by a good system of firepower and strong reserves located in different places. The reserves in form of battalions and companies comprised about one-third of all forces.

Each large building or group of small structures were converted into strongpoints. The numerical strength of the garrisons at such strongpoints were not the same. For example, a single 5-story building would be occupied by a battalion and it would be called a battalion strongpoint. At the same time, another battalion would occupy several buildings, some of which would have garrisons of 4 or 5 men.

Company strongpoints were set-up so that the battle could be conducted in encirclement. The regimental commanders designated commandants of the strongpoints. Even in those cases where a house garrison consisted of 3 or 4 men, one of them was a commandant and bore full responsibility for the defended objective. Each garrison had its own ammunition and food rations.

A widespread network of observation posts for regimental and battalion commanders was organized. The observation posts for the artillery and mortar crews were collocated with the battalion and company commanders. The above organization permitted operational control of the battle and provided more effective use of fire systems.

In the beginning, the Germans saw the battle in the sector as being only of a street nature. They considered that after the strong artillery and aviation action against defended buildings that they would be able to carry the battle in the streets and squares and press our forces to the Volga. However, the steadfastness of the defense surpassed all expectations. During the artillery or aviation preparations which lasted for several hours in a row, our soldiers took cover in the basements of buildings or in the trenches closest to the enemy and were unharmed. No matter how destroyed the house would be, its garrison continued to stubbornly defend it.

Then when the enemy managed to suppress or destroy a garrison, reserves were immediately committed. They counterattacked the enemy and reestablished the situation.

After the German-Fascists' command was convinced that they could not push our division to the Volga and they could not possess the land occupied by that division, a new stage of the battle began -- underground war and grenade battle. The positions of both sides were located almost against each other. The German soldiers were afraid to lift their heads above cover for fear of a bullet from our snipers or good marksmen. The enemy started to dig under the houses trying to break into them or destroy them.

We understood the importance of underground lines of communication in city fighting. The regimental commanders drew a map of these lines. This permitted us to construct ambushes and dispatch assault groups and scouts into the enemy positions. The battle in the city took on a still more delayed and fierce character and became futile for the enemy. (5: pp. 154, 155).

Observations at Hue

In a more recent city battle, a Marine Corps battalion commander and his company commanders have documented the decentralization of control they experienced in the battle for Hue (162: pp. 38-42). The battalion commander stated he had few problems in control because of the nature of the city terrain and the combat. He was never further away from his company commanders than 100 yards and could communicate with them by voice. However, control did break down at the company level. One company commander describes the situation as follows:

> Once you made your fire team or squad rushes, it was that squad leader and that fire team leader that had control once he got into a building. And we did have some difficulties from time to time where we would end up getting too many Marines in a given building. I can remember one particular instance where one of my platoons was assigned to the building to the direct front. The platoon commander made his evaluation and he sent two squads after the building. He thought he had a divided building, or two different buildings in one. Well, it turned out to be the same. He ended up with troops on the second deck of that building bursting into one large room and from the other squad bursting in another door of the same room. And of course you had a shoot out. So we definitely had problems with control down to the small unit level within the buildings themself. (162: p. 39, 40).

Another company commander verified the difficulties of control inside buildings at the small unit level but states that these problems diminished as the troops became more experienced.* As in most accounts of city fighting, the participants at Hue emphasized their initial inexperience and the extent of learning that took place in the initial engagements.

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*Also see the narrative of the battle for Hue by S. L. A. Marshall in Appendix B.

APPENDIX B

NARRATIVES OF TEN CITY AND TOWN ENGAGEMENTS

INTRODUCTION

A primary source of information concerning city fighting is the history of city battles. WWII and later battles are of particular interest because weapons systems currently available, and which are useful in city fighting, have changed little during this period. As a result, examination of U.S. city fighting experience during and since WWII could be expected to provide valuable insights into how weapons were used, and how they may be used in the future.

There are several levels of detail at which an examination of U.S. city fighting could be done. The most cursory would be that which uses secondary source material only, in this case already existing accounts of city battles. (This is the procedure used in Appendix A where the objective was to understand the reasons for and the consequences of city battles.) However, a survey of such material shows this to be a poor source for the type of detail needed.

As a result, Brig. Gen. S. L. A. Marshall (U.S.A. Ret.) was asked to do a series of accounts of city and town engagements. In this process he was to use three primary sources: the secondary material noted above, the notes and journals (when they could be found) prepared by him during WII and now in the archives, and notes and journals made during and since WWII which are in his possession. The following ten city and town battle accounts are the results of this effort. Not all of the fights described are true "city" fights as described in Chapter I--some of them occur in towns and villages where blocks of contiguous structures do not exist. However, they are useful both because they contain examples of fighting techniques involving buildings and because they illustrate the differences and similarities between "city" and "suburban" fighting.

NARRATIVES OF TEN CITY AND TOWN ENGAGEMENTS

S. L. A. MARSHALL

CAPTURE OF STE. MERE-EGLISE

The nighttime capture of Ste. Mere-Eglise on 6 June, 1944, was the first such successful incident in the airborne invasion of Normandy and is considered a model of its kind.

It was the work of a medley from one battalion of the 505th Parachute Infantry. Though Ste. Mere was the proper target of that battalion as a whole, most of the battalion had become far-scattered through a misdrop. So small groups coalesced and went on rapidly together, since the troops had been schooled to the belief that speed in the seizure of the town was the essence of success and the battalion must not wait to bring about full assembly.

Ste. Mere was the dairy center of a pastoral countryside. The conformation of this community of roughly 200 houses and some 100 other buildings, such as a high-steepled church, a dozen or so shops, a town assembly and quite a number of barns, was more or less circular. The streets were cobbled. The homes, with almost no exception, were of solid, thick masonry. Most of the houses had gardens and in the center of town they were in the backyard.

For the German occupiers of France, Ste. Mere was the headquarters of the military district, hub of a network of hard-surfaced roads and midway station of a cable linking Cherbourg and Carentan with the coastal towns of the lower Cotentin. It was built on high ground and as a defensive position dominated the near countryside.

The commander, Lieut. Col. Edward C. Krause, had the rare luck to land on the designated drop zone at about 0200, one of only 15 men to do so. His first act was to form the others into patrols to go collect other people, telling them, "Return in exactly forty-five minutes." Krause consolidated the people they collected into two scratch companies and set forth.

One of the patrols had picked up a drunken Frenchman staggering along a road. When brought before Krause he quickly sobered and proved to be a gold mine of information.

After verifying the location where Krause then stood, he said he knew of a practically unused trail that led into town from the northwest. Until one week earlier, according to the Frenchman, the town had been strongly garrisoned; but most of the fighting troops had then been redistributed to key points along the roads leading into Ste. Mere. Within the town proper, there was about one company of German infantry covering the motor park, headquarters and other installations. Most of the tactical troops that had formerly billeted in Ste. Mere were now to the south of the town.

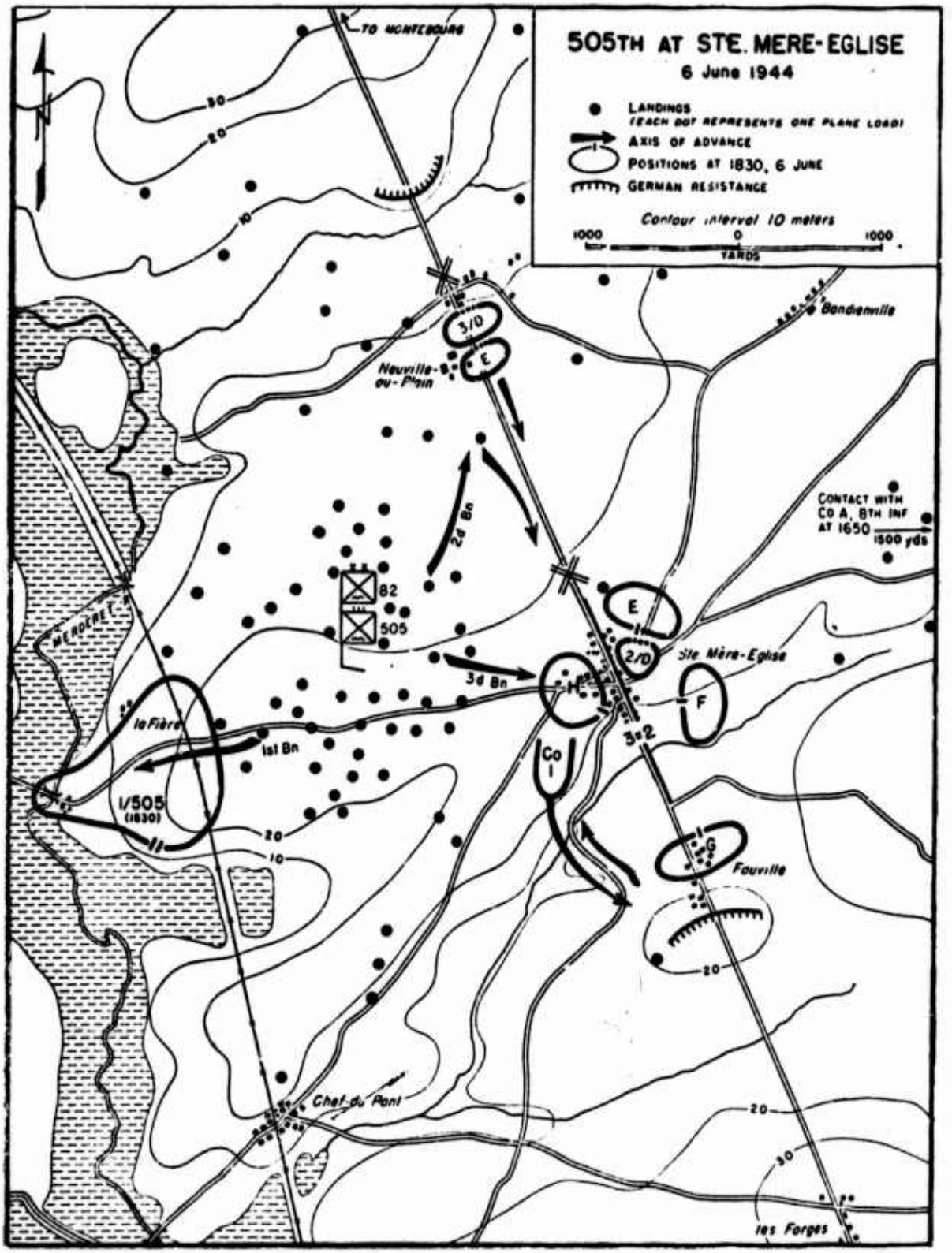
The Frenchman was put on the point of the formation under charge of one of the captains and the Battalion started for its objective with about one-quarter of its normal strength. There were heavy clouds over the area and the night was almost pitch black. No sign was seen of the enemy as they moved along and no fire was received. The older and more experienced men were quite willing to step out, being fully aware that surprise was their main weapon, but Krause could hear the veteran NCOs growling at some of the greenhands who were moving too cautiously with their rifles at the on-guard position, so that they continued to bump the hedgerows on either side of the trail, making a clatter.

In just 30 minutes they came to the fringe of Ste. Mere. Krause all along had schooled his men: Do not use your rifles until after daylight. Should you engage, use only grenades, knives and bayonets.

Krause kept pace with the lead files until reaching the most northern buildings along the main highway that runs north to Montebourg. There he decided to send separate detachments flankward in both directions to set up roadblocks and seal off all avenues of approach to Ste. Mere. Here was a quick change in plan. Prior to then, the arrangement had been that the battalion would block the roads to the east and south and depend on other 82nd Division forces at La Fiere, Chef du Pont and Neuville to seal off the approaches on the other sides. Now, because of the misdrop of his own battalion, he felt he could no longer depend on them.

The other men went on south along the main road, careful to stay within the shadows of the buildings. But they did not move slowly: They bounded from doorway to doorway, or to a covering wall. They had been instructed specifically <u>not</u> to search out any of the buildings. The object in that was to avoid the risk that hand-to-hand sk[illegible]ing would thwart the establishing of all of the roadblocks before dawn, which Krause rated the imperative move.

While the flanking groups were circling the town, the point, with Krause going along, headed straight south, holding to the sides of the main highway that runs through the center of Ste. Mere. Its task was to set the roadblock (RB) south of town. Krause could hear rifle fire and machine gun chatter from that direction and he guessed that some of his scattered soldiers were engaging the enemy.


505TH AT STE. MERE-EGLISE
6 June 1944
LANDINGS
(EACH DOT REPRESENTS ONE PLANE LOAD)
AXIS OF ADVANCE
POSITIONS AT 1830, 6 JUNE
GERMAN RESISTANCE
Contour interval 10 meters
1000 0 1000
YARDS
TO MONTEBOURG
Neuville-au-Plain
Bandienville
3/0
E
2d Bn
82
505
CONTACT WITH CO A, 8TH INF AT 1650
1500 yds
E
2/0
Ste Mère-Eglise
F
3d Bn
3-2
Co I
la Fière
1st Bn
1/505 (1830)
G
Fauville
Chef-du Pont
les Forges
20
10
20
20
30

The cable point was another 400 yards south along the main road. Krause had been briefed on its location and importance before leaving England. He went to it at once and did the cutting in person.

All of the RBs were set before first light. There was some skirmishing at three of the locations, though the resistance was swiftly overcome. The troops stayed with their instructions, using only grenades and cutting weapons. Every man in the battalion had jumped with an M-1 antitank mine. Every man carried a gammon, tank-killing, grenade. (It was made from Composition C, there being about two pounds of explosive in a small sock, along with a point detonator. The material is soft and plastic and two pounds is often enough to cripple a tank.)

In addition to the weapons heretofore stated, each RB was armed with one or two bazookas, a few covering riflemen, one machine gun and usually a BAR. The blocks were reinforced steadily during the morning as more men reported in.

By 0900, approximately 300 paratroopers had collected in Ste. Mere. By that time, following the establishing of the RBs, cleanup squads had gone through all of the buildings, and the town proper was reckoned to be totally secure.

There was little house-to-house fighting. The few Germans present were taken almost wholly by surprise. Some were routed from their beds. About 30 surrendered, ten were killed and the others ran off to the south. By 0930, Krause was satisfied that such future trouble as he would know around Ste. Mere would be in the form of attack from the outside. There had been no such stress as years later was to be portrayed in the motion picture, The Longest Day.

Several hours earlier, Krause had dispatched a runner who had been given the task of finding the regimental commander, if possible, to tell him that the battalion was on the objective. Now he sent another runner with the message that he had solid possession of the town. Neither message got to the man for whom it was intended--Col. William E. Ekman.

Wandering around the Division HQ drop zone, however, the second runner ran into Maj. Gen. Matthew B. Ridgway, the Division commander, and told him what he was supposed to tell Ekman, without telling him it was meant for Ekman, who continued in doubt. Such deliveries are more or less SOP with runners.

COMPANY G, 16TH INFANTRY AT COLLEVILLE-SUR-MER

In the Omaha Beach landings on 6 June, 1944, the first town to be fought for and captured was Colleville-sur-Mer. It was done house-to-house by elements of Company G, 16th Infantry. The weapons used by the attackers during the sweep were the M-1 rifle, hand grenades and the BAR. The Company was commanded by Capt. Joseph T. Dawson. The transcription is from the basic document and the pertinent portion of the narrative starts after the survivors have crossed the beach, gained the high ground and confronted Colleville.

"The plan was for the Third and Fourth Sections to attack the German bivouac area on the right of the draw, after which the whole Company was to pivot left against Colleville. Then the First and Second Sections only would advance against the town and the others would remain behind as a reserve. That is how they tried to do it. But then Third and Fourth Sections took 12 casualties clearing the bivouac area. It was short-range fighting all the way, first through the hedgerows and then house-to-house. The Americans used rifles and grenades only, hugging the walls, never rushing, bombing

through the doorways, then mopping up with rifles, using never more than one-half squad to clean out a building.

"Once the bivouac area was swept and the left turn was made, Dawson found the fire from Colleville building up against him at such a rate that he felt the Company was unequal to a head-on attack. This was at 1300 and the men farthest forward had already worked into the edge of the town. Burbridge's First Section already anchored the Company there, its men being holed up in a few houses along the outskirts. Bleau's Fifth Section tied into Burbridge on the south, extending in line to the buildings short of the bivouac area. Lieut. Day's Second Section closed the perimeter to the north.

"Dawson sent word to Hicks (Bn. Cmdr.) at 1430 that he simply could not commit the Company to an assault on Colleville and was then digging in on a defensive perimeter. But he didn't explain that his other two sections, under Lieuts. Stine and Kruckas, had become separated from the Company, having gone on to high ground about 1000 yards beyond Colleville. This was due to their excessive optimism. The two leaders had figured that the three sections would be enough to take the town and hence had gone on to extend, and thereby cover, the flank. But then the Germans had promptly filtered in behind the two far-out platoons. Though the enemy hugged ground and did not press hard, his snipers along the flanks picked off one officer and three men.

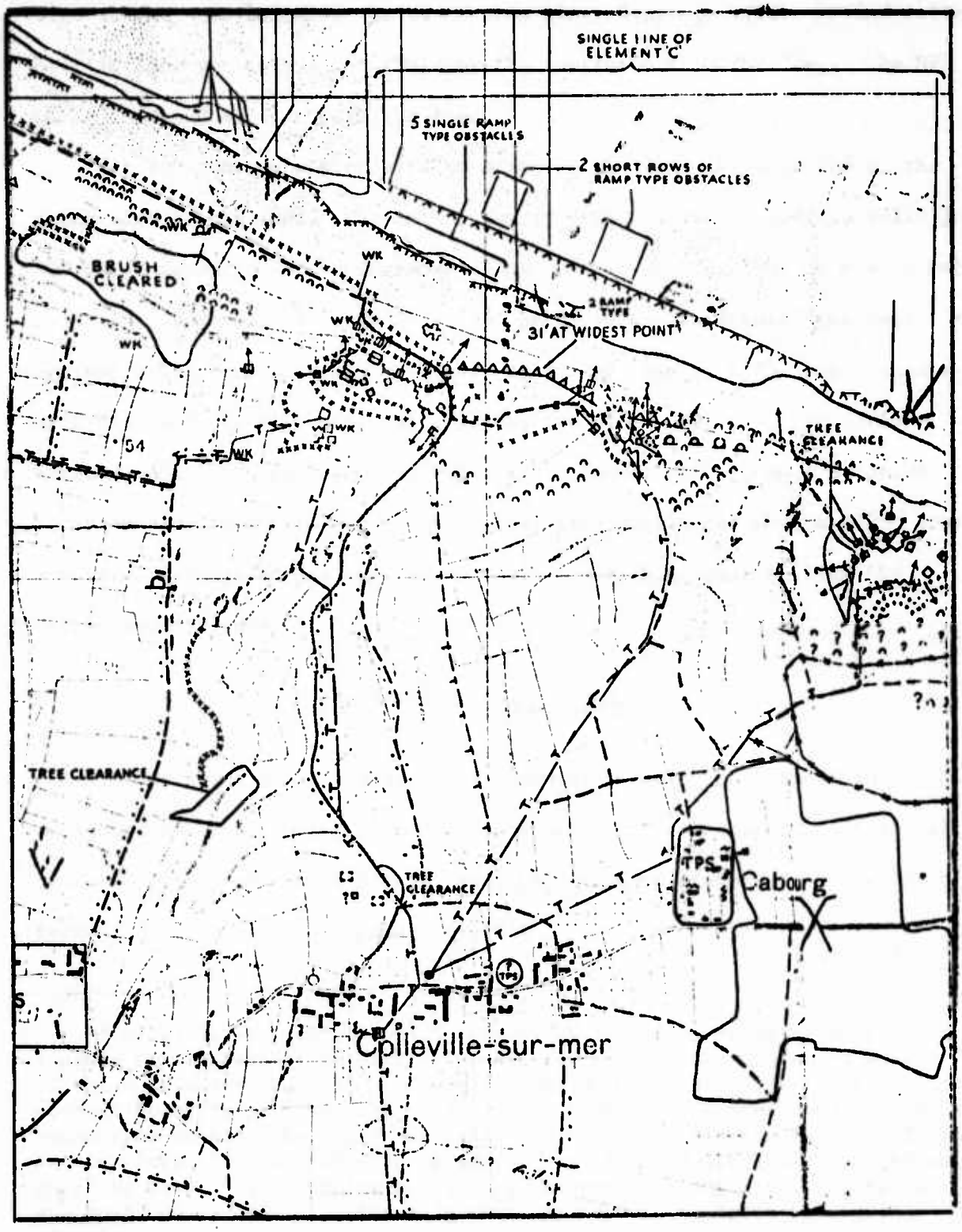
"At about 1500, the 18th Infantry came through G Company and advanced south of Colleville, bypassing the Germans there. Dawson continued his hold on the town's flank. At 1630, the Navy opened cruiser fire against Colleville and raked it end to end; but the first shells landed directly on Dawson's company, which took eight casualties. G Company exhausted its supply of

orange smoke in a vain attempt to end the fire. It was lifted at last by a radio message put through battalion. The Germans scurried to the cellars and bunkers when the ship fire started; it cost them no casualties and did them no materiel damage. Or so they said when later taken prisoner.

"Through early evening, Dawson was getting small arms fire from all around his perimeter, but still could not see any way to withdraw his men. The pass-through of the 18th Regiment, followed by the fire from the cruisers, had depressed this resistance for a while. But then it broke out again, redoubled in volume. Dawson got hit in the knee, though he stayed with the Company. Eighteen others were killed or wounded at this stage of the operation. 16-1 had started arriving at 1300 on D-Day and had moved into position on G Company's rear, which buildup continued into the late evening. G Company was not in contact with 16-1 and did not know of its presence. Still, by being there, it blocked any threat to Dawson and his people from that quarter.

"At 0800 on D plus One, Dawson put his first patrol through the town. The two missing sections had returned during the night. The patrol was formed of Lieuts. Burbridge and Kruckas, Sgts. Gaettano and Pezek and four privates. They moved down the main thoroughfare, four men to either side of the street, one rifleman in each team covering the windows and doors of the far side. The others stayed flat against the walls, moved from door to door, held grenades ready, but did not use them, and prowled each house with rifles in hand. In the sweep they killed five Germans and captured eight.

"As the patrol reached the far end of the main street, its people saw some soldiers from the 20th Engineers and several military police enter Colleville over the same route. Just then Gaettano doubled in his tracks to re-enter a house where he had just killed several Germans, but had also


SINGLE LINE OF ELEMENT 'C'
5 SINGLE RAMP TYPE OBSTACLES
2 SHORT ROWS OF RAMP TYPE OBSTACLES
BRUSH CLEARED
2 RAMP TYPE
31' AT WIDEST POINT
TREE CLEARANCE
TREE CLEARANCE
TREE CLEARANCE
TPS
Cabourg
Colleville-sur-mer
WK
54

dropped his reserve ammo. An MP, standing there ready to post an "Off Limits" sign on the same building, tried to stop him. Gaettano said: "Stand aside or I'll blow you to hell." (This by the testimony of Burbridge.) The MP walked off and did not post the sign.

"At 1000 Dawson was ordered to displace the Company to ground on the south side of the town. The 15th Infantry Regiment was already in solid just 500 yards beyond. So the movement seemed wholly secure. But on moving only 200 yards, Dawson drew heavy fire. So he deployed his frontal two sections against a hedgerow to build up a fire base, and then in a 15-minute engagement disposed of 19 Germans while losing two of his own men. In early morning, they had departed Colleville via a tunnel leading to a prepared position along a sunken road. Their last stand collapsed when a round from a 60mm mortar landed dead center on their one machine gun, killing the weapon and its crew."*

506TH REGIMENT AT EINDHOVEN

In Operation Market-Garden, the Airborne invasion of Holland in September, 1944, the one outstanding example of the capture, or attempted capture, of a defended city, other than Arnhem, was the taking of Eindhoven by the 506th Parachute Infantry on September 18, 1944.

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*Colleville-sur-mer extended approximately 750 yards east-and-west, or roughly the equivalent of eight city blocks. There were houses on both sides of the main street but the main buildup was on the south side. The village counted about 50 main buildings, including houses and stores, and another hundred or so of barns and sheds. All of the larger structures were of stone and the lots were separated by hedgerows atop a thick dirt base, any of which could be used as a defensive barrier by infantry. Along with the cellars--and most houses had them--the hedgerows afforded cover against incoming missiles.

The fight for the city was not full-scale battle, but rather, on the part of the attack force, a set of highly successful skirmishes, fought with light weapons against heavy artillery, and is instructive in that one particular.

The 506th had spent D-Day night just south of the Wilhelmina Canal across the Son. The plan had called for Col. Robert Sink to march the Regiment against Eindhoven that same night. But the blowing of the canal bridge by the enemy just as the advance started and the onset of a heavy rain as darkness fell changed all of that. The movement of the regiment in small boats across the stream took till midnight. Expecting Eindhoven to be defended by at least a regiment, Sink decided to bivouac on the far side and press on at first light.

Of that occurred a curious command blunder. Sink consulted the almanac for the time of first light, and told his staff to wake him at exactly that moment. When he was aroused next morning, the sun was already one hour up. Roaring with indignation, he said: "I told you to wake me at first light." Replied his exec: "No, you didn't. You gave us the exact minute. What you missed was that we had a time change last night."

Sink then told his people: "If you see any Germans, let them filter on through and maybe the Ducks (502nd Regt.) will get them. We must get to Eindhoven and we can't waste time killing Germans." The rest of the story is digested from the official records.

Only 600 yards beyond the LD the leading 3rd Bn. came under rifle and machine gun fire and there on into Eindhoven the column was opposed by little groups of infantry and some artillery fire. For about two miles, the battalion bulled its way through, either driving the enemy groups back or

eliminating them. Then as it moved into the city outskirts it drew direct fire down the main street from two 88mm guns and four or five mortars, which brought it to a halt. Capt. John W. Kiley, the S2, was killed by a sniper's bullet from the Woensel church tower. One bazooka round crashed the tower and finished the sniper.

Coming forward, Sink decided that to force the issue with 3rd Bn. would cause unnecessary losses. The alternative move was to swing out 2nd Bn. to the left or southeastward along an adjoining road that turned sharply toward the center of Eindhoven.

As the move was made, Colonel Strayer, the battalion commander, peeled off Company F to make a flank attack against one enemy group that was holding up 1st Bn. The 2nd Pl. of Company F, which was its lead element, was moving west on Pastorie street, when at the corner of Klooster Dreef, it met the battalion exec., Capt. Charles G. Shettle. He told Lieut. Russell Hall, its leader, that his task was to take on the German 88 battery.

Well strung out, the platoon column continued on along Klooster Dreef without any of its other people knowing the mission or the situation or being aware of the nearness of the guns. They were stopped by a Dutchman who told them that the battery was just around the next corner. Hall then called on his rifle grenadiers, Pvts. Homer Smith and Robert W. Sherwood, and four tommy gunners, Cpls. Marion J. Growdow, Willard A. Sharp, and Robert E. James and Pvt. Clarence L. Shrout, to move to the head of the column.

The block which lay between these men and the gun position was triangular in shape with Dutch homes and stores on all three sides. The second

squad under Lieut. Robert Pardue took the left side of the block. The third squad was kept in a reserve position in the center of the block and the one mortar was set up just a little forward of it. Hall and S/Sgt. John H. Taylor went with third squad which was to move to the left and deploy between the houses on Klooster Dreef.

Both assault squads then took off through the backyards to move up cautiously to the far side of the block. Not a shot was fired.

As first squad got into position, Sgt. George Martin saw a German soldier waking south on Klooster Dreef, shot at him, and missed. Hall, S/Sgt. Hugh Borden, Taylor and Sherwood, in moving between the buildings on Klooster, saw a Dutch woman waving furtively from a second story window across the street. Then she pointed down the street and held up three fingers. As the American stopped abruptly, three German soldiers passed them, walking northwest toward the gun. Hall and his men jumped into the street, with Taylor yelling: "Hold on! Stop!" The Germans turned around, their hands raised. They were disarmed and moved back, under guard, into one of the houses.

From the far side of the street, two Dutchmen motioned the squad on toward the Woenselche intersection. Still in the open street, the men of first squad looked that way and saw the first 88 at the crossroads, 150 yards off. Six Germans were running for the gun. Taylor stood at the curb and fired a full clip at them. Two of them dropped and then the tommy gun jammed. Taylor retired to the cover of the houses to clear his piece.

As he worked, the Germans got the 88 going, and the first round blasted a cornice from the roof just above Taylor's head. Now all of the first squad had pulled back to the cover of the buildings. The Germans got off

two more quick rounds. Being behind one of the buildings, Sherwood could no longer see the gun, but could still use a tree a few yards beyond it as a general aiming point. By guess and by God, he got off two rifle grenades at a very high angle. The second round landed five yards behind the gun. Coincidentally, Smith, the rifle grenadier of second squad, fired from a position on Woenselche Straat, only 75 yards from the gun. To make the most of his building cover, he was firing from his left shoulder. By rare luck his second grenade made a direct hit. Sherwood saw it explode, figured the gun was out and yelled to Smith: "We got the bastard!"

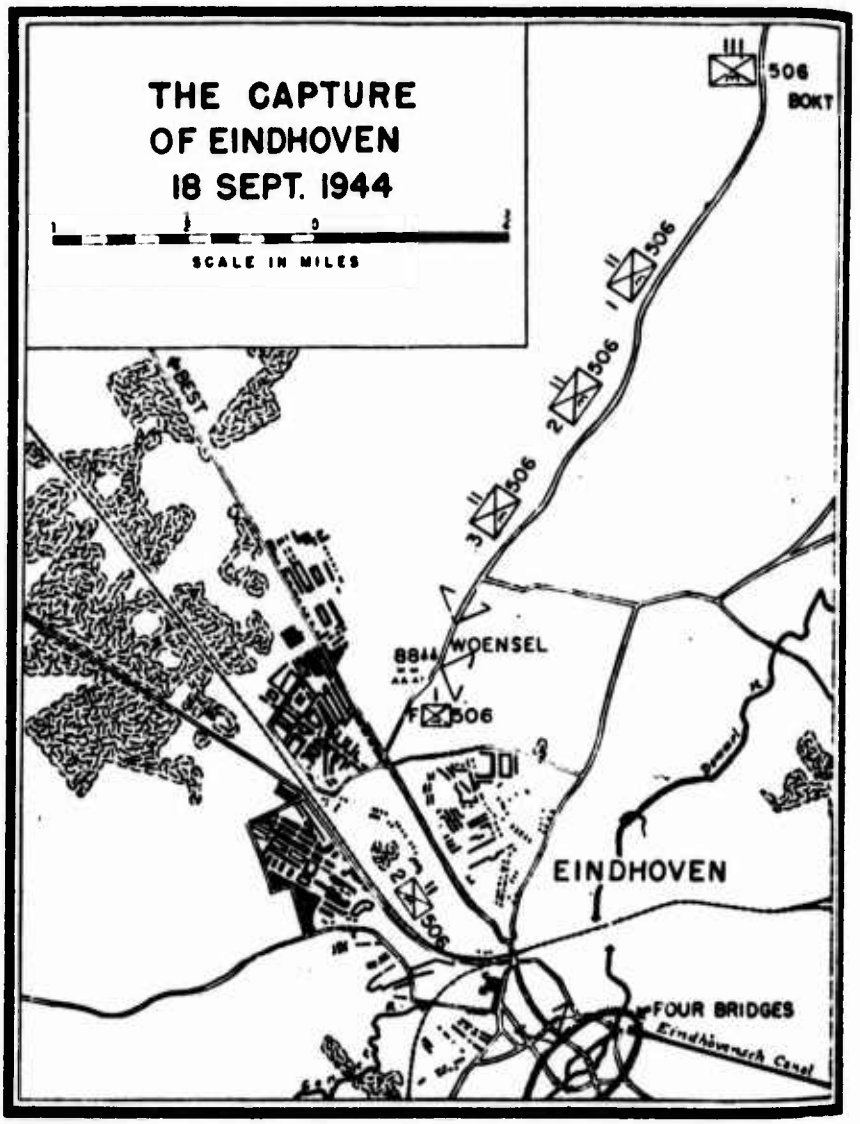
Sherwood and Taylor ran back to bring up Sgt. Frank D. Griffin who was in charge of the mortar. They figured they had scared off the crew but couldn't be sure that the 88 was ruined. Together they advanced the mortar to within 75 yards of the gun where Griffin had a clear view of it. Just then a German officer came up behind it. Aiming at the live target, Griffin saw his first round explode and pitch the officer toward one of the houses. Then Taylor shot him in the leg with his tommy gun as he arose, saw the German fall again, rise again, and hop on one leg toward house cover. The second mortar round from Griffin exploded directly on the gun. Here was phenomenal adjusting, since Griffin was operating only with a mortar tube that he held between his knees to steady it when firing. Then Sherwood put a rifle grenade point blank against the house into which the German officer had vanished. It was a sensational hit. Exploding inside the building, it wounded or killed 10 Germans.

Members of first squad did not know that there was a second 88 to the north on Woenselche Straat. But second squad had already encountered it, and was moving into position to engage. Just as the first gun was knocked

out, the second gun opened fire with three quick rounds aimed loosely at the area where second squad was advancing. Smith countered with five or six rifle grenades at range of approximately 150 yards. It was all high angle fire from behind house cover. None hit the gun, but the crew couldn't take it. The breach of the gun was blown with a grenade and the crew then tried to get away. Second squad moved fast across Klooster Dreef and flattened into firing position at the end of the houses. Fourteen Germans came running, ducked through one of the houses and started to run through a sugar beet field in rear. The Americans opened fire. The Germans flattened among the beets. Called on to surrender, they came in rather meekly.

While the few heavy weapons of the German defense of Eindhoven were being extinguished by one rifle platoon, 506th's 2nd Bn. had continued advancing into Eindhoven to get control of the bridges--the essential point. The 506th had engaged but one overstrength but badly positioned enemy infantry battalion, with its artillery complement, rather than the expected regiment or brigade. The Germans lost 13 killed and 41 prisoners; many more had managed an escape for the time being. During its action the platoon suffered only two light casualties.

506th at Eindhoven invites attention mainly as an example of economy of force operation in attack on a large target, Eindhoven being a city of more than 100,000 persons. The Regiment, expecting resistance by a force of its own size or larger, still attacked only one quadrant of the built-up area, and kept its main body in reserve, well removed from the fire zone. Employing small forces lightly armed, it made ingenious use of its people and weapons, and so doing experienced unusual fortune. The end of the


THE CAPTURE
OF EINDHOVEN
18 SEPT. 1944
SCALE IN MILES
506
BOKT
506
506
506
WOENSEL
506
EINDHOVEN
FOUR BRIDGES

fight was concisely put in the report to higher command: "We hold the center of town and we are sitting on the four bridges over the Dommel River."

THE SCHIERWALDENRATH RAID

Schierwaldenrath in the autumn of 1944 was a German village of 46 houses, one church, one store and a conspicuously high windmill. The village was based around a country road which ran through its center and the two Y's where at either end the road branched in two directions.

These were sturdy and typical German country houses, brick and stone-walled, most two-storied and fixed with basements. Each had its own back-yard and garden and there were fences or stone walls between. This seemingly peaceful setting was already a legitimate military target. The German Army had garrisoned it throughout, Schierwaldenrath had become part of the fighting front.

On 7 October, it became the site of one of the more eccentric operations in the European Theater, a raid by elements of the 115th Infantry, 29th Division, with the object of sacking the village, killing or capturing its garrison and holding the ground for whatever period seemed desirable.

Both the antecedents and motives of this second attack on Schierwaldenrath are perfectly clear. Four days earlier units of the same regiment, along with support forces, had struck against the village and the affair had turned out very badly. Out of Company K, four officers and 64 men had become lost and were marked "missing." Later it was learned from German POWs that a specially trained Kampfgruppe of 200 men, supported by four SP guns, had been posted to the village just to stage such an entrapment. The force was then promptly

withdrawn and the village defense was left to troops of a poorer quality, though the Americans did not yet know that. Sixteen men and one officer of a light tank platoon that had accompanied Company K had also become lost.

So 29th Division ordered the second attack to liberate its own prisoners if they were still there, to capture German prisoners if it proved feasible and to sack the village out of vengeance.

The operation and its planning, despite the smallness of the undertaking, are therefore illuminating as to the tactics and materiel judged suitable to attack on a built-up area.

On 5 October, Lieut. Col. Glover S. Johns, commanding the 1st Bn., was given his order for the raid and asked what hour he thought best to start the attack. He replied that if he had to go without tanks or air support, he preferred 0400. Provided there were tanks only to help the infantry, the jumpoff should be 0700, but if he could get air support also, any hour until 1200 would do. Because none of the heavy support he wanted was available, and he was so advised, he chose to attack at 0400 on 7 October. Thus the outcome of the raid would depend initially on stealth, speed and surprise, since Johns rejected the proposal of a preparatory barrage.

It was agreed that he would try to hold the village throughout the day, then withdraw under cover of dark. To take care of demolitions, Company A of the 121st Engineer Battalion, under Capt. Leland D. Moring was attached. Consulted, Moring said that one platoon would be enough to demolish the village, but on the other hand a company was required to get the materiel forward.

On 6 October, the countryside forward of Kreuzrath village and Birgden town were reconned from the high steeple of the Birgden church. The view

took in the entire landscape up to where Schierwaldenrath began. It showed that the land beyond Kreuzrath was perfectly flat and barren, providing no sort of cover short of the objective. There was one cluster of houses between Bergden and the objective, suspected to be held by German soldiers, so Johns asked that 3rd Battalion hit the cluster at the same time to secure his flank. He had already decided to attack across the open space beyond Kreuzrath but he planned to retire via Birgden, that being the shorter route.

The attack would launch with two companies abreast, each in column of platoons. The third company would follow at 75 or so yards, followed at a like interval by the engineers. The 81mm mortar company would support the attack from southward of Birgden. But its fires would be withheld until troops had control of Schierwaldenrath.

The road into the village ran straight so far as the church where it branched forming the first broad Y, each branch of which was treated as a sector. The two lead companies would attack down the branches, then hold them. The follow-up company would mop up, then stand guard, over the base. All hands were instructed that they would move quietly as possible until discovered, then rush the Germans with the bayonet.

But they would not, must not, attack down the street. They were to attack across the backyards and through the orchards.

As to the loading, all hands would carry a double load of grenades, including thermite grenades, which were to be thrown only where windows and doors were open. No soldier was to stop long enough to force an entry into any house or building until the signal came that the perimeter of the village was secured. The exception would be if an officer present authorized the use of a rifle grenade or bazooka round against a particular building.

The companies were instructed to dig in where they formed on the perimeter (as outlined on the operations map), set up automatic weapons and prepare for defense. Mop-up squads were designated to dispose of enemy within the houses: they would move down the line, attacking from the rear, building by building.

Each company was to carry wire. The two lead companies would place their wires on opposite flanks and the third company would lay its wire through the central street. The object was to avoid the silencing of all messaging through one shell burst. Then if possible all companies were to tap into one separate line.

Each engineer was to carry two 20-pound packs of charges. That was figured to be enough to demolish all 46 houses while sparing the church and several small religious shrines.

The withdrawal plan called for the engineers to get out first. The infantry companies would follow in order C, B, A but each company would leave a withdrawal "shell," two men out of each squad to cover from the rear, the shell as a whole under one officer.

For the 110th Field Artillery Battalion there was a preplanned use of its fires once the surprise was over. Concentration areas through and around the village were numbered, each 200 by 600 feet, and the calling of the number would bring on a TOT. Each officer would carry a copy of the numbered overlay and there would be an FO with each rifle company.

After dark on 6 October, the Battalion (its companies were at approximately half strength, averaging around 90 men) moved to an assembly area

south of the LD, which was to be at Kreuzrath. There the several company commanders [were given] overlays on which were marked known enemy positions. A combat patrol had been sent out the prior evening with the mission of drawing enemy fire from Schierwaldenrath so that the machine gun positions could be spotted: it drew several bursts of fire from two guns and also learned that the village was strongly outposted with riflemen. There was an additional threat, this from left of the line of advance: the village of Langbroich was strongly held by German troops. And along a low ridge to northeast of the objective, the enemy was solidly entrenched. Four SP guns, two to the northwest and two to the west, could range in on Schierwaldenrath.

At 0300, 7 October, Johns got the word from Regiment that instead of trying to hold Schierwaldenrath through the day, he should pull back as soon as the engineers had completed the demolitions. (It was a change for the better: after the raid was over, its leaders agreed that four hours is the maximum that a small force can hold any area the size of Schierwaldenrath against an aggressive enemy.)

At 0400 the assault companies started their move across the wide open field. Johns stayed behind; he had decided that Kreuzrath was the proper place for his command post. There was a bright moon overhead but the waves rapidly became lost to Johns' view due to a fairly heavy ground fog that cut visibility to about 125 yards. At 0423 fire broke out. But it was coming from the left flank and at some distance from the advancing men--steady rifle fire, the chunk-chunk-chunk of the BAR, but no machine guns. Johns guessed it was the attack on the clump of houses beyond Birgden.

All three rifle companies made it to Schierwaldenrath exactly as planned and the surprise was almost total. The two German machine guns

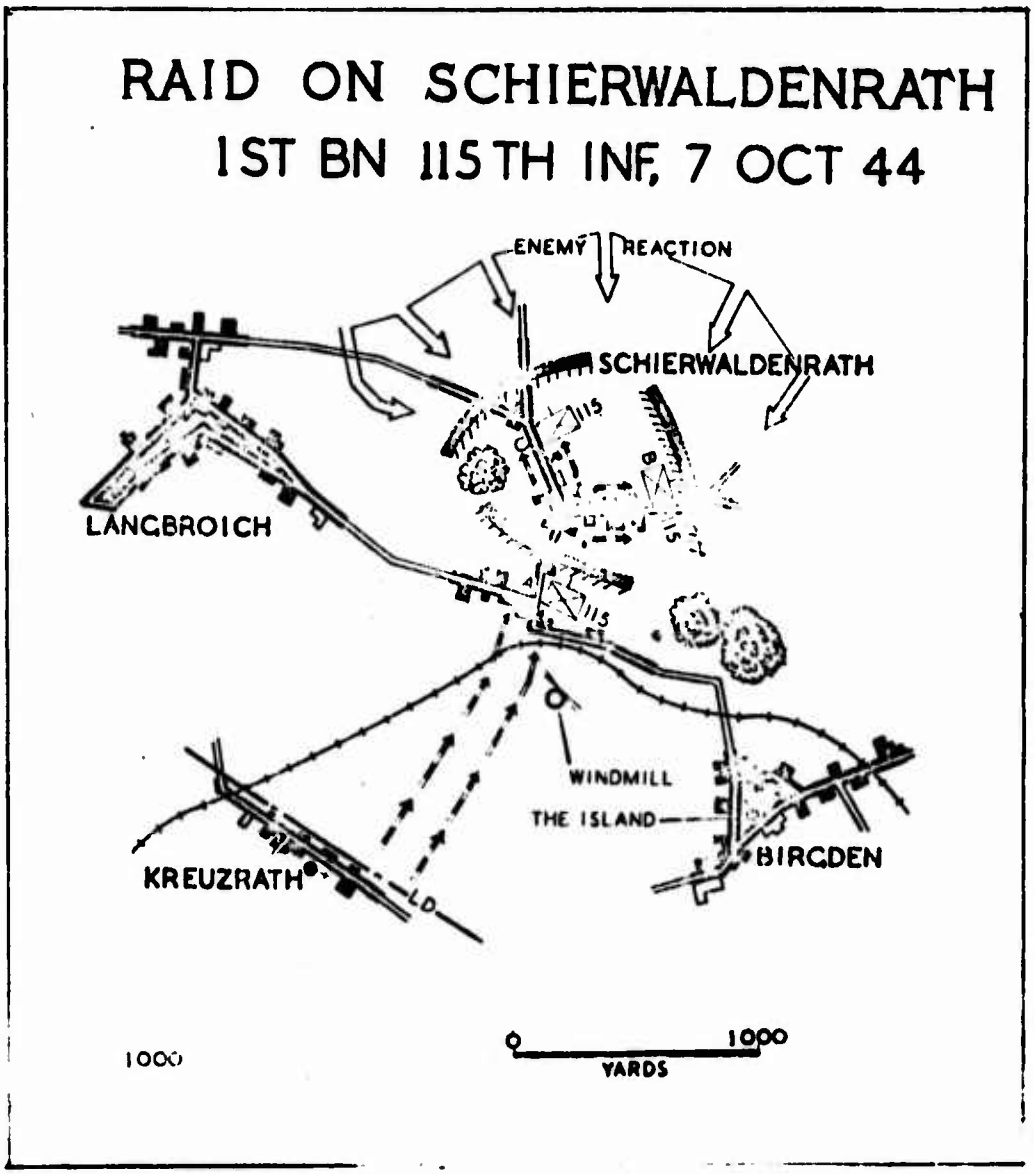
covering the road intersection at the first Y had just time enough to open fire and get off short bursts. Two rifle grenades fired by Pvt. James W. McGuire, an assistant squad leader in Company C, hit the pillbox where the guns were nested, killed one gun and its crew and drove off the second crew.

Working through the yards and orchards rearward of the houses along the main street, Companies B and C got to the maneuver point at the angle of the first Y without losing a man. There stood the church. Right next to it was the 20mm gun sited to repel any force moving down the main street. It was destroyed with thermite.

As the soldiers moved from one yard to the next, grenades were thrown at the windows and the backdoors were splintered with M-1 and BAR fire. The object here was more to frighten the Germans than anything else, and drive them to the cellars if possible. Oddly enough, though relatively little fire came back from the houses, most of it also was M-1 mixed with BAR, probably out of weapons taken from Company K in the earlier action.

Company B turned right where the road branched and Company C turned left. There was still no meaningful resistance. The strike had come so swiftly at such an hour when the garrison was drugged with sleep that there was no time for collected reaction.

The first heavy counter shock came from without. Suddenly two red flares lighted the sector forward of where most of Company B was starting to dig in on its third of the perimeter. Then from northeast and northwest the German artillery opened fire along with a number of antitank guns. The fires were dropped first between the village and Kreuzrath, the enemy seemingly believing that the attack forces had not yet closed. Then after five minutes or so they lifted to Schierwaldenrath. But the enemy gunfire


RAID ON SCHIERWALDENRATH
1ST BN 115TH INF, 7 OCT 44
ENEMY REACTION
SCHIERWALDENRATH
LANGBROICH
WINDMILL
THE ISLAND
BIRGDEN
KREUZRATH
LD
1000
0
1000
YARDS

was just an added nuisance to the raiders and for the time could not change the tactical balance within the village.

The special mop-up groups were getting in their blows and the German guns gave them more help than hurt. The Germans in Schierwaldenrath, who had taken to the cellars and bunkers, were just that much more unnerved. One Company B radio operator, himself jumping down a basement stairs when he heard a shell incoming, came up from it herding three prisoners. A squad from Company C located an enemy dugout overlain with several feet of straw. Kicking through the straw, they kicked up six Germans. One machine gunner from the same company, becoming shot in the wrist and going for medical aid, fell into a zigzag communications trench and came out with 22 Germans, their hands in a . . All through the village other Germans were being routed out, most of them half-dressed or still in night clothes.

Moring of the engineers had assigned to each of his platoons a sector of Schierwaldenrath marked on an overlay. House by house they went at it, after the skirmishers had disposed of the occupants one way or another. A demolition squad set the charge and prepared to blow it; a second squad torched the flammable interior. Before daylight the village was high ablaze almost from end to end and its earth was shaking from the TNT blasting of the houses minute after minute while the rattle of bullet fire incoming and outgoing and the pounding of the enemy artillery added their special menace.

Before Company A could complete its tie-in to the left flank of Company C on the west side of the village, two German machine guns just outside the American perimeter, which both companies had missed in their overly rapid entry, opened a fire that stopped the digging halfway. Then

40 to 50 enemy skirmishers from the outside filtered into the gap between the exposed flanks by creeping along the hedgerows between A and C. There being no infantry reserve, there was a call to the engineers to plug the gap. Several of their demolition teams responded, drove back the invaders with rifle fire and then stayed.

Then came more trouble. The incoming artillery and mortar rounds, steadily building in volume, knocked out the wires wholly and communication thereafter depended on the 300 radio. But Company C's set would not transmit and that corner of the perimeter had to resort to the use of runners. The substitution had one critical defect: Company C could no longer call in the artillery for close-in fires. Some Tigers tanks were approaching this flank and the 88mm fire was passing directly overhead. Above all else, what saved the Company was that, not having had time to complete its own digging, it found protection in a prepared trench that the Germans had dug. Three of the Tigers continued to roll toward Company C's line. Its men watched their own artillery fire fall short and could do nothing about it.

Two other Tigers bore in straight against Company B. One Private Stockton, his assistant having been hurt, engaged the pair single-handedly with a bazooka, doing the carrying, loading and firing. Moreover, the bazooka was defective. Each time he fired, he burned his face and hair. Still, he blew the turret from the lead tank, the crew of which jumped clear and ran for the rear. Then he ran to the left of the company line to get a better sighting on the other Tiger. There he fired three rounds, missing with all. The flashes had given his position away and the return fire of the Tiger gunner killed him. Still, the enemy tank hesitated.

At the same time the pressure against Company C's front mounted. The Germans had laid down a smokescreen, seemingly using only rifle grenades. As the smoke cleared away (the light was now fulling) an enemy force estimated at around 300 men could be seen advancing from a knoll about 450 yards distant. Coincidentally, the Tiger that had killed Stockton turned against Company C's left flank. It got to within 50 or so yards by about the time the company bazooka team was knocked out by fragments from an artillery shell. The other Tigers were still coming on, Sgt. Elmer Michaelis undertook to engage them with rifle grenades, putting a booster on the launcher that added 200 yards range. He then propped on a log and fired through a hedgerow. One early round made a direct hit on a tank tread, broke it and stopped the Tiger. At that point Michaelis mounted the roof of a German air raid bunker hoping to add to his score. The killed tank swung its main gun in his direction. Without wasting a second, he jumped for the door of the bunker, having just discovered that he had no more grenades.

While the Germans were attacking around an arc extending roughly from WNW to ENE, the command had begun to evacuate prisoners under engineer escort to the southward. The immobile wounded were also being taken out. Doors, shutters and couches from the Schierwaldenrath houses had been collected to serve as litters. Just to the south of the village, the imposing stone-towered windmill, which looked like a possible site for a German OP, had been mortared and shelled by tanks the day before the raid, with little discernible damage to the structure, and no active response. it now opened machine gun fire on the packets of wounded and POWs under engineer escort and the engineers had no heavy weapons with which to silence it.

The message exchange between Johns at Kreuzrath and his subordinates at this stage is eloquent of the rise in tension. Battalion to Baker: "Hello, Item Three. Hold 'em." Baker to Battalion: "Hello, Item Three. Charlie Company asks permission to execute Maneuver Q at 0800." (Maneuver Q meant withdrawal.) Battalion to Baker: "Hello, Item Three. Wait." Battalion to Engineers: "Hello, Item Eight, have you finished?" (Completed the demolition.) Engineers to Battalion: "Hello, Item Three, Yes." Battalion to Baker: "Hello, Item Three, Execute maneuver Q as requested."

Johns knew, and by his order made clear, that the operation had passed the point of diminishing return. Right then came a call from regimental headquarters: First battalion was to hold on for another hour at least: (it was then about 0730). And for what reason? Tank retrievers were coming on to pull out the damaged tanks that had been lost in the Company K fight. Then the conversation resumes: Battalion to Baker: "Hello Item Three. Tell Charlie to hold on for another hour." Baker to Battalion: "Hello Item Three, but sir, we can't, there are six Tiger tanks out there shooting like hell." Battalion to Baker: "God damn it, that's an order, you hold 'em."

There is nothing unusual in any of this. The regimental rear had no understanding of Johns' problem and Johns could only sense very vaguely what was going on within and around Schierwaldenrath.

A few minutes later a voice came over the battalion radio net, that of Lieutenant Joseph Blau, commanding C Company: "Sir, this is Charlie Six. No more officers in Baker Company. All of our officers have been hit.

So have I. I'm sorry sir, but we have done all we can. We've got to execute Maneuver Q." Without temporizing, Johns said immediately: "OK, you pull out according to plan and don't leave any prisoners or casualties behind."

By the time the withdrawal was authorized, 31 of the village dwellings had been blown up by the engineer sabotage crews, along with some of the bunkers and air raid shelters. Infantry thermite bombs and torching had at least partly ruined six to eight of the other houses. Company C had set the enemy headquarters building ablaze and it still burned. The village's sacking was somewhat more than 80 percent accomplished. Ninety-nine German prisoners had been taken and 54 of the enemy had been killed. The tank kills in the fire fighting were as earlier reported.

The losses of the First Battalion, when it was all over, were six KIA, 52 WIA and 16 MIA, except for the latter a normal attrition in an operation of this kind. In fact, it was far better than average. Seven officers had been shot up. Company A had gone through the fight with little sweat. In retrospect, it is clear that Blau's request for immediate relief was a slight overstatement of the situation. Things were not that desperate as to manpower losses.

Even so, there was no sensible alternative to withdrawal. By that time there were 13 German tanks within sight and moving toward the perimeter: 250 effectives remained to the Battalion but their only tank-killing weapons were gammon grenades and about nine bazookas. One of Company A's closeout messages to battalion was: "All prisoners out. All casualties out. The town is wrecked, except we've run out of stuff to burn things with." Battalion replied: "Then use matches and see to it you don't leave a

single Yank or live Jerry. Cover Baker and Charlie according to plan."

The getaway was anything but orderly. When the German tankers saw the Americans rise to move out, the armor came on fast firing 88 HE and WP. Blau had been badly dazed by flying debris from a shellburst and was in no condition to steady or control his people. By the time they passed through Company A's lines and had come to the south edge of the village they had disintegrated as a unit and were running or staggering along in knots of three or four, some giving help to the walking wounded, others paying no attention. Company B, though it had been less hard hit than Company C, as to the casualty count, was hardly any better organized for withdrawal. All of its wounded officers had been evacuated and only three NCOs were still functioning. A communication sergeant had taken command while another sergeant directed the "shell," the three-man rearguard that covered each platoon. As best they could, the survivors made their way along a sunken road, then following the railway track for a distance, moved down the embankment and headed for Bergden. Looking back, they saw three columns of enemy infantry coming over a hill to the eastward, firing as they advanced.

OPERATIONS AT AACHEN

In the protracted battle that brought about the capture of Aachen, Germany, in October, 1944, by two battalions of the 26th Infantry Regiment, there was house-to-house, building-to-building fighting by one of these battalions for eight days running.

Operations in the sector overrun by this battalion (the 2nd under Lieut. Col. Derrill M. Daniel) fell into one basic pattern. The companies were split into platoon-size assault teams. With each rifle platoon moved either a medium tank or tank destroyer to provide heavy, close-up artillery support. The vehicles would put each building under fire prior to the infantrymen rushing it, at which point the tank or destroyer would lift fire to the next building. With the battalion's light and heavy machine gun raking the streets, the shelling tended to drive the German defenders to the cellars, where the assault force showered them with hand grenades.

Where the German defense from behind the walls proved particularly tenacious, the infantry called on other weapons at their disposal, particularly demolitions and flamethrowers operated by two-man teams attached to each company headquarters.

The assault groups did not wait for live targets to appear before striking. Rather, it was taken as a basic assumption that every building was a nest of resistance until proved otherwise. Light artillery (the 105s) and mortar fire, as in a moving barrage, jumped forward block by block several streets in front of the infantry while the heavier guns pounded enemy communications and other sensitive points farther to the rear.

To maintain contact between units, the command each day designated a series of check points based on street intersections and more prominent buildings. No unit was to advance beyond the check point until after it had established contact with the units to its flanks. Each company was given a zone of advance with defined boundaries based on city maps; the company commanders in turn assigned platoons to a particular street. What was taken over, after being cleared, became held. Prior to darkness,

the advance was stayed and units along the battalion front went on the defensive, but maintained contact during the night.

After a number of hard experiences in which enemy groups, either becoming bypassed in cellars or hiding in storm sewers, emerged to take the attackers in rear, the infantry learned that speed counted less than thoroughness. The sewers were therafter treated as a special problem. All manholes were located, then blocked and sealed. Another special problem came of glass and other tire-puncturing litter which the enemy had systematically strewn over the streets and walks.

That phase of the battle, of which these rather rudimentary tactics were part of the detail, opened on 10 October when the German garrison commander was presented with a surrender demand and ultimatum. Normally a city of around 170,000 people, though most of the civil populace had fled to other parts, Aachen was by that time wholly enveloped by American forces. The once heavily-walled and solidly structured place was already a sea of rubble, Aachen having been made a main target for repeated air bombardment since two months before the landings in Normandy. Additional bombing attacks would follow the rejection of the surrender demand by Col. Maxmilian Leyherr, the overall German commander within the city. These strikes aimed primarily at the perimeter of the built-up area, the targets having been designated by the infantry commanders who were to assault, then marked with red smoke by the artillery. In two attacks, 161 tons of bombs were dropped on the marked targets in the outer circle. Twelve battalions of corps and division artillery contributed 4,871 rounds to the softening up bombardment.

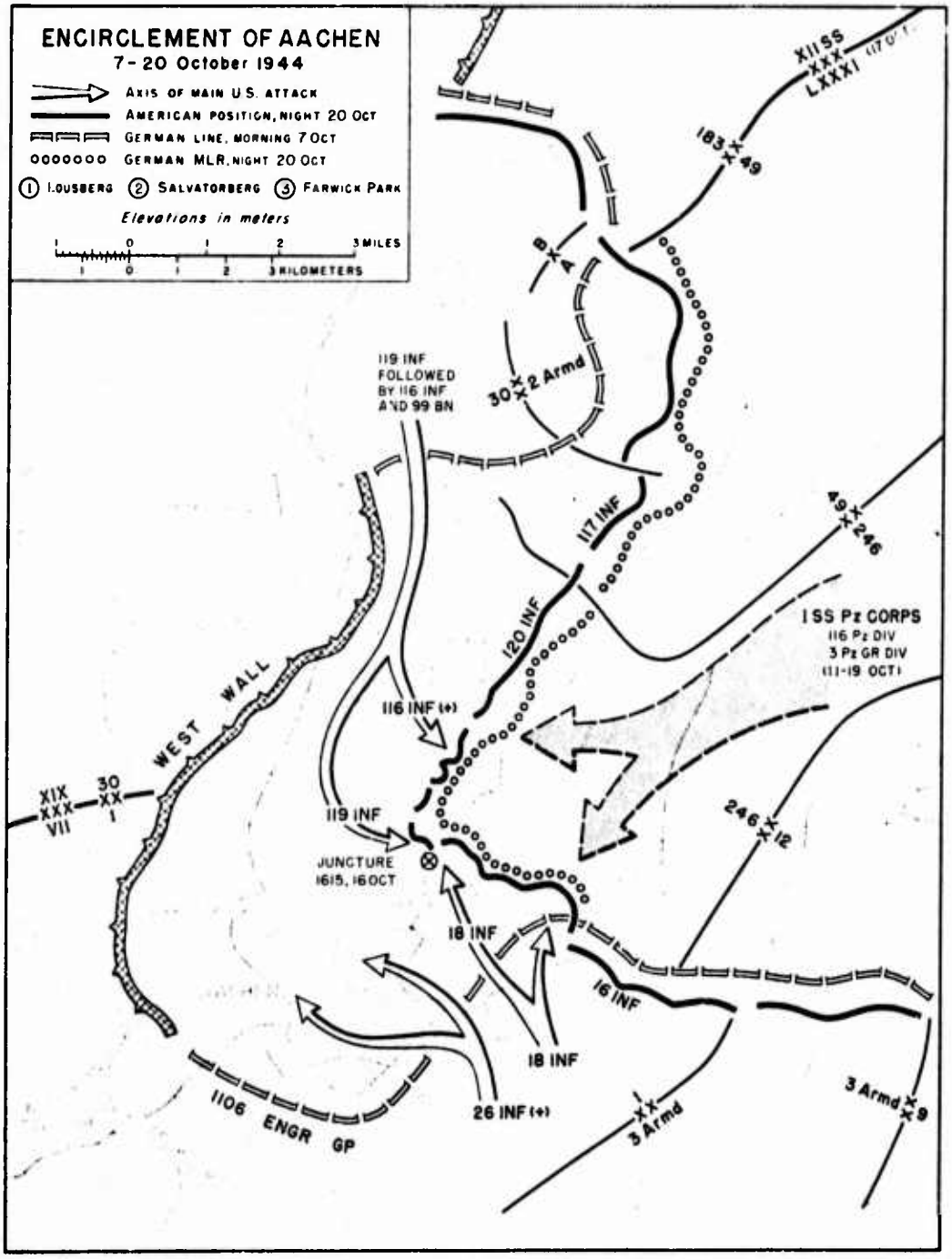
Available for the defense were 5,000 soldiers of the German 246th Division, though some of these troops were unfit fortress units and the

garrison also included 125 Aachen policemen press-ganged into front line service under their own chief. In heavy weapons, the defense counted five Mark IV tanks, nineteen 105mm howitzers, eight 75mm guns and six 150mm guns.

Since for the assault, Maj. Gen. Clarence Heubner had available only the two battalions of the 26th Regiment, he was determined not to get them inextricably involved or cut off in the street fighting. They should move "with one eye cocked over the right shoulder" while advancing on parallel axes through the heart of the city. But they started with one main advantage. They were assaulting from the east against defenses that until the last few days had been sited to resist attack from the south and west.

The foregrounds of the two assaulting columns, however, were quite unlike, and so were their tactical problems. The battalion under Daniel, jumping off along the Aachen-Cologne railroad tracks, was to advance straight through the center of the city over fairly even ground. The 3rd Bn., under Lieut. Col. John T. Corley, also attacking west to begin, was then to turn northwestward through a maze of shattered factories between Aachen and the suburb of Haaren, then swing west again, its far objective being three hills that dominate Aachen from the northern outskirts. The bulk of this hill mass had been developed as a large public park known as the Lousberg. Rising to 862 feet it overshadows the whole city.

The attack jumped off on 12 October, and by next day Corley's battalion had cleared through the factory complex and was pushing for the Lousberg. That's when they found the way blocked by persistent fire from the upper stories of well-defended apartment houses. The fight became "from attic to attic and sewer to sewer," and the fighters measured their gains in "floors and rooms, more than in buildings."


ENCIRCLEMENT OF AACHEN
7 - 20 October 1944
AXIS OF MAIN U.S. ATTACK
AMERICAN POSITION, NIGHT 20 OCT
GERMAN LINE, MORNING 7 OCT
GERMAN MLR, NIGHT 20 OCT
1 LOUSBERG 2 SALVATORBERG 3 FARWICK PARK
Elevations in meters
3 MILES
3 KILOMETERS
XIISS
XXX
LXXXI
183 XX 49
B XX A
119 INF FOLLOWED BY 116 INF AND 99 BN
30 XX 2 Armd
117 INF
49 XX 246
I SS Pz CORPS
116 Pz DIV
3 Pz GR DIV
(11-19 OCT)
120 INF
116 INF (+)
WEST WALL
XIX XXX VII
30 XX 1
119 INF
JUNCTURE 1615, 16 OCT
246 XX 12
18 INF
16 INF
18 INF
1106 ENGR GP
26 INF (+)
1 XX 3 Armd
3 Armd X 9

As riflemen from one company advanced along Juelicher Strasse, fire from a 20mm gun on a side street drove them back. Two medium tanks accompanying the infantry were knocked out by panzerfausts, the kind of incident that will invariably stall an infantry advance when foot soldiers situationally are employing armor as a shield. Corley was learning, as he moved along, that heavy-walled apartment houses, along with air raid bunkers, could not be reduced by tank and tank destroyer fire, and that so long as the walls stood, the resistance would usually continue.

The following morning he called in a self-propelled 155mm rifle to do the heavy work. From the start, it proved to be so effective at leveling masonry walls that Col. John F. R. Seitz, the regimental commander, ordered up another 155 rifle to help Daniel's battalion.

By nightfall of 13 October Corley's battalion was at the base of the hill mass. In early morning of 14 October two of his companies combined to overcome a German strong point based on St. Elizabeth's Church. Then the trouble began. One company, overextending for several hundred yards beyond the church, became pinned down and isolated in Farwick Park, where the Germans were present in strength, holding and defending the hotel, a solidly based greenhouse and several gardening buildings. The remainder of the battalion was still engaged in mopping up buildings to the rear.

Col. Gerhard Wilck, the German garrison commander, was directing the defense of the high ground. The night before he had asked that the park area be reinforced and 150 soldiers had arrived. Now he appealed to the corps commander, General Frederick J. Koechling, for further reinforcement, claiming falsely that American tanks had surrounded his command post. That done, he withdrew from the hotel to some more secure spot.

In response to his message, Koechling started a convoy of eight assault guns on their way to Wilck's relief, and tried to bring off the disengagement of an SS infantry battalion so that it might follow along. The assault guns made it to the park by the early evening of 14 October and SS Battalion Rinck got there next morning.

When Corley renewed the assault on the Farwick Park buildings in early morning of 15 October, he started with close support from some attached chemical mortars. By noon his troops had wrested all other buildings from the Germans though they were still resisting strongly from within the hotel. Then as Corley set about ordering up the 155mm rifle to blow down the building, the Germans launched their counterattack.

Supported by the fire of the eight assault guns, they came on in the strength of one infantry battalion. For about one hour the lone rifle company of Corley's that had made it to the north edge of Farwick Park held its ground and fought back. Then it had to give up the houses and pull away to the flanks. The German drive pressed on against the buildings providing cover for the second company. By late afternoon, however, the enemy counterattack had become held, or had run out of energy, and Corley could report that his men had pretty well held their own. Because of operational developments elsewhere in the Aachen area, Huebner suspended the attack against the inner city throughout the next several days. In that interval, by decision of the corps commander, General J. Lawton Collins, the attack on the central city by the two battalions was heavily reinforced by assignment to the mission; two battalions of tanks and armored infantry from the 3rd Armored Division. Called Task Force Hogan, these units were to join the fight by Corley's people against the Germans holding Farwick Park and the high ground beyond.

When on 18 October, Corley's people resumed the attack, the ground lost three days earlier was quickly regained. The 155mm rifle, turned against the hotel, drove the Germans to the basement. A platoon commanded by a 2nd lieutenant rushed the lobby as the fire lifted. Still, hand grenade duels developed around the several entrances to the basement and the resistance did not die until the attackers added machine gun fire to the grenade shower. Twenty-five Germans died in this finishing skirmish. Search of the hotel revealed that on the second floor there was a 20mm antiaircraft gun that the Germans had carted indoors piece by piece, then reassembled, and sited to fire into the park.

On the following day Corley's battalion advanced up the high ground meeting meager resistance, and Task Force Hogan overran the heights of the Lousberg. German resistance withered rapidly through 19 and 20 October. By the latter date, Daniel's battalion was holding the main rail station and was proceeding along the line that separated the Aachen downtown from the main residential area. Most of the German military who had backed away from that sector had gone into hiding somewhere in the abandoned houses.

On 21 October Corley's battalion point drew nigh to a large air raid bunker at the north end of Lousberg Strasse. Getting the word that the building looked very resistant, Corley ordered up the 155mm rifle, and thereby, almost inadvertently, terminated the engagement. Unaware, the point had come across the command post of Colonel Wilck who had been exhorting his troops to resist to the last man, but now found the authority of the big gun irresistible and overpowering.

There was no need to fire, but only the technical problem of how to arrange a surrender before anyone else got hurt. It was contrived fairly easily, the agents being 30 American prisoners that Wilck's people were

holding in the bunker. The fighting broke off at high noon.

The U.S. 1st Division listed 5,637 prisoners, 3,473 of whom had been taken within the city. The two battalions of the 26th Regiment had taken 498 casualties in the advance through the city, of whom 75 were killed and 9 were MIA.

ENGAGEMENT AT ENCHENBERG

Enchenberg in the Department of the Moselle in France is mainly a railway town and farming community, population, 1,277.

In 1944, it was made up of roughly 360 family dwellings, with about 40 business houses, the railway station, post office, a winery and other solidly walled structure. The living habitations were two or three stories, fashioned usually of brick or stone, though the local architecture featured wooden frames and paneling. Most of the built-up part of Enchenberg was close-joined and the town streets were hard surfaced.

When at 0600 on 7 December the 1st Battalion, 114th Infantry, 44th Infantry Division, was ordered to advance from Montbronn to Enchenberg, it was not known whether the place was enemy-held, and if so, how many Germans were there. The order read simply that the 2nd Battalion was coming in from the north and therefore the 1st should displace and meet it in Enchenberg.

Since no daylight reconnaissance had been attempted, Company B, in the van, was instructed to approach cautiously and feel out the situation. The point squad of eight men, which would include a bazooka team was to stay 200 yards forward of the lead platoon. The first scout would stay 75 yards ahead of the second scout who would stay 25 yards ahead of the point squad.

Company B moved along the dirt road in two columns on either side of the road, with a 15 yard interval between its people. Companies A, C and D, in that order, with a 100-yard gap between company tail and company front. The march had begun at 0730.

When the point squad got to within 400 yards of the first house at the southern end of Enchenberg, several mortar rounds exploded 50 yards to its front. Even so, as the two scouts dropped back, the point kept moving along the roadside ditches until within 100 yards of the first house. By then it was being engaged by rifle and machine gun fire from the houses and the men had flattened out. The time of the first fire was 0830.

By word of mouth, or rather loud yelling, the word was passed to the rear for Company D, then 1600 yards back along the road, to mortar the first few houses. The first two rounds of 81mm did the trick. The Germans got out and moved deeper into town.

Then enemy mortar fire began to break around the main body of Company B. At 0840, the battalion commander, Maj. Martin Minion, directed the Heavy Weapons Company, then deployed in the northeast corner on Montbronn, to place smoke between the point squad and the first houses of Enchenberg. Under cover of the smoke, the first platoon managed to take over the first three houses, siting their weapons on both sides of the street.

There followed a tremendous blast which shook that end of the town. The Germans had blown the bridge dead ahead where the grades separated and the road passed over the railway as it entered Enchenberg.

A Mark V tank that had maneuvered into a firing position immediately to the north of the rail crossing opened fire with its 88mm gun and machine gun on the Company B men still in the open. That speeded their redeployment

into the same three stone-walled houses where the point had taken cover. That happened somewhere around 1130.

At high noon enemy infantrymen in the number of one hundred or so were seen digging in along the forward slope of a low ridge rising above the railway line to the southeast of the town. Company B had nothing but rifles to turn on them. Its commander radioed for the cannon company, based 3500 yards away in the churchyard at Montbronn, to "turn all of its guns against the ridge and fire along a 175 to 200 yard front."

Through early afternoon most of the battalion column was still strung out along the highway to the rear. Lieutenant John Tankel, commanding Company B, thought he should back away, less because of the tank and the German infantry pinching against his flank, but because his only communication was via the SCR 300 and the Germans had found the frequency and were jamming it. With Company B virtually isolated, Minion ordered patrols from the two other rifle companies to explore to the west and east of Enchenberg. When they reported they could find no more Germans in movement toward the town, he ordered Tankel to stick to it.

Major Minion, who had come forward to reconnoiter in person at about 1600, decided that Company B's 110 men were quite capable of defending the houses through the night, no matter what the Germans threw at them. Though the houses were then under fire from the Mark V and several machine guns, it was doing no great damage. He doubted there would be any hard-pressed counterattack. He returned rearward near the onset of dark amid heavy fog and hard rain. Slipping in the mud, he reinjured an old football knee and had to go to the hospital.

With the coming of dark, mine detectors were used to clear the road up to the Company B houses. Braving sniper fire (the Mark V had backed off) two men in a jeep brought up water, a bazooka, small arms ammo, a new battery for the SCR 300 and a daisy chain of eight AT mines hooked to a rope. Casualties (there were only three or four) were taken out in the same vehicle.

While these things were happening, the weapons platoon was called forward to set up their two LMGs to the east and west of the buildings Company B was holding on both sides of the street. The wire crew had installed a field telephone in the Company B CP which was in the most forward house. In the next move two platoons were deployed forward along the main street to occupy all of the other houses south of the track. The third platoon's riflemen then went into perimeter on the east side of the first intersection, with one LMG pointed to the east. The second platoon protected in the same way on the west side of the intersection, also having one LMG.

Half of the men were kept at alert; the others could doze for a spell. The chain of mines was laid out on the east side of the road one hundred yards below the blown bridge. Extending from the cellar of the house closest to the railway track, it was to be drawn across the path of any enemy vehicle that tried to pass.

At 2200 the Mark V tank came back to the same position from which it had fired during the afternoon. As before, it immediately opened fire with its cannon. The riflemen in the house it took under fire couldn't clear to the street because now small arms fire was sweeping it from side to side. The 88mm fire against this one house was kept up intermittently until just

before dawn. Yet such was the stoutness of the walls that only two men were injured, both so lightly that first aid from their comrades was good enough.

At 0700 PFC Michael J. Kness had to urinate and started for the door of the most forward house. Pvt. Dyer who was guarding warned him not to enter the street. He went anyway. Dyer was keeping watch of the outside through a street level window. But it was still dark outside and he had other problems. He had never seen action or a German in uniform and he had no idea how one looked. So when he saw three soldiers walking south on the main road, he hesitated. Two of them ducked around the side of his house while the third lounged next to a tree to his front. Then the man turned and started back toward midtown. Dyer yelled: "Halt!" and sang out the recognition word for the night, just as he heard a shot from upstreet.

Simultaneously five Germans armed with rifles, running from behind the house Dyer was guarding, went at a dead run up the street. Dyer fired two shots at the group and saw one German fall. Another turned and fired a burst at him from a Schmeisser; but Dyer had already dropped to the floor.

Then Dyer heard someone yell: "They got Kness!" It had been a six-man patrol that had swung out and around the roadblocks. The member who had leaned against the tree had winged Kness while he was 50 yards beyond the leading house, having gone much too far to take his leak.

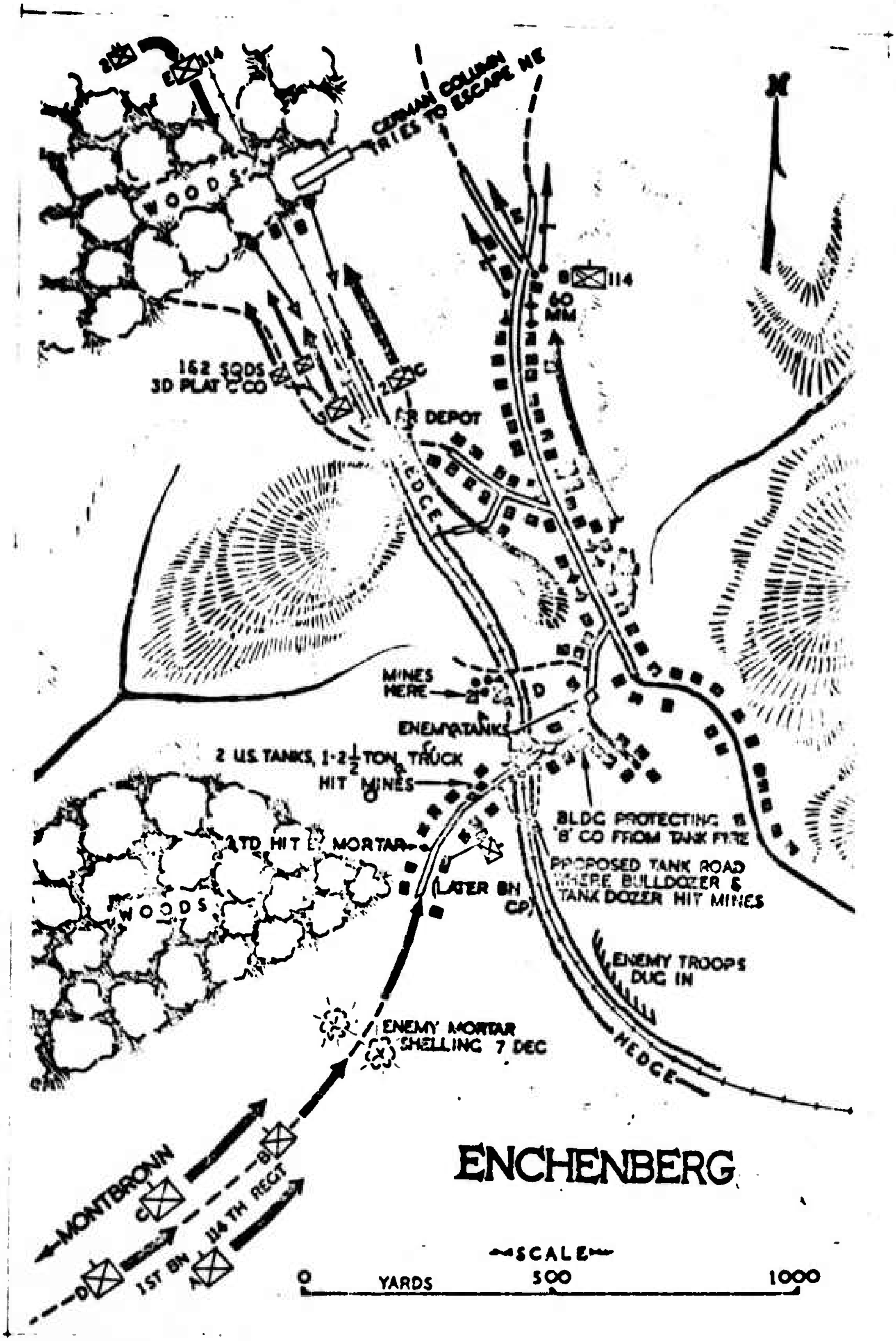
That brush rattled the men in the forward house and they fell back, seeking company, to the second house. A lieutenant there reorganized them, then led them to the same billet. Later they found Kness at the

bottom of the cellar stairs where he had pitched on stumbling back after receiving his wound. The absence of his comrades, the fall which knocked him unconscious, and the long bleeding, rather than the would itself, had killed him. They felt some guilt about it.

Sgt. Leslie Curtwright, a squad leader, from a third story window, saw a German officer on a railway bank about 175 yards away; the German stood rather clear in the open while observing for the artillery. Drawing a bead on him with the M-1, but not pulling trigger, Curtwright asked of Lieut. Borgending, who had shepherded the return: "Do you mind if I shoot him?" Borgending said: "Go ahead." Curtwright pulled, and the German fell dead, the first of six that he killed that day at long range.

At 0730 hot chow was brought up in a quarter-ton to the first house in the town. From there it was passed forward to the men in pots taken from the houses. They ate in shifts of four at a time in each house and later made the same arrangement when cleaning their rifles. While they were dining, Lieut. Larsen, the FO, saw a "bunch of careless Germans" digging in on the hill directly to the eastward and passed the word to the cannon company to let them have it with all barrels. There was a spectacular killing before the surviving Germans, taking to their legs, could get away.

Then over the SCR 300 came word that 2nd Battalion had gotten into heavy trouble trying to circle around Enchenberg and would not be keeping the appointment. It had been stonked by heavy mortar fire while moving through a wood to the northwest. The cannon company couldn't help extricate it because the position of the battalion in the woods and the location of the mortars were unknown.



GERMAN COLUMN TRIES TO ESCAPE NE
WOODS
B 114
60 MM
1&2 SQDS 3D PLAT C CO
DEPOT
HEDGE
MINES HERE
ENEMY TANKS
2 U.S. TANKS, 1-2½ TON TRUCK HIT MINES
TD HIT BY MORTAR
BLDG PROTECTING 'B' CO FROM TANK FIRE
PROPOSED TANK ROAD WHERE BULLDOZER & TANK DOZER HIT MINES
LATER BN CP
WOODS
ENEMY TROOPS DUG IN
ENEMY MORTAR SHELLING 7 DEC
HEDGE
MONTBRONN
1ST BN 114 TH REGT
ENCHENBERG
SCALE
0 YARDS 500 1000

Regiment called to say that 1st Battalion should resume the attack on the southeast of the town to help ease the pressure on 2nd Battalion. There was the small matter that the Mark V tank had once more moved into its familiar position across the railway gap and was blocking the way.

Maj. Ralph C. McCrum, who had replaced Minion, sidelined by his hurt from the football wars, recalled all of the company commanders to Montbronn for a conference. There was to be a fresh try working from a new plan. Company C was to advance to the woods west of town, then go at the houses on that side of main street from the rear. Company B was to leave the billets where it had been fighting, cross the railway track, then try to clean out all resistance along the east side of main street. Company A would advance along the road to the houses Company B was vacating and stay there, serving as the Battalion reserve.

The jumpoff, set for 1100, was later changed to 1300. No one was quite ready.

Up front in the forward house, Sgt. Lobe had been keeping an eye on the ever-shuttling Mark V. He started downstairs to report that it was back again. As he made the second floor, three rounds from the tank--one AP and two HEAT--crashed through its sidewall. One explosion blew off Lobe's right leg and wounded Pvt. Mortimer with a number of shards. Lobe died a few minutes later in the jeep that was rushing him to the hospital.

Taking in this scene, his head showing from behind the cover on an ambulance 100 yards up the street, stood a German. From his post in the attic above where Lobe had been hit, Curtwright sighted on the head, fired and the German fell dead.

By the time the Company commander got back, men of Companies A and C had become mingled with the men of B. They had started forward toward their own LDs, one just short of the town, the other at the edge of the woods, then coming under mortar fire, had run for the nearest houses.

The assault was preceded by a 15-minute artillery fire laid on directly above the railway tracks. Then Company B made it across the tracks at a dead run, one man at a time. Sgt. Henry Bayer was the leadoff, the first man down the railway cut. He surprised two Germans who came up out of a deep trench with their hands raised. "Don't shoot! Don't shoot.!" Bayer kept yelling. But the men behind him paid no attention and came on firing. "Stop it for Christ's sake!" he screamed, and for some reason they quit. The only other men in the trench were a few who had been wounded during the preparatory fire.

As the race across the track continued, Sgt. Henry E. Welsh saw two Germans setting up a mortar atop the railway cut about 300 yards south of the blown bridge. He opened fire with his M-1. Leaving the mortar, they started to run. He shot them dead at that distance while they were still in flight.

Once again collected on the far side of the tracks, Company B began its mop-up of the houses on the east side of the street. The method was elementary. Three to four men were used to clean out each house. They were armed primarily with M-1s and grenades. If the door was bolted, they shot or blew off the lock. They didn't bomb the interiors before entering, lest they were French-occupied. They grenaded cellars only when certain there were Germans present.

From the street, other soldiers covered both of its sides with rifles and BARs, never shooting at random but watching for heads to pop up. They drew some rifle and Schmeisser fire from the buildings and a few of the barns in rear, but it was remarkably light and there were few casualties.

By 1600 Company B's men had purged all of the houses and stores along the east side of the main street as far as the first side street turning east. Company C was well abreast of Company B in the mop-up along the west side, the two commanders were in radio communication and Company A had worked into a group of houses northeast of the tracks, and the Battalion CP had been set up in the house where Kness had died.

At 1700 the overworked Mark V, supported by a column of German infantry to its rear, returned to the fight. It came down the main street firing indiscriminately at houses on both sides of the street with its machine gun and the 88. Near the blown bridge, it stopped in front of a large building behind which were the houses that Company B was using for night quarters. To get at the troops, the tank had first to blast away the building. But the building was a barn loaded with baled hay and the bales absorbed most of the shock from the shells.

The tank found a way to edge a little closer. The German infantrymen were still to the rear of the tank but had closed in next to the walls along the street, trying to keep out of harm's way. From his perch in the second story window of the east side of the street, only 25 yards from his target, Pfc. Reynold A. Blubaugh fired his bazooka. His round hit the turret of the tank, exploded, and did no apparent damage. A second Mark V appeared and parked alongside. Two Company C bazooka teams engaged it, made hits, but did not score. Then both tanks opened cannon fire on several of the

billets of the two forward companies. But from the upper stories the riflemen had been picking off the German infantrymen who had followed the first tank.

A German ambulance arrived to pick up the dead and wounded. When the German aid men hit the street, large red cross panels covering their chests and backs, the Americans broke off fire and the German tankers reciprocated in an undeclared truce that little endured.

A bridge had been brought up the railway cut. But because the span was one foot too short to fit the gap in the road, a road had to be built parallel to the tracks then crossing them short of where the bridge had been blown, from where it ran north to tie into the main street. Metallic mine detectors were used along the proposed route but found nothing. A bulldozer from the 63rd Engineer Battalion entered Enchenberg to help in the construction. On the south bank of the railway cut the dozer hit a plastic mine and was completely wrecked.

The men ate K rations that night and food scrounged from the French stores. They drank only canteen water. Casualties were evacuated by carrying parties with improvised litters who worked their way back under fire from the Schmeissers, mortars and machine guns. A German 20mm cannon was firing down the railway track zeroed-in on the crossing: the dark reduced the hazard but the carrying parties had to risk it.

At midnight a second (tank) dozer arrived. It, too, struck a plastic mine and was knocked out. Then mortar fire ranged in on the pioneers who were building the road. It hit a tank destroyer parked behind the southernmost house. The round set it afire and the blaze destroyed the TD.

At 0600 on 8 December, a 2½-ton truck loaded with engineer supplies struck a plastic mine 200 yards south of the blown out bridge on the main road. It was wrecked. At 0800 eight Sherman tanks arrived in Enchenburg. To avoid the ruined truck which was still burning, the tanks rolled off the road and onto its left shoulder. The third and fourth tanks in the column hit plastic mines and had their tracks blown and several crewmen injured. That persuaded the other tanks to turn about and quit the fight. They were too late, in any case, for the main task to which they had been called. The two Mark Vs had departed during the night.

Regiment directed that 1st Battalion would continue the push through town and "shake hands with 2nd Battalion coming in from the north." The jumpoff was set for 0830. Beginning at 0730 and continuing until 0815, the upper end of Enchenberg was pounded without letup by 96 cannon and mortars based on Montbronn or beyond--chiefly 105s, 155s and the 4.2 mortar. The shoot also took in the high ground to the north and the hilltops immediately east and west of the town. Somewhat more than 100 tons of ammunition went into it.

At 0830 the lead companies resumed their prowl of the buildings on both sides of the street. The only resistance was a scattering fire from a few snipers who faded back as the Americans came on.

By mid-morning the companies were abreast where the built-up area ended at the north end, little hurt by the morning's run. They set up a perimeter to defend what they had captured. The 81mm mortars were brought forward, and the machine guns were sited with their fire bands crossing. Four tank destroyers arrived and joined the defense.

The Battalion Commander was approached by an aged Frenchman who asked

that some engineers undertake the clearing of his orchard of plastic mines so that he could get on with his work. He knew the location of every one of them because he had seen them planted. The engineers went along with him and dug up 21 mines.

The 2nd Battalion never did come to the fight. It stayed bogged down somewhere in the woods to the northwest. In the next round a task force, with parts of Companies B and C as the main combat element, were sent northwest along the railway track, to locate 2nd Battalion, attack from the south such enemy force as was engaging it, and open the gate for its passage southward. The easy morning victory had cheered all hands, and far from feeling overworked, the troops went forward with more bounce than previously.

There was another fight that revolved around German fortified positions in the woods, and once again, excellent and unstinted use was made of the artillery mass. But all of the skirmishing and exchange there, along with the maneuvering, was away from the urban environment.

Afterwards, the infantry of the 1st Battalion was disposed to thank the artillery for its smashing victory and credit the guns for easing the final advance through Enchenberg. But it reads like a gratuitous compliment. The indications are that when the two Mark Vs left, most of the enemy infantry also moved out to positions in the woods to the northwest. Artillery concentrations cannot shatter infantry resistance in a town where close-together houses with walls of solid masonry also have deep cellars. The shells spend their force on the upper stories.

What the record does say rather clearly is that to the forces in the attack (they had not thought through their problem very well, possibly

because of doubt that any enemy was present) by far the most useful weapon was the M-1 rifle. The weight in heavy weapons to begin was on the defending side. But in the crisis moments, the rifle eliminated enough people either to repulse counterattack or to give the defenders reluctance. Among troops, there was not one recollection of an incident in which the grenade figured prominently. In urban house-to-house warfare, all of this is more than a little unusual.

THE METHOD AT REMAGEN

Of the Americans who first worked their way into the town of Remagen, then capturing it made possible the taking of the Ludendorff Bridge crossing the Rhine, thus hastening the destruction of Hitler's Germany, it is recorded that they were very careful, battle-seasoned soldiers.

They were members of the 27th Armored Infantry Battalion, and they first looked on the town from the height above it, doing it late in the morning of 7 March, 1945. Their tactics upon entering the built-up area are described by eyewitnesses. The advance by the lead platoon of riflemen began at 1300. The individuals advanced hugging the buildings on either side of the street, their backs to the walls most of the time, facing outward to guard against snipers or grenade throwers in the buildings opposite; thus the flanks mutually covered each other. Though no fire came against them, and they proceeded without firing, in a situation which might have otherwise superinduced carelessness, or speeded up the penetration, mainly because they were veterans they continued this cautious method of advance through the town and toward the bridge.

Here is the least regarded lesson from the Remagen victory--that forces do not shoot their way through a built-up area where there may

be a safer, less costly way to win the object. In any fluid situation, where both sides are in doubt, the initiation of fire will invariably bring on counter violence, and possibly an untoward outcome. At one stage after another, in the Remagen story, it was the withholding of fire where human and materiel targets were plentiful and tempting, that in the end achieved a decisive and overwhelming success. The prudent caution of the individual rifleman was in that sense curiously consistent with the decisions and orders of higher command once the action began.

At first, however, there had to be some limited recognition of the scope of opportunity, leading to a reconnaissance. It started when a small group of soldiers from Company A of the 27th under Lieut. Karl H. Timmerman arrived at the overlook above the river and saw to their astonishment the intact bridge only one mile away. A steady stream of Germans in uniform was crossing to the east bank but there was also an intermingling heavy traffic of women and children as well as farm animals.

The first reaction of Lieut. Emmet J. Burrows, who was with Timmerman, was to order the crew with the 81mm mortars to set up and prepare to fire. But then there were sober second thoughts; if they opened with the mortars, the Germans might reply with artillery. Puzzling, Timmerman sent a message for his superiors to come up. Shortly, Maj. Murray Deevers, commanding the 27th, and Lieut. Colonel Leonard Engeman, commanding the overall task force, arrived. Engeman wanted to bring up some of his tanks and at the same time put an artillery concentration on the bridge. That request was turned down by higher command, the reason given being that too little was known of the location of American units operating in the vicinity.

In this way, quite fortuitously, the opportunity and the options were kept open, and it was decided that the infantry should try to take Remagen. As the preliminary, Timmerman and Lieut. William E. McMaster made a reconnaissance 500 yards downslope along a footpath that wound to the edge of the town. They received no fire while concluding that the path was a satisfactory approach to the scene of action.

Timmerman's Company A was ordered to lead the advance. Company B, under Lieut. Jack Liedke, would follow along, its mission being to clear any German military in southeastern Remagen while protecting the right flank of the advance. One of A's platoons was to peel off and screen the bank of the Rhine; another was to take the railway station and move through town one street to the right of the main body before rejoining it at the bridge. So in effect, Timmerman was to overrun and clear the main stem of Remagen with half a company. What followed, though an historic penetration, could hardly be termed an assault, though there were a few minor fire incidents, promptly suppressed, with little loss. At no time did the infantry either bomb out houses or loose a general fire. Some armor from the 14th Tank Battalion had followed Timmerman down the slope. On the only occasion when an infantry element was stalled by machine gun fire a tank knocked out the gun. The personal tactics of the maneuver are otherwise as earlier set forth.

While Timmerman's files were proceeding with their cautious advance, developments atop the hill further shaped the face of fortune. Strictly by chance, and out of personal whim, Maj. Ben Cothran, G3 on the staff of Gen. Hoge, Combat Command B, 9th Armored, came up and took one look which convinced him that Hoge had to be present. Engeman was still pressing for

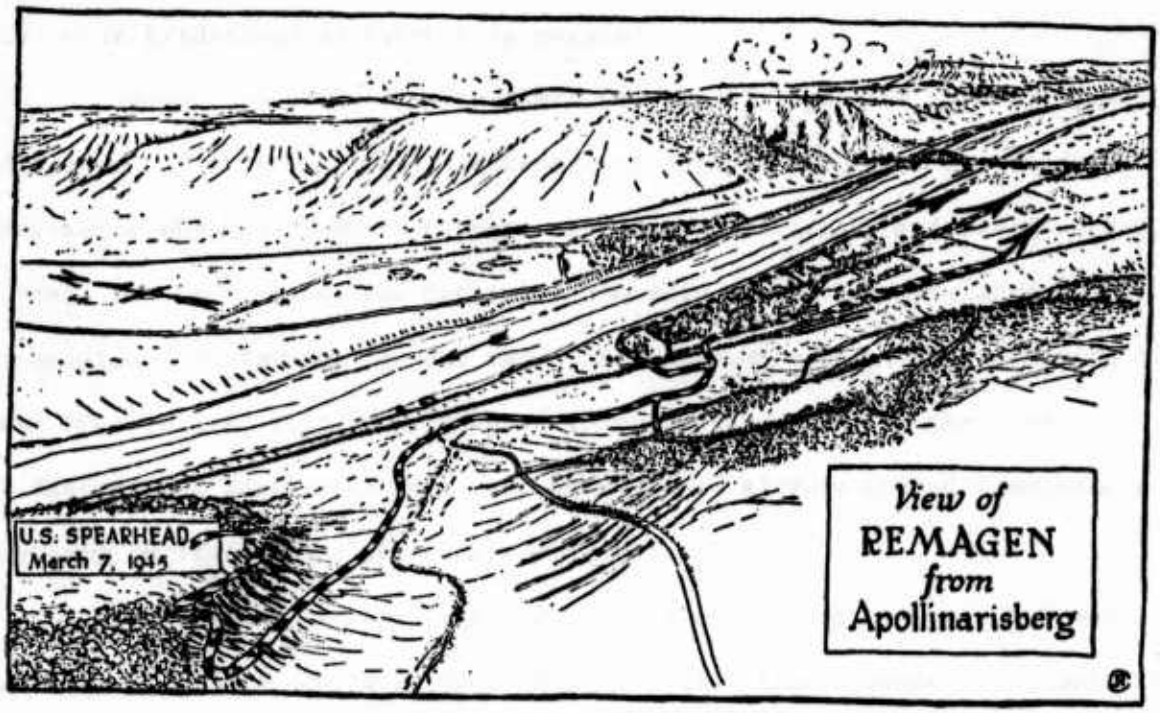
the use of artillery against the bridge. Cothran temporized, saying that the decision was of such moment that Hoge had to come see for himself, then radioing Hoge to that affect. Hoge got there before 1400. His chief input was to urge Deevers' infantry to move faster, but he did not direct the artillery to fire on the bridge. A rumor had started at another bridgehead distant from Remagen that the Germans controlling the Ludendorff bridge were under instructions to touch off the demolitions promptly at 1600 and Hoge was under the pressure of his belief that there was something in it. Hence his pressure on Deevers' people who proceeded at their own pace. Hoge did, however, direct the artillery to put smoke around the bridge to curtain the American advance toward it, and prepare the tanks and machine gunners to supply a covering fire for the infantry rush to the east bank.

By approximately 1530, Timmerman's company was solid again, next to the western abutment to the bridge, somewhat tired but otherwise little the worse for its passage through Remagen. It got the call from Deevers simply because it was there and supposedly time was pressing, if not due to a German order for the destruction of the bridge, then because of its tantamount--that American higher command believed that the order was fact. As to why the enemy had not fought back, there are only these several conditions all contributing to one end: there was no overall command for the defense of the bridgehead, the Germans not anticipating the speedy arrival of enemy forces in that sector; the German impulse, civilian and military, to get away to the east bank, which faced enemy people in the opposite direction; the American restraint, peradventure, against firing aggressively and destructively when experiment indicated that a less wasteful course might prove more beneficial. Movement, not fire, won Remagen.

The crucial developments between 1515 and 1600 determined the outcome at Remagen. Yet they were singularly undramatic and no one on either side moved confidently to shape them toward a positive end. Until then, the German officers east of the bridge--and the top figure was a captain--had postponed decision about blowing the bridge as much out of compassion as from confusion of mind. They had been given no order to trigger the demolitions at 1600, as Hoge believed. But the escape eastward of their fellow Germans had stayed their hand; then when the American artillery from the west bank began its intense smoking of the area between the eastern abuttment and the tunnel, the ranging-in served notice that killing shell could quickly follow.

Among the Americans directly concerned with the question of what to do next, there persisted at the several levels of command some fuzziness of thought and a failure to communicate oneness of purpose from top to bottom. Not only was the prospect so large that it boggled the mind: its hazards were so wholly obvious that they seemed unreal if not unacceptable. Only the magnitude of what eventuated and the passing of time have made it possible to think of Remagen as an example of clear thinking amidst an extraordinarily complex situation.

Hoge told Engeman, as they stood together on the high ground, that he should order some of his armored infantrymen to cross over the Ludendorff bridge and clear a bridgehead to the east. (In later years he said he had reckoned he was prepared to sacrifice a battalion making the try should the bridge be blown during the assault. That is no doubt rationalizing after the fact, since he did not direct that at least one battalion be committed.) The story of this exchange describes Hoge as being in such temper with


U.S. SPEARHEAD
March 7, 1945
View of
REMAGEN
from
Apollinarisberg

Engeman for not taking positive and immediate steps that Engeman also blew hot. While Hoge's order has been praised as heroic, it was at one and the same time both too vague and too specific to be satisfying, in that it passed to Engeman the responsibility for success while detailing how he should proceed. The proper order would be: "Secure the bridge and the east bridgehead as quickly as possible."

Engeman, on proceeding to where Deevers' troops were marking time, directed a highly qualified lieutenant of engineers to walk the bridge, determine whether it would support the passage of armor, and besides that, locate the demolitions and determine how they could be neutralized--a mountainous assignment for one man. Then Engeman, with an understanding of the proprieties, left it to Deevers to order the attack by the armored infantry, and whether he knew that Deevers had already tapped Timmerman's company to lead off is relatively unimportant.

The fortunes, forebodings and frights of the next few minutes have been described in many writings. A deep crater from a concealed demolition was blown in the roadway of the western approach directly to the front of Timmerman's people while they waited. Then as they got in motion machine gun fire from the east bank began to rake the bridge roadway. It was countered by machine gun fire from the American position. A small group of German soldiers had appeared at the far end and were making frantic preparations. Then a lone German came crawling along the bridge daring the fire for about one-fourth the distance from the east bank. He made it to the primer cord. There was a tremendous explosion that rocked the bridge, threw timbers in the air and blew apart the main truss at the far end of the span. But the principal demolition--300 kilograms of a rather weak industrial explosive--had failed to collapse the bridge.

A few minutes later Timmerman's lead platoon started its slow crawl forward along the left catwalk of the bridge. There they had some protection provided by the steel paneling aside them, since the German rifle and machine gun fire was coming from the stone tower on that same side. From behind them, some of the 14th Battalion's tanks were blasting at the tower trying to suppress the fire, with no success. Halfway across, or less, the advance was brought in check. The Germans in the tower now had a clearer sighting on the flattened bodies and snipers from a barge upstream were rattling the steel panel next to them. Fire from one of the Pershings knocked out the barge and motion was restored. Some men arose and tried to run zigzagging, advancing the point a little farther. The sight of the engineer lieutenant and his several assistants cutting other demolitions from the bridge as if wholly unperturbed somewhat heartened them. They were two-thirds of the way when someone yelled: "Who's going to stop the fire from the tower?"

One man, Sgt. Joseph DeLisio, arose and ran for the far end, bobbing and weaving, making it clean-skinned to the rear of the stone tower leftward, the source of the fire that still pinned down the forward platoon. A comrade, Alex Drabik, had beaten him to the east shore, but had then sought cover.

Though Drabik was the first American to cross the Rhine, DeLisio, after his run to the bridge end, did more about it. He ran up the tower's circular staircase to the first floor where he heard the machine gun chattering, threw open the steel door and yelled: "Hande hoch!" to the three Germans who were bending over the gun. When they threw up their hands, he marched them to the next floor up, where he bagged a German lieutenant and his orderly. After pocketing the officer's pistol for a souvenir, he herded the five to the bridge end and told them to start walking to Remagen as prisoners.

Drabik had already collected his squad and was moving to set up a small skirmish line somewhere off the flank of the bridge tower.

THE BATTLE FOR MANILA

Nothing is more strange about the battle fought through Manila and its suburbs between American and Japanese forces, lasting 20 days in February, 1945, than that it occurred, when by every reason in logic it should have been avoided.

General Tomoyuki Yamashita, who commanded in the Philippines, was so certain that a defense of the city would be outright wasteful of life and property, and serve no useful military purpose, that he decided against it. His decision was published to the Army two months prior to the battle. Then in the interim commanders at the lower levels took the matter out of his hands and disposed approximately 8,000 troops (army and navy) for the defense of the city and its enclave, Intramuros.

Once that was done, the useless bloodbath became inevitable. The American attackers, flush with a succession of major victories from the time of Guadalcanal and Midway on, were under pressure to keep casualties as low as possible. But from the hour of Pearl Harbor, psychological warfare against the Japanese went untried except for minor projects along the fighting front. (This statement is supported by Generals Handy and Hull who at that time ran Operations Division.) So the prospect of talking a hopelessly-placed garrison into surrender was nil. Planning had not contemplated it and there was no apparatus at hand. As for starving out the garrison, over the long pull that would have visited isolation and starvation on a civil population of nearly one million.

The consequences were pitiless. The defenders were killed almost to the last man except for the relatively few who managed by night to escape the city and flee to open country where they met death later. The three American divisions that engaged, along with the combat units organic to U.S. XIV Corps, took just under 7,000 casualties of which approximately 1,100 were KIA.

Greater Manila has a spread of about 110 square miles, extending from the Paranaque River north some ten miles to include Grace Island, and inland nine or so miles to the Marikina River. With the near towns and suburbs of Rizal Province, it forms one general public utilities service area.

The city proper is of many diverse parts, some as modern, and elaborately structured, both in the business sections and residential areas, as are to be found in any American metropolis. There are numerous slums, blocks of lean-tos, shacks and hovels. There are hospitals, universities, great prisons and stadiums, filling stations, ancient churches and monasteries. Broad tree-lined boulevards traverse its surface but wide thoroughfares are less prominent than narrow alleys. Many quarters of Manila are highly flammable: others are generally fire-resistant. South of the Pasig River, which cuts through central Manila, lies the old Spanish walled city of Intramuros, bound on three sides by a filled moat long since converted into a public park. Its inner stone-walled citadel, Fort Santiago, built by the Spanish in 1590, is one-half mile inland. The western wall of Intramuros was fronted with the facilities of a modern port--piers, warehouse, oil storage tanks, machine shops and so on. Beyond Intramuros, south of the Pasig lay government buildings, schools, apartment buildings, several parks and one of the better residential areas.

The banks of the Pasig through the eastern part of Manila had become pretty much factory-lined in the quarter century preceding the war. Five bridges for motor and foot traffic and one railway bridge crossing the Pasig were all destroyed by the Japanese in the course of the defense.

The aborting of Yamashita's general plan to evacuate the city, leaving only a small force there to guard supply or blow what was left of it, and then wreck the Pasig bridges to delay the American advance against his Shimbu Force that would make a stand in the mountains, was mainly the result of Japanese naval intervention.

Yamashita's stay-behind garrison in Manila amounted to about two regimental combat teams as to manpower and armament. But through December, as the rest of the army in Manila began to move out to the high ground, the navy started to concentrate in Manila in larger numbers than before. Adm. Denshichi Okochi, the ranking Japanese naval officer in the Philippines, initially assigned 4,000 sailors to a new command that he designated the Manila Naval Defense Force, then ultimately, because other plans for an outward movement by navy personnel already in Manila fell through, the force grew to more than 16,000. The approximately 3,750 Army stay-behind force was still there under Gen. Shuzio Yokoyama.

When Yamashita departed the city for Baguio, so did Okochi: he had already committed the Defense Force to Adm. Sanji Iwabuchi. Not until around 10 January did Yokoyama learn that the Navy command had decided that Manila was to be defended to the bitter end and that he and his people would have to go along with it. That was also his first information that Iwabuchi had 16,000 men available, which figure doubtless little impressed him, generals having small faith in a sailor's ability to fight a land

battle. But he was stuck with the fact that Iwabuchi had the far larger force, that under Navy orders he had been given command of the defense of Manila, and that therefore he had best accept the admiral's concept of how to go about it. Iwabuchi and people had been directed rather vaguely to defend "already established positions and crush the enemy's fighting strength."

The admiral's plan of defense, as it developed, was correspondingly vague. He informed subordinate commands that they were to carry out extensive demolitions while limiting them to "military installations," which term he broadened to include the water system, electric power, transportation lines including street railway, bridges and the port facilities.

The general scheme called for using Intramuras as the final stronghold because the approaches to it, once past the Pasig, could be covered by a semicircle of fortified government buildings extending from the General Post Office to the Army-Navy Club on the waterfront. The streets and houses of Manila to the north of the river would be prepared and used as a delaying and killing zone, preparatory to blowing the bridges and making the stand in the fallback position.

Main use was to be made of the strongest walled reinforced concrete buildings; whether business houses, schools or government installations, they were to be converted into redoubts. Entrances were to be fixed with sand-bag bays to protect firers; barricades would be made ready along stairways and corridors; outside walls were to be given fire slots for rifles and machine gun; tunnels would be dug connecting basements with bunkers at the building corners as well as with the next building marked for defense. Where any avenue or park provided an advantageous field of fire, pillboxes or bunkers were to be so sited as to command it.

But little or no care was taken to work out a citywide grid system defense whereby the fire position would be mutually supporting, or to locate strong points so that their fire would bear on a building forward or to the flank that was coming under direct assault. The headquarters directed that there were to be barriers and blocks throughout the city, along main streets and at the intersections. They would be of many types, using whatever materiel seemed best--concertinas and other barbed wire, (it was very scarce with the Japanese) loaded oil drums, rails driven into the pavement, hasty ditches including some that could be filled with fuel and set ablaze, and piled-up trolley cars and wrecked automobiles.

The main purpose of the barricades was to slow movement rather than to provide cover for firers. One thing the Naval Defense Force did not do was to plot withdrawal routes.

Mines of many types were worked into the defense--marine beach mines and depth charges, shu mines, linked mortar rounds, air bombs, etcetera. Some were contact detonated, others fired by hand from a distance, but where used singly or in chains, the mines were rarely well camouflaged.

In building defense, the rifle played the lesser role. The light machine gun and other automatic weapons were ubiquitous and the ammunition was plentiful. Grenades, offensive and defensive, also figured prominently in the defense of buildings. There was little or no studied use of snipers operating from the housetops and upper stories, though tree snipers had been used commonly enough by the Japanese in the island-hopping stage of the war.

Mortars, from the 50mm to the 150mm, were available to the defenders by the hundreds. There was a plentiful supply of artillery, for example,

60 of the dual-purpose navy 120mm, 120 of the 22mm cannon, 390 dismounted antiaircraft guns and so on. Much of the heavy stuff was mounted in the Nichols Field-Fort McKinley area. Then something new had been added: for the first time during the Pacific War, the Japanese prepared to use rockets in large numbers, most numerous being the 200mm army rocket though there was also a scattering of the navy's giant 450mm.

But neither the army contingent nor the large naval force was a first-class body of fighters. It was too late to give the sailors more than a primary lesson in the tactics of urban defense, and the greater number was of service or administrative background. The majority in the scratch army units had also been doing rear area duty.

The attacking American divisions, 1st Cavalry, 11th Airborne and 37th Infantry, prepared to operate under certain self-imposed constraints. Because Manila was a city of friendies, risk of killing civilians would be reduced to minimum. There would be no use of support artillery fires unless they were under close-up observation and the shell could be pinpointed on Japanese personnel or Japanese-held positions. Air strikes would be similarly limited to begin, and shortly after the start were called off altogether.

No new doctrine or tactical design was put forth to regulate the operation. The plan stipulated the desirability that combat forces gain control of the city water supply and the electric power system at the earliest possible hour. There were nearly 100 artesian or other deep wells within the city limits, but provided their water was still potable and that all would be seized, that supply could slake the population for only a few days. So a first priority was given to the capture of Novaliches Dam outside the city, a second to the Balara Walter Filters, five miles

northeast of the city's eastern edge, and a third to the capture of San Juan Reservoir, two miles outside the city limits. The fourth step would be that troops would secure the pipelines all the way into Manila.

Other forces out of XIV Corps would move to take over the electrical power system simultaneously with the securing of the water supply. But the main installations, far to the south and southeast of Manila were reckoned to be in Japanese hands and it was assumed they would be at least in part sabotaged before they could be liberated. For that reason, the Sixth Army directed XIV Corps to get on with the capture of the steam power generating plant, located in the center of Manila, and of its two substations expeditiously.

And that about covers the statement of strategic objectives as initially outlined. It was elementary, and at that time devoid of any unique detours or digressions. But when the men of the 8th Cavalry landed north of the river on 3 February to start the clearing of the city, their first fighting mission was an errand of mercy--the freeing of 3500 civilian internees held under Japanese guard at Santo Tomas University. Their guard, mainly Formosans, put up little fight. But the camp commander and some of his soldiers, barricaded in another building, were holding 273 other internees, mainly women and children, as hostages. That was leverage enough to get them a safe conduct out of the city.

While that scene was being played out, another column of the 8th Cavalry had gone on from Santo Tomas headed for the Pasig River. Eight blocks along they came to the stone walls of Bilibib Prison, to its left the three-story concrete main of Far Eastern University. The buildings, like the street, seemed empty. Then suddenly the University building

erupted a storm of rifle and machine gun fire, and 47mm gun fire ranged in on them from an emplacement at the corner of the next intersection. There was a breath of panic. When drivers tried to turn about they collided with oncoming elements like the ends of an accordion closing. The jam on Quezon boulevard gradually worked itself out and most of the 8th returned to the grounds of Santo Tomas where it bivouacked with one squadron of the Fifth Cavalry. But one troop of the 8th had moved through sidestreets virtually unopposed to secure Malacanan Palace on the banks of the Pasig one mile south of the campus.

The advance body of the 8th stayed where it was through the next day. It was too light to do any meaningful patrolling, it still had no definite information about the positioning of enemy forces and was uncertain when the oncoming 37th Division would arrive. Besides, it had the nearly 4,000 Santo Tomas internees to protect.

The Japanese were no less tied by circumstance. They had not expected the Americans to appear for another two weeks, and worrying that their own defenses were not better than half set, they were in no mood to counterattack.

In late afternoon of 4 February, orders from Maj. Gen. Vern Mudge, 1st Cavalry Division, broke this spell. He directed Brig. Gen. William Chase to attack along Quezon Boulevard southward and take Quezon Bridge so that he would have a passage over the Pasig. The column was again punished with fire from the university main, and then a short distance to the south collided with an impossibly strong roadblock. It mounted four machine guns and still other machine guns from the upper floors of the university building played on the block as well. The bastion of the block was a line of truck bodies cabled together. To its front, steel rails had been driven into the pavement and a daisy chain of mines had been woven through the rails.

As on the night before, the cavalrymen had to withdraw under fire, making it to Santo Tomas, the enemy not pursuing. But while the cavalrymen were on their way out, the Japanese were blowing the Quezon bridge, thus writing a final failure to the American mission of that day.

That night, the van of the 37th Division arrived, and established contact with the 1st Cavalry at Santo Tomas. The 148th Infantry Regiment then drove on toward Bilibib Prison, which the cavalrymen had seen and almost touched, only to be driven off. Parts of two battalions of the 148th finally subdued the local resistance and got inside the prison walls, there to uncover 800 American and Allied prisoners of war and 530 civilian internees. There being no better place to go, prisoners and their liberators remained in Bilibib through the night. Fighting flared outside its walls until morning but that part of the regiment which was still in the street held its ground in strength.

With the arrival of more troops from both divisions in the following day, the Corps Commander, Lieut. Gen. Oscar W. Griswold divided the northern part of the city in half as far as the Pasig, giving the western sector to the 37th for clearance while the 1st Cavalry took the east. The 145th Regiment began clearing the densely populated and slumlike Tondo District along the waterfront on that day and by midafternoon had reduced enemy resistance to one pocket containing about one overstrength company. It was still fighting to reduce that pocket through 8 and 9 February though artillery fires called in to support the attack in extremity had set ablaze large stretches of the Tondo District.

Farther south, other elements of the 145th, having passed through the Tondo District, worked toward the north bank of the Pasig. To its east,

the 148th was driving toward the river on about the same axis. The resistance was mainly from machine guns supported by a few riflemen, firing from the prepared concrete buildings; the defense was nowhere heavily persistent and the attack stayed hopeful of winning the two westernmost passenger bridges over the Pasig.

By near nightfall on the evening of 5 February, the two battalions had worked to within two blocks of the two bridges. That is when they were blown, and immediately afterward, a blaze that started along the riverfront and quickly spread to roar north fanned by a strong wind, forced both regiments to make a speedy retirement. Through the day, the Japanese, as they fell back, had been blowing military dumps and stations: it is supposed the fire was started by these demolitions. But the conflagration rose and raced north at such a rate that the 37th Division, fearing it might destroy everything north of the Pasig, including the business district, rushed its own blasting materiels forward and began blowing a fire lane by leveling the frame houses. Whether that did any good, the fire came under control late on 6 February, but only after another shift in the wind direction. The cavalrymen, who were not concerned with the fire, were little opposed in their clearing of the eastern sector and by the night of 6 February were satisfied that those environs were about purged of Japanese.

The 7th Cavalry had completed a main assignment two days earlier by capturing intact the Novaliches dam and reservoir. The Japanese had not prepared the dam with demolitions but the 7th claimed to have captured three men who were on their way to blow the structure with explosives they were packing along. (A likely story?) The next day the 7th secured the Balara Filters, and following that, the pipelines between the reservoir and the

waterworks. Thereafter it stood guard over the system, doing no fighting inside the city.

The 8th Cavalry, on 7 February, in trying to gain a water supply facility within built-up Manila, ran into trouble. The New Manila Subdivision was a tract of modern, strong-walled dwellings in size about four by 12 blocks, as it ran southeast to latch onto the San Juan del Monte Subdivision. The Japanese had mined many of the streets in New Manila, slotting the walls along these same streets. Inside the fortified houses were crewed machine gun nests and 20mm machine cannon. At the southern end of New Manila, which was a quite flat area, were emplaced three dual purpose naval guns which could range over its main, lengthwise-running avenues.

As much surprised as shocked, the 8th was speedily driven back when it hit this buzzsaw. Next day it tried again, this time supported by the mediums of the 44th Tank Battalion and the fires of the 61st and 947th Artillery Battalions, the one with 105mm the other with 155s. Between them they laid 1710 rounds on the two new subdivisions in a few hours of fighting.

While the cannonading wrecked or damaged most of the houses, it did not subdue the resistance. The armor helped very little, being restrained by the minefields. To gain ground, the foot soldiers had to make short rushes from one house to another, grenading as they closed, but wasting no time on buildings from which no fire had come.

The vital statistics bespeak that the artillery barraging had broken the back of the defense. The cavalry took 43 casualties but all were WIA. The armor lost 11 men killed and 12 wounded, with three tanks put out of action, one of which was blown apart by a land mine.

The American claim for this one fight was that 350 Japanese had been killed and there had been captured or destroyed twenty-two 20mm machine

cannon, three 6-inch naval guns, five 13.2 machine guns and an assortment of small weapons. While such statistics do not reflect either a major victory or determined resistance by force majeur, this is the only instance of defense in depth, fairly well distributed and coherently organized by the Japanese in that part of Greater Manila that lies north of the Pasig River. The rest of it was a hit-or-miss, non-coordinated resistance by disparate groups, most of them probably caught unaware.

By 10 February the two divisions of Americans, along with the units of XIV Corps, had cleared all of Manila north of the Pasig. They had pushed onward through normal movement and fire, neither the Japanese defense nor the American attack having brought forth anything new and spectacular. About 1500 Japanese (it is estimated) had been killed in the fighting north of the river. American losses had been about 50 men killed and 150 wounded. The comparative figures, if anywhere near accurate, bespeak mainly the ineptitude of the Japanese weapon users and the lag in their preparations, inasmuch as the physical circumstances had otherwise given the defenders main advantage.

The Americans during their sweep toward the river had experienced no real problem in night defense since the Japanese, being disorganized, refrained from counterattack. The weather was generally inclement, so for comfort the attackers usually repaired to one of the larger buildings so situated that it could be conveniently outguarded with machine guns, grenades and other company weapons. Such cover was plentiful. Other than in the Tondo District, where the one pocket of resistance still held out, and where the fire had swept north from the river, Greater Manila had been little hurt by the battle. The Japanese, furthermore, had so far

abstained from atrocities, and apart from the military demolitions, had not ravaged as they withdrew.

Contributing to the wavering of the Japanese defenders was the vagary of the high command. General Yamashita, 150 miles away at Baguio, did not even know that the battle was going on, or that the Japanese rear in Manila was beset by anything worse than a logistical problem. General Yokoyama, in the mountains at the Shimbu Group Headquarters, was so little in touch that he thought the Americans had put only one regiment into the city and so he was weighing plans for a counterattack. Admiral Iwabuchi, who was based on Intramuras, was preparing to remove to Fort McKinley in the interests of his personal safety.

The battle, however, had already taken a radical turn toward massive violence when on 7 February the American Corps Commander directed the 37th Division to prepare an amphibious crossing of the Pasig to be followed by the destruction of enemy forces to the southward.

Quite apart from the anticipated Japanese resistance at or near the waterline, the river crossing engaged some particularly acute problems. The sides of the Pasig, other than where streams gave off or where it flowed past the Botanical Garden, were lined with concrete sea walls, not to be negotiated by DUKWs or Alligators. Then there had to be a diversionary assault launched against Provisor Island just off the south shore because it was the site of the steam generating plant, and the island was well fixed with fortifiable buildings.

The assault was committed to the 148th Infantry, with special crossing assistance to be supplied 672nd Amphibious Tractor Battalion. The 145th Regiment was in reserve and covering communications lines. The attack

went in midafternoon of 7 February, pointing at the garden area where there was no sea wall. The first wave got across unscathed, the second wave landed amid a concentration of mortar and machine gun fire and took some casualties. Two battalions had crossed to the south bank by 2000 and were holding a bridgehead about four blocks deep by ten along the Pasig, this at a cost of 15 KIA and 100 WIA in that day's operation. The boat movement had been given a covering fire by the guns of a 105mm howitzer battalion. For the Regiment, from there on, it became rougher still.

During those same hours, however, the 129th Regiment, which had crossed the Pasig at the same time directly to the eastward, was becoming more seriously compromised. By plan, it was to turn west toward Provisor Island, which is like an enclave fitted into the south shore and separated therefrom by narrow water passages that bound it on three sides. Three large concrete buildings, two big frame structures and any number of small sheds and warehouses covered most of Provisor's surface, an area equivalent to one city block deep by four as the river runs. Part of the Japanese naval force had prepared to make a last stand there, probably for no better reason than their certainty that the Americans would come that way, and might do it carelessly. Provisor had been hastily fortified end to end. Several 20mm machine cannon could sweep its lengths; other guns on the mainland could register along its shoreline. The larger buildings had been fixed, as had the intersections, with sandbagged machine gun emplacements and the walls were slotted for rifle fire.

In late afternoon of 8 February, one rifle company from the 129th launched a platoon in small boats against the south side of Provisor; it promptly recoiled under a storm of mortar shells and bullets. At 0800

next morning another rifle company tried, crossing the water in engineer assault boats, covered by 105 howitzer fire. The plan was that the lead squads would seize a boiler plant at the northeast tip of the island and the attack would build up from there. The first boat made it. The second got hit and sunk, several men were killed, and the survivors swam to the island. Fifteen men then occupied the boiler plant, only to be driven out by a Japanese counterattack, whence they took refuge behind a coal pile. There they stayed pinned prone by automatic fire that wouldn't let up. They couldn't get away and the Regiment couldn't get to them, so thick, so steady was the sweep of enemy fire over the intervening water.

The rescue preoccupied the Regiment throughout the day. A mortar barrage was laid on the island just beyond the coal pile and thereafter maintained. Artillery worked over the rest of Provisor to keep the Japanese tied to their cover. After dark fell, the captain who commanded these marooned men swam to the island, pulling along an assault boat, and brought off his survivors, though he was wounded in so doing. The cost of the day to that unit was six dead and six missing.

Thereafter the mortars and cannon of the RCT worked over the island end to end for one hour. Then another rifle company launched 90 men across the estuary in six assault boats. Just after the lead craft made it safely, the moon broke through the clouds exposing the others. Three were sunk by a storm of machine cannon fire and then the flaming of a suddenly-hit fuel tank revealed the men already ashore. Thereupon they too, had to jump for cover behind the same coal pile. At 0500 the moon went behind the clouds again and they sortied forth to capture the boiler plant after a fire fight, and that lodgment lasted.

The position was reinforced and deepened during the day of 10 February while the guns continued to pound the enemy-held buildings. Still, the fight for Provisor Island, pressed to the extermination of its garrison, continued until early morning of 11 February, by which time it had cost 2nd Battalion, 129th, more than 100 casualties. Furthermore, the defensive fires from the island along with the need to support the attack with all heavy weapons within range, had stalled the 1st Battalion on 2nd's left. And it was all pretty much a wasteful extravagance. Between the Japanese sabotaging of the machinery and the heavy American fires poured on the buildings, the steam generating plant that the Americans had gone to Provisor to secure had become an irreparable ruin.

By an irony, this embittering episode, that might have been avoided, since it developed out of tactical awkwardness, was largely responsible for the lifting of the prohibition against employing heavy artillery and air bombardment within Manila. At Provisor, a few troops had been trapped into a situation where there was little, if any, option, and once the flood gate was opened, it could hardly be closed. What was proper for one division was good enough for another. In battle, it almost inevitably happens; massive action or reaction, once begun, may hardly be stayed.

Over the same period the 148th Regiment on the right had full cause to mass fires toward saving infantry lives. Following its successful and not too costly passage of the Pasig, it ran into heavy trouble. Some 500 Japanese of the navy force had fortified a perimeter defense, or hedgehog, over an area some six blocks square that included the Paco Railway Station, Concordia College and the Paco School. It was a pattern becoming familiar--the use of strong wall cover, machine guns, revetted and placed where they

would have good observation, one fire position supporting another. Not until the evening of 10 February was the area at last tranquilized and by then the main buildings had been rubbled by artillery. The 148th had taken more than 500 casualties in three days and was 600 men understrength.

In these circumstances higher command decided that anything south of the Pasig should be considered a free fire zone, other than churches, hospitals, orphanages and such. It meant a change in tactics: the FOs would work with the rifle skirmishers and the guns would stay on call and be used whenever resistance appeared.

A general convergence was already in process. Beginning on 5 February troops of the 11th Airborne Division had crossed the Paranaque River and started attacking toward Manila from the south. It was a building-by-building advance over a 600-yard strip of tidal land between the river and Manila Bay in which they used flamethrowers, demolitions and mortars, along with some 105mm howitzer backup, to blast and burn the Japanese fighting from house and pillbox cover. There followed a regimental-size assault against the enemy defenses at Nichols Field that fairly bristled with heavy Navy hardware. There the 11th got hung up for the greater part of one week. Not only did the Japanese sea artillery dominate the situation; there was a command snarl; the 11th needed the 8-inch and 155mm fires operating under XIV Corps to soften up the Nichols Field defenses before it could risk direct assault; but because the 11th was still operating independently, coordination was overly difficult. After control had passed to the Corps on 10 February, the two together got on with the problem. By the time two regiments had completed the overrunning of the Japanese defenses in late afternoon of 12 February, however, the 11th had taken more than 900 casualties since

entering the Philippines, and most of the losses occurred in the fighting for Nichols Field.

The 1st Cavalry Division crossed the Pasig on the left of the 37th's sector on 10 February and after driving south, swung west with the Manila Bay shore as its objective.

In consequence of these several movements, by 12 February all escape routes from Greater Manila had become closed, and the Americans were present in such numbers that the gradually compressing encirclement should have become a not-too-costly mopup.

It did not so eventuate. The frenzied enemy resorted to a last-stand defense not more desperate than dirty. With the compression, for the first time the attackers had to proceed building by building with a search of every room and basement. All manner of atrocity and horror, such as rape, torture and mutilation, was inflicted by the Japanese on the Filipinos still within their power as on any Americans taken prisoner. The Japanese command was either indifferent or powerless to control it.

In coping with the new situation, the combat troops of XIV Corps made main use of armor, tank destroyer, mortar and bazooka fire. The blast by all weapons preceded every infantry advance. The rifle squad still remained the basic cleanup unit. The tactical pattern was, wherever possible, to secure the roof and top floor first by moving from the top of an adjoining building. As the point man descended the staircase, he would grenade or fire ahead only if a Japanese appeared, saving his ammunition for the certain encounter.

Where a business building was being purged, and the walls were visibly strong and modern, a bazooka team might go with the point to blow down doors

and barricades. The losses in this kind of fighting in any one unit were seldom high on any one day, but there was a disquieting day-after-day attrition, with seemingly no way to avoid it, due to the compaction and fanaticism of enemy forces.

After the 1st Cavalry Division reached the shore of Manila Bay on 12 February, thereby completing the encirclement, its spearpoint was about 3000 yards south of its boundary with the 37th Division. The 5th and 12th Cavalry Regiments therefore turned north to engage any Japanese in the intervening area and so doing encountered the most extensive and strongly fortified enemy hedgehog in the city. Extending from the bay eastward for more than one mile and running north and south about one-half mile, this armed perimeter embraced Fort Abad and the Manila Yacht Club on the bay shore, Harrison Park, Rizal Memorial Stadium, a large baseball stadium, the three-storied concrete main of LA Salle University, the Japanese Club and Santa Ecclesiastica College. Bunkered positions dominated most of the area. The ground was flat. The buildings were stoutly walled. But there was more open space than otherwise and the main weapons had favorable fields of fire. At the baseball park, machine gun nests covered the entraces to the concrete-walled stands and other bunkers in the outfield could put fire anywhere on the diamond. The 2nd Naval Battalion of Japanese and a number of provisional units manned the hedgehog.

The two cavalry regiments started to engage after a meager artillery preparation on the morning of 15 February. By nightfall they had captured only La Salle University and the Japanese Club. On the 16th the 5th Cavalry cleared the baseball park of its bunker complex after three tanks battered down a concrete wall in the outfield enabling the riflemen to take positions

in rear. At the same time the 12th Cavalry was mopping up Rizal Stadium and the ruins of Fort Abad. Still, the resistance did not end within this strong box until 18 February, by which time close to 800 Japanese had died defending it. Flamethrowers and demolitions became particularly useful as the fighting there wore to its end. The cavalry division had lost about 40 killed and 315 wounded. It was no small affair.

There was still much more ground to be won, and several of these all-around defended strong boxes to be overcome in far south Manila before the storming of the old walled city of Intramuras provided a more spectacular but less lethal anticlimax as February closed out. But the tactical details are largely repetitious and little instructive as to weapons usage and human ingenuity under stress. Intramuras was an empty shell of shattered walls and rubbled roofs when the battle was over. The American artillery had laid 7,803 rounds on it and the 240mm round from the howitzers of the 544th Field Artillery was found to be better than the 8-inchers at breaching walls. General MacArthur had refused to let it be bombed from the air, it being a "friendly" city. That made little practical difference. The guns accomplished its ruin no less effectively, and whether the option saved any lives is beyond proof. There were very few lives to be saved in any case. A few Filipino women and children emerged from the debris. There were few men. They mostly had been murdered by the Japanese in the dungeon of Fort Santiago.

At a central point in each armed and barricaded building the Japanese kept a sufficient store of ammo, water, food and even some spare weapons along with medicines, to keep the defense solvent so long as the defenders were still active. There was no falling back from building to building, though

some of the Japanese did try to clear away. Appeals over the loudspeaker brought a few surrenders toward the end. Also, after most of the resistance was battered down at Intramuras, the American high command weighed attempting to starve out the remainder of the garrison. But on information coming from Filipinos and a few POWs that each command had enough water and food stored by to last several weeks, that thought was laid aside and the order was given for the last stretch to be taken by storm. It typified the war in the Pacific.

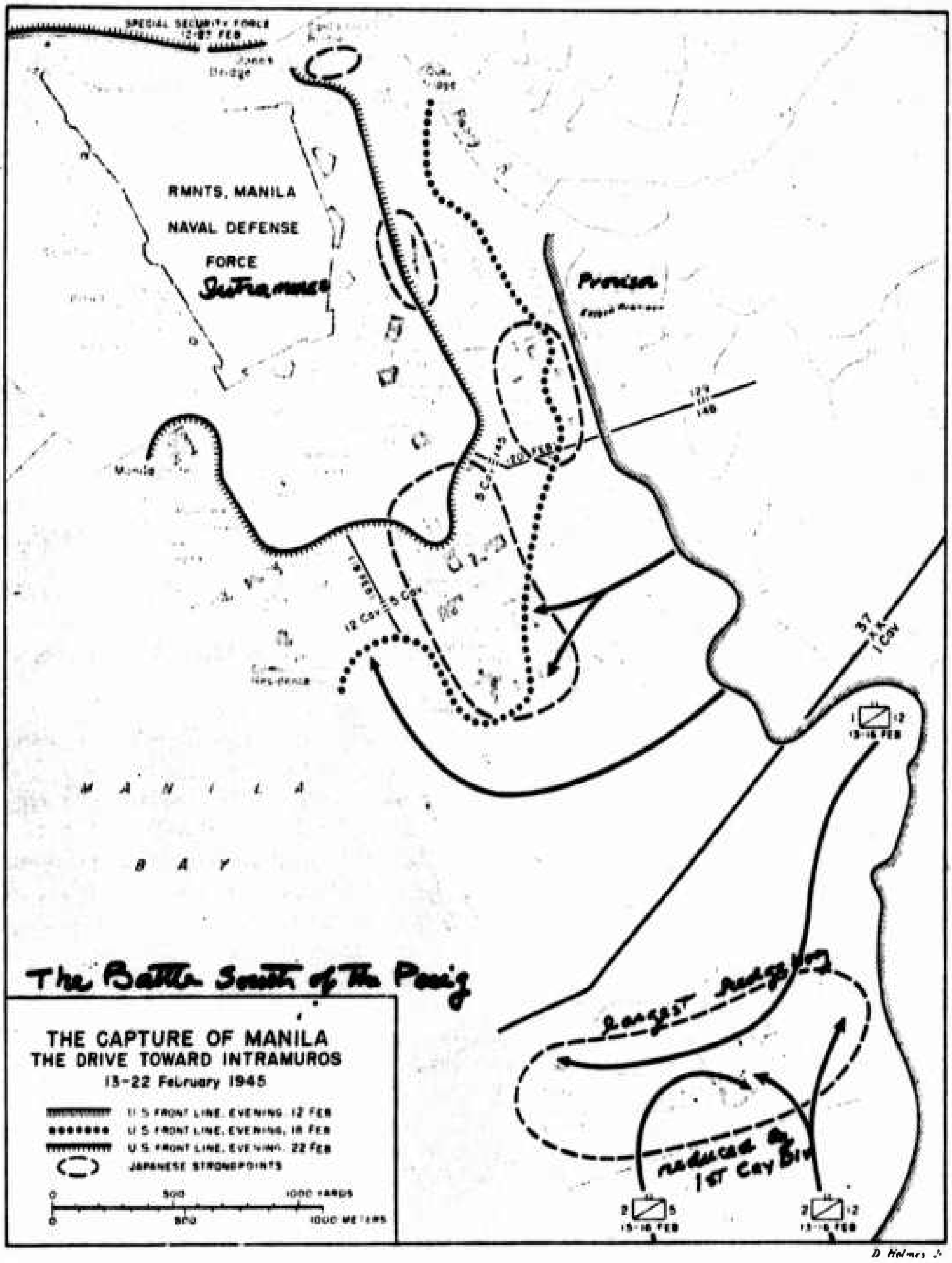
THE LIBERATION OF SEOUL

During the Korean police action, 1950-53, the most intensive and prolonged battle within a city, fought primarily to gain possession of the city itself, was the liberation of Seoul in late September, 1950, which followed the Inchon landing.

The main forces in the attack were the U.S. Army's 7th Infantry Division and the 1st Marine Division. There were also some tactical elements from the ROK Army and Marines. Defending were the NK 18th Division, 25th Brigade, 78th Independent Regiment and various other Communist forces.

The drive to get the city began on 20 September with the crossing of the Han River and the last resistance within the city proper flickered out on the morning of 29 September. In Phase 1, fighting operations developed around a determined Communist defense of the ridge lines covering the western approaches to the city, no resistance having been met in crossing the Han. There followed four days of bloody battle in the hill beyond it, off the flanks of the rail line and main highway to the capital.

Combat operations within the city proper, which promptly followed, has at least one aspect of highly significant interest. It provides the


SPECIAL SECURITY FORCE
12-27 FEB
RMNTS. MANILA
NAVAL DEFENSE
FORCE
Intramuros
Provisor
129
Manila
20 FEB
5 Cav
12 Cav
5 Cav
M A N I L A
B A Y
37
1 Cav
13-16 FEB
The Battle South of The Pasig
largest pocket
reduced by
1st Cav Div
13-16 FEB
13-16 FEB
THE CAPTURE OF MANILA
THE DRIVE TOWARD INTRAMUROS
13-22 February 1945
U.S. FRONT LINE, EVENING, 12 FEB
U.S. FRONT LINE, EVENING, 18 FEB
U.S. FRONT LINE, EVENING, 22 FEB
JAPANESE STRONGPOINTS
0
500
1000 YARDS
1000 METERS
D Holmes Jr

reminder that under given conditions, fighting within the urban environment may differ only in minor detail from conventional combat in a fairly open countryside.

To be explicit, the defenders do not take primary advantage of built-up walls and housing or public buildings to use these things for ambushing and as protective cover, and therefore the attackers do not advance house-to-house, thereby to conserve themselves while cleaning out pockets of resistance. The street itself becomes the battleground. The clash between contending forces is head-on, or if it is an out-flanking movement, the approach is still via an avenue running parallel to the position to be attacked. Maneuver is determined by the same obstacles and blockage that limit normal civilian traffic flow and the guide to the possibilities of operation, other than the use of air power, becomes the city map.

That is pretty much how it was in Seoul throughout Phase 2. Given such extraordinary fluidity in the contending forces, the materiel requirements for urban warfare differ little, if at all, from what must be listed for all-around operations in the open field. For the tactical contingencies and possibilities are practically the same. There must be lights for night defense, smoke to cover an assault, panels to mark positions, demolitions to blow culverts, tank and other vehicle killing missiles with the forward elements, etcetera.

In Phase 3, the Communists in Seoul took to street barricades, which improvisation is only a poor substitute for the foxhole or hasty entrenchment, and by no means as effective or tenacious and difficult to overcome as house-to-house defense. By defining the target, it foregoes ambushing. By that time, however, the defending forces were already beaten, the main elements were trying to get away, and the barricades were merely a delaying instrument.

As to why the battle for Seoul took this unusual form, there are three explanations. First, the Inchon landing had come as a surprise only five days (Sept. 5) before the advance on Seoul started. The defenders of Seoul were not set for building-to-building defense, had no time in which to organize it, and conceivably had not even considered it. Confronted by the sudden threat, their first and determining reaction was to deploy their main tactical forces to defend the high ground covering the approaches where they became pretty well used up.

Then too, the forces in the attack were under the utmost pressure from the Supreme Commander, General Douglas MacArthur, to capture Seoul as swiftly as possible. He told the commander of X Corps, Maj. Gen. Ned Almond, that he wanted it in five days, to which Almond replied that it would more likely take two weeks. The urgency was not simply that the liberation of Seoul would be a great moral victory of worldwide import: the demoralizing impact on the enemy and its relation to the pending breakout from the Naktong Line to the southward was also a consideration. It does not necessarily follow, however, that the decision to employ the X Corps forces in this way best served the ultimate object.

From the onset of the war, swiftly followed by the American intervention, both sides had become timed and tuned to highly mobile warfare. The supremacy of the tank, or more properly, its dominant role in the greater part of the fire fighting, had so made them. Position warfare, the use of fortifications, the static employment of built-up areas in defense, had played practically no part. Communist armor was still available for the defense of Seoul; American armor would help shield and pace the advance on Seoul. Neither side could shift to a new way of going, or a different tactical equation, practically overnight.

Both were set, in short, to slug it out swifly on the shortest line.

Above and beyond these several determining factors was the physical layout of Seoul, the geography and structure of the city proper. The ground is undulating and around two-thirds of the perimeter rises rather steeply to the adjoining ridges. At the center stands Government House, in September, 1950, already somewhat of a shell and made almost useless by air bombardment. The area for about one-half square around Government House was landscaped and open, with few other buildings. This openness was then a general characteristic of the city. About one-fourth of the city's expanse was either developed as parks or undeveloped and unhoused and the distribution of such was city-wide. The principal avenues that lace Seoul are unusually broad and while they do not exactly radiate outward from Government House they are roughly concentric to that building. There was then a very small business district at midtown. Outward from it the built-up blocks had no solid or consistent pattern. Pagodas, the few apartment houses, some administrative buildings, etc., were scattered among family dwellings that almost invariably were flimsies. House-to-house fighting, in other words, was next to impossible because there could be no movement from one strong wall to another. At the same time, the breadth of the arterial roadways, which were little tree-lined other than in the outskirts, by reducing the threat to vehicular movement, were conducive to open warfare in what was at least nominally an urban environment. The one familiar aspect of city fighting that manifested itself was occasional sniping by the Communists from house cover.

Passing up Phase 1, this account of operations within the city starts with the events of 25 September, by which time the two main bodies, 7th Division and 1st Marine Division, were already fronted within Seoul. Early that evening General Almond received information that strong columns of the enemy were already on march northward away from the city. He asked for a flare mission to be flown by Far East Air Force to illuminate them to be followed promptly by attack from fighter squadrons. At the same time the Corps artillery fires were switched to block the escape routes. Two enemy columns were detected and put under air attack, with results that remain unknown.

From that information, Almond assumed that the enemy was fleeing the city and his own forces would therefore be dealing with a pursuit situation. On that basis, at 2040, he therefore ordered 1st Marine Division to attack at once "toward the limit of its objectives," meaning Government House, Middle School and the Russian Consulate, standing in the very heart of Seoul.

The order was resisted by 1st Marine Division. The idea of a night attack through a city was abhorrent to Maj. Gen. Oliver Smith, and furthermore, the G3, Col. Alpha Bowser objected that Almond's information was probably wrong and the columns sighted on the road were probably refugees. Still, at 2200 the order was passed along to the commanders of the 1st and 5th Marine Regiments.

The preparation to attack, however, was held up immediately in 5th Regiments' sector when a force of 200 North Koreans (an estimate) struck the position of the Regiment's Third Battalion, the attack persisting until 0450.

Upon receipt of that order, each Marine regiment had sent out a patrol seeking contact with the friendlys to its flank or flanks. (The combat elements of 7th Division had also been ordered to attack by Almond.) In every instance, the patrols failed their mission.

The 1st Regiment, under Col. "Chesty" Puller, was ready to move out by 0130, following a 15-minute preparatory barrage. But where the artillery fire ended, as a precautionary measure one battalion sent out an exploratory patrol to its front. A short distance from base, the patrol blundered into a large enemy body, launched in counterattack, and became engaged. A few of its members escaped and carried the word back. The battalion at 0143 radioed Puller that a tank-led body of North Koreans was attacking and he then ordered another 15-minute barrage fire along the front of his 3rd battalion, again delaying the attack.

This second fire by the guns, along with mortar, tank and machinegun fire, fell directly on a body of North Koreans estimated at 700, attacking straight down the main boulevard of Seoul from the direction of Government House. Moving with the infantry body were twelve tanks and two self-propelled guns. The charge became supported also by 120mm mortar fire. The leading NK tank struck a mine in a 1st Marine roadblock at an intersection, and others were destroyed by bazooka fire from behind the block. The NK attack persisted until just before dawn though it steadily weakened. Burning buildings on both sides of the street illuminated the scene fully. Following dawn, the Marines captured 83 prisoners and counted 250 enemy dead in the street. There were four ruined tanks and two wrecked SP guns in front of 3rd Battalion's block.

From these signs it was concluded that, for the time being at least, the enemy was not trying to flee the city.

The Marines launched their counterattack at sunup that same morning. It was a daylong effort by 1st Marine's 2nd Battalion aimed at clearing the enemy from Ma-Po boulevard. But in the first four hours they advanced their front not more than one mile and through the afternoon they gained only a few blocks. Snipers off the flanks firing from the taller buildings were the main impediment, and besides this harassment, the NKs continued to barricade the boulevard and the feeder side streets.

Most of the barricades were built at intersections. They were approximately chest high, formed out of rice and fiber bags filled with earth. They stretched from sidewalk to sidewalk. Antitank mines were spread in front of each barricade, while from behind NK soldiers manned antitank guns and machine guns which swept the street as the Marines came on.

The Marine tactics for reducing the barricades partly account for the slow rate of advance toward keeping casualties down. Navy and Marine aircraft rocketed and strafed them. Then they were pounded by mortars. Next, the infantry would set itself to sweep the top of the barricade with bullet fire while the engineers removed the mines. Then the tanks would advance, firing on whatever weapons or resistors still theatened from behind the barricade, and then breach it. Also occasionally flame-throwing tanks were employed. As the tanks attacked, riflemen moved along the sidewalks to their flanks looking for snipers at the windows and on the balconies. But there was no blowing down of walls or advance through the houses. The tallest of the barricades was about eight feet and they averaged five feet in thickness.

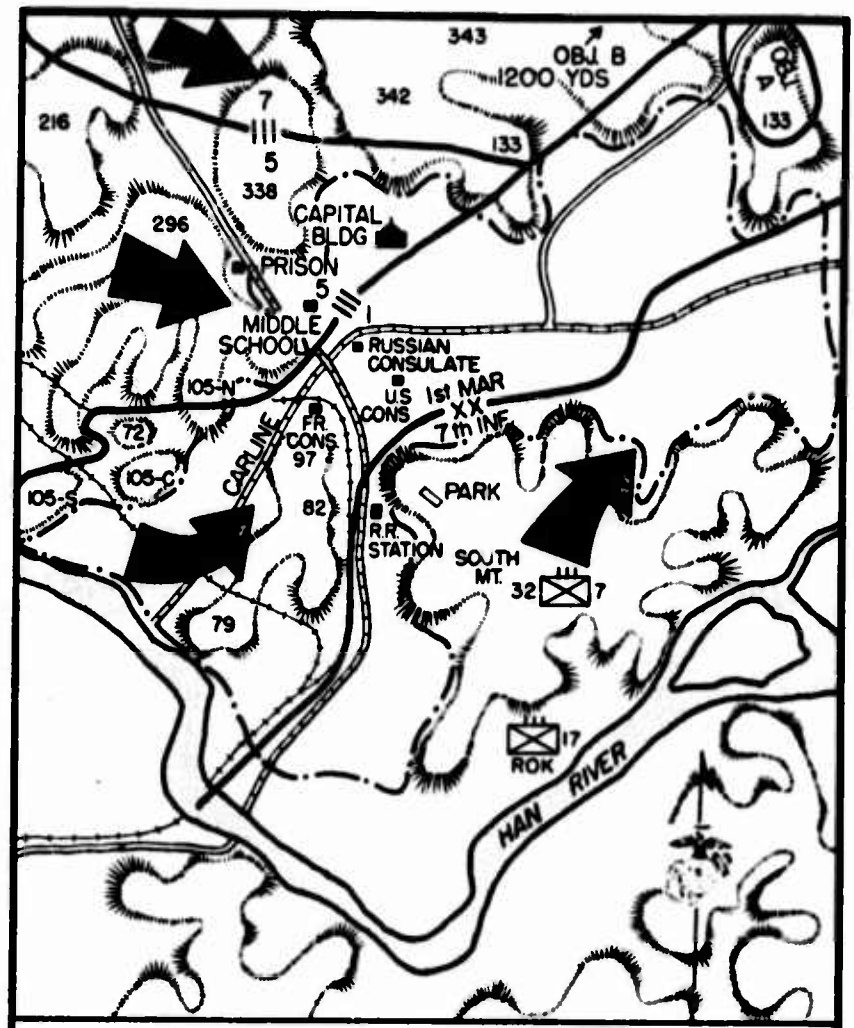
Another drag on the advance was that the M-26s always tended to expend either their ammunition or their fuel at the same time, and with

their withdrawal from the fight for resupply, the infantry attack stagnated, as will usually happen.

In one of the more spectacular incidents in this fight, an NK soldier jumped from behind a building and charged a flame-throwing tank moving behind two M-26s. Ignoring the astonished Marine rifleman alongside, he threw a large satchel charge inside the engine compartment and then made his escape unhurt, despite an explosion that blew apart the flame-thrower and rocked the neighborhood. The same kind of one-man assault was tried several times later, though unsuccessfully. The Communists had trained suicide crews of demolitions men for this special task.

The 7th Regiment, until then based or engaged on high ground outside of Seoul, shortly after noon on 26 September got fouled in its first brush with the built-up area. The main body had been directed to seize and hold the mountain pass northeast of Seoul to close one escape route. But Company D was sent on an exploratory mission to Sodaemun Prison in the northeast corner of the capitol. The Communists had fortified the building. The Company took many casualties there, was driven off, and went into a defensive perimeter in a road cut between two nearby hills. There through the day it was supplied with medicines and other vital supply by air drop and tanks had to move in that night to bring off its evacuation.

Simultaneously, Almond was proclaiming the liberation of Seoul and General MacArthur was signing a United Nations proclamation announcing that the capital of the Korean Republic was once again in friendly hands. Both statements were a trifle premature and somewhat exaggerated, though the worst of the barricade fighting would be over by noon of the following day, and the Communist will to resist was measurably weakening.



SEOUL ASSAULT PLAN

26 SEP 50

SHOWING DIVISION & REGTL BOUNDARIES

On the other hand, it should be noted nothing even faintly resembling a block-by-block neutralization of Seoul had been either contemplated or would be attempted. The invested segment was as a meager slice cut out of a whole pie. Moreover, the force committed to the task was a very small portion of the whole. Most of the Marine Division was still deployed outside the Seoul perimeter and the concurrent actions of the 7th Division combat elements as of the participating ROK units were on and around South Mountain which lies between the city and the Han River.

On 27 September came the convergence--the concentric movement by main forces around the perimeter toward the center of Seoul. But this was more a parade of force than a hazardous military mopup, the battle being amost over, and resistors being too few in number. The 5th Marine Regiment, attacking east, got to the Seoul Middle School by mid-morning and reached Government House, its major objective, before noon. Before that, 3rd Battalion moved on to the memorial shrine at Kwang Who Moon Circle. The place was barricaded and there the North Koreans put up their last organized resistance in mid-city. One flame-throwing tank charged across the circle and reduced the defense to smoke and ashes. The 5th had earlier that day overcome the NKs still holding Sodaemun Prison and liberated the 400 Americans confined there. The breakthrough by 5th Regiment from a new direction caught some of the NK stragglers unaware. Hot food was waiting in the kitchens of the Government House basement. The Regiment took it over as a command post.

To the right, or directly south of this successful thrust to Government House, 2nd Battalion, 1st Marines started the day having to break through another succession of rice bag barricades along the Boulevard

Ma-Po. By then the barricade defenders had little heart for the contest and resistance became tokenlike, with little loss to the attackers. Just before 1100 the Battalion arrived at the French Embassy in mid-center and raised the Star Spangled Banner over it, thereby making an extraterritorial claim toward exhalting Marine Corps prescience, since front line fighters do not normally carry American flags around in their pockets.

Minutes later, a hot fire fight broke out between Company D which was spearheading 2nd Battalion's drive and the remnants of NK resistance. It occurred at the loop of the central city where just below the Middle School the main street car lines form a figure eight. There was still another barricade. Dog Company, overanxious, attacked it head-on, lead by an M-26. The tank was knocked out by the mines in front of the barrier but not before the tank had destroyed two Soviet-made 76mm SP guns emplaced behind the rice sack wall in the center of the intersection. The M-26 also destroyed an NK truck carrying some 90mm ammunition as the vehicle tried to get away towing a howitzer and its crew.

Practically everything that followed was by nature anticlimatic. The liberation of Seoul became largely a competition in flag-raising over various installations that had nothing to do with the battle between Marine units competing for victory honors little marked at the time and not long remembered later. Organized violence had given way to symbolism.

As the Marine Corps history remarked sardonically, the battle for Seoul had no new moral but reaffirmed the law in physics that no two bodies may occupy the same space at the same time. The JCS cabled MacArthur: "We remain completely confident that the great task entrusted to you by the United Nations will be carried to a successful conclusion." Battle's

end superinduced a state of euphoria in Far East Command, the national military and Americans generally.

The pre-invasion estimate prior to the Inchon landing had been that there were 5,000 Communist troops defending Seoul. Actually there were about 8,000 in organized units at Seoul and 5,000 more in the nearby Yongdungpo area. Reinforcements following the landing brought the total to around 20,000 before X Corps could strike for Seoul. Then there were another 10,000 NKs south of the Han River in the neighborhood of Suwon and environs. The available total is therefore nearer 30,000 than 5,000.

U.S. X Corps figures were that 14,000 NKs had been killed in the fighting and 7,000 had been taken prisoner. The latter figure at least is relatively accurate and was substantiated by subsequent events.

The greater losses in X Corps were in the Marine Division which listed as casualties 2,383 men. That number breaks down 364 KIA, 53 DOW, 1,961 WIA and 5 MIA. The preponderant loss was in the five days, 21-27 September when 1st Division was fighting for, and through, Seoul. In that span, it took 1,482 battle casualties. The heaviest day's toll--285 on September 24--could not have been entailed fighting through the streets of Seoul. The main battle then was still for the high ground outside.

HUE

The most protracted battle fought in Vietnam by American forces was for possession of the city of Hue.

Until the Tet holiday assault and uprising in February, 1968, that northern city, the nation's religious capital, along with Quang Tri, the nearby provincial capital, were considered so secure and had such other attractions, that American troops were using them as R & R areas.

Then overnight Hue became the most intensely disputed battleground in the bloodiest campaign of the war. The fighting was within the confines of the city proper. It began the night of 30 January and closed out on 25 February when Nguyen Van Thieu, President of the Republic, flew in to congratulate the ARVN commander, General Truong, on his victory.

The estimate of U.S. intelligence was that 16 NVA battalions, or two divisions, had been committed to the capture of Hue. Of that commitment came the most savage street fighting ever witnessed by American forces. By the end, 2,642 enemy soldiers had been killed in the streets of Hue.

Hue was a city of 140,000 people at battle's beginning, the third largest in the nation. It was also the headquarters of the ARVN 1st Division, located in the northern corner of the Citadel of Hue, the walled-in portion of the city that sits on the north bank of the Perfume River. Within the Citadel was the Palace where the emperors of Vietnam had lived in antiquity.

There are two distinct parts to Hue, the Old City, which is known as the Citadel, and the French Quarter or Gold Coast, the south side where the Americans did most of their fighting.

The Old City has many oriental flimsies in it, the kind of home construction that can be pushed aside by a tank or bulldozer. On the other hand, the Citadel was doubly walled around a 9,000 meter square. The outer stone wall of the fortification was one meter thick and five meters high, separated from the inner wall by dirt fill, and the average distance between walls was around 40 meters.

The Gold Coast side is relatively new and most of its houses, business places and administrative buildings are modern and solidly constructed. The tallest buildings, running to seven or eight stories, were of stone or brick. Some of the houses were of reinforced concrete. The streets

were paved. The Gold Coast side had comparatively few parks or other open spaces. Overall the environment of the Gold Coast would compare with that of a progressive American city of the same size.

Throughout the battle, the weather was dismal, the skies overcast, rainfall more or less constant. The winds during most of the month approached typhoon conditions.

The covert Viet Cong forces basing in Hue were strong, tenacious fighters, particularly the several sapper battalions. The NVA forces that penetrated the city were not formed of recently mustered, half-trained troops. They were well-equipped, down to gas masks, and strongly armed. Their heaviest weapon was the Chinese-made 120mm mortar. They were well fixed with the 12.7 machine gun and the 20mm cannon. Their supply of B40 rockets was seemingly limitless and they would fire them in showers of 10 to 20 at any appearance by U.S. armor.

Furthermore, in defense these troops performed as if they had been specially schooled in city fighting. They did not defend block by block, but rather in alternate blocks, so that the pattern was more or less checkerboard. Where they took a stand, they not only made use of the strongest walls which also afforded covered fire positions from where fire could sweep the street; they dug in around the houses. The positions were camouflaged and never obvious; they had to be found.

The use of the checkerboard pattern was such that where a stand was made, it was supported from a backup position, either to the flank or rear, depending on how lay the rise and fall of ground, or the location of the buildings providing observation and a field of fire for the weapons.

Main force was concentrated around strong points where high ground afforded its usual advantage and the heavy weapons could bear upon forces

in the counterattack. The defense was sufficiently tenacious that, combined with American awkwardness, it took the two Marine battalions 13 days to uproot NVA and VC positions distributed over seven blocks.

Even so, the NVA made one major miscalculation. Many of the well-prepared positions were sighted in the wrong direction. The Communist plan apparently premised a swift, total capture of the city by forces that had been gathering inside it for a week or so before the battle started. Thereby the forces of the counterattack would be compelled to begin their advance from outside the perimeter. But to begin, the NVA failed to do the one necessary thing--destroy the approach to the inside, which was the bridge over the Perfume River. So the bridge became a portal for the entry of foot forces, tanks and guns. By the time the NVA realized its mistake, its own heavy weapons became targeted on the bridge but could not collapse it in time to influence the course of the battle.

The American tankers, to begin, were noticeably reluctant to engage. They had read up on doctrine and they knew that armor was not supposed to fight in cities. As the battle progressed, they became more aggressive, particularly when friendly infantrymen moved along just off their flanks to guard /against/ enemy parties that might rush the armor. But the tankers would not let the infantry bring up their ammo resupply so that they could stay in the forefront of the fight. They invariably withdrew to the ammo dump, and at that point the attack lost its momentum. That will always be the case any time armor has to engage where the horizon is foreshortened, such as bush, tall elephant grass or the city street.

The American riflemen did no fighting at night, none whatever. The usual operations day was 0700 until 1700, which took all there was of

daylight. There was no prohibition against night movement so long as it was through a secured area, and such movements were frequent, either for tactical or logistical reasons, such as a relief. But night attack was not tried; the dark brought on perimeter defense or a pull-back to a building where there was protection and warmth that could be readily outposted.

The battle started inauspiciously and then built upward at unusual speed.

On the night of 30 January a reconnaissance party of 36 men from the 1st ARVN Division was making a river surveillance on the Perfume about five kilometers southwest of Hue. There just to its eastward at 2200 it heard the tumult of battle as two NVA battalions hit and overran a Regional Force company. That body then raced directly past the recon group, not seeing it. The two battalions were making full speed for Hue before midnight. The officer in charge of the recon party got off a radio warning to 1st Division HQ giving the size and direction of the assault force. Then at 0340, from its position on the river, the recon party saw launched from the mountains west of Hue successive waves of 122mm rockets that exploded into the city, starting fires at many points. That was the signal. Fighting broke out in numerous sectors as Viet Cong units and NVA soldiers in peasant dress joined the attack.

The 800th and 802nd NVA battalions (they had been detected by the recon group) struck directly for the Citadel, or the Old City, its primary target being the 1st Division's command post. Then as the 800th, enroute, drew nigh to the Citadel's air strip, it collided with the Headquarters' reaction force, known as the Black Panther Company. As the Army soldiery

goes, this was an elite outfit. From their position on the eastern side of the air strip, where they faced west, the Panthers loosed machine gun fire and a shower of LAW rounds against the 800th as its people started across the wide open strip. The surprise fusillade killed 30 NVA, panicked the others, and the 800th pulled off to the south, still inside the Citadel. It was a small action of utmost consequence. The 802nd broke into the 1st Division compound and took over the area of the medical company. There they were counterattacked by a scratch force of 30 clerks, guards and staff members from the headquarters. Though that small sortie heavily blooded the 802nd (about 35 KIA) and its own exhaustion gave it some pause, by dawn the NVA held the whole Citadel except the one corner compound occupied by the division HQ. The other battalion of the 6th NVA regiment (the 806th Bn.) had mounted a block outside the northwest section of Hue on Highway No. 1, the principal route of reinforcement from out of the piedmont.

Through these same hours there had proceeded an attack by the 4th NVA Regiment against the MACV compound in the new city on the other side of the Perfume River to the South. It opened with a heavy rocket and mortar bombardment of the compound. Then the direct assault on the walls was pressed by the 804th Battalion a sapper unit, heavy in demolitions specialists. The attack was repulsed with hand grenades and rifle fire. When enemy bodies lying near the wall were examined the following day, almost without exception they were weighted with heavy explosive charges. The NVA self-evidently had planned to blow up the compound building by building.

By mid-morning, then, NVA and VC units had control of all of Hue except the objectives they mainly sought, the MACV and 1st Division compounds. General Ngo Quang Truong, commander of the 1st had ordered to Hue from the outside his 3rd Regiment, the 1st Vietnamese Task Force and one troop from

the 7th (armored) Cavalry. Four tanks and two companies of 1st Battalion, 1st Marine Regiment, were also on their way to the fight.

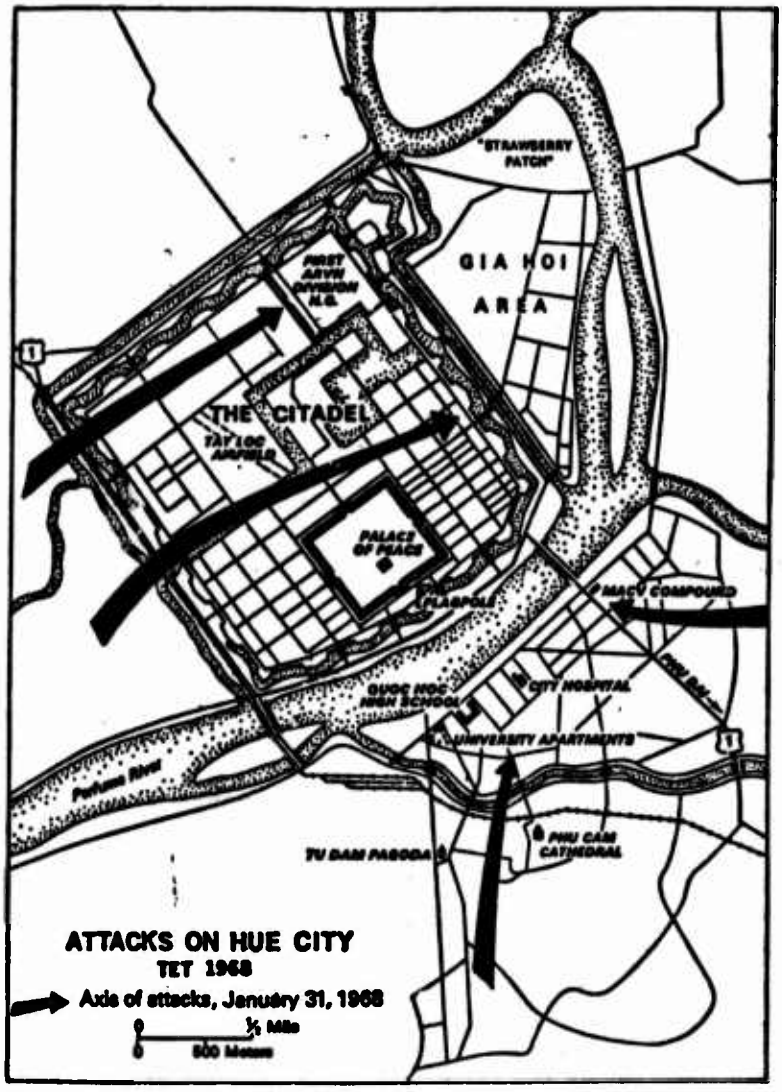
From their base camp 17 kilometers north of Hue, the 7th Cavalry's one troop and the 7th Airborne Battalion of ARVN got on the road to Hue shortly after sunrise. Somewhere around 0930, they ran into the 806th NVA Battalion's roadblock, became held, then were counterattacked in two-battalion strength, got badly bruised and had to call for help. The 2nd Airborne Battalion was rushed to the scene from Quang Dien, and with this reinforcement after three more failures, the Communist block was at last broken. It was the following morning, 1 February, however, before the convoy made it to the northern gate and reenforced 1st Division's defense of the compound, its manpower decimated by the roadblock fight which had also cost it 12 APCs destroyed.

On coming up, two battalions of the 3rd Regiment worked their way eastward along the north bank of the Perfume River aiming for the Citadel, then on arriving at the southeast wall, had to spread out along it, since they had no equipment with which to surmount the barrier. The 1st and 4th Battalions of the 3rd, which had been on a search and clear operation to the southeast of Hue when the battle began, became wholly surrounded in open country, and had to fight for survival before doing anything to relieve Hue. Repeated air strikes helped save 1st Battalion and gradually turned the tide. Then near mid-day of 1 February, the battalion boarded some motorized junks and by mid-afternoon had arrived at 1st Division headquarters. The 4th Battalion was less fortunate. Its breakout fight continued four days, and when on 4 February the encirclement was broken, only 170 survivors made it to the MACV compound.

The Marine column--two rifle companies and four tanks--on moving north from Phu Bai on the morning of 31 January, had two collisions with

the 1st Battalion of the 4th NVA Regiment, one at the An Cuu bridge on Highway No. 1 and the second one 700 meters to the southward next to the MACV compound. It arrived badly battered at the compound in mid-afternoon. The Marine column then crossed to the north side of the Perfume River and tried to make it to the Citadel, but was thrown back by massed rifle and automatic fire by NVA soldiers fighting out of trenches in the elevated bank between the high stone walls. The survivors turned back to the MACV compound, where on the following day they were joined by the remainder of the battalion. It was enough reinforcement to risk the enlargement of the friendly perimeter along the south bank of the Perfume. Then when the 2nd Battalion, 5th Marine Regiment, arrived next day, the perimeter was broadened and deepened still farther. It grew more or less wedge shape, point inward contrary to the average penetration through a built-up area. At the line of departure when the movement began, the attacking front was about three blocks long, and during the next three weeks it slowly spread until it extended about eight blocks. This came from learning through experience how the economy of force principle applies in urban warfare; the thinned out frontal line could muster enough fire power while also taking lighter losses. To begin, these troops were not only outnumbered and badly shaken; they were also practically unseasoned.

Neither battalion used artillery until about the tenth day and then it was mainly ineffective. Even when it hit on target, it had little impact on the NVA formations, since the roof and wall cover was usually too stout. Furthermore, the continuous bad weather hampered observation, and while the enemy could range in almost exactly, being familiar with every benchmark in the old capital, the Marines had no such knowledge. They had never reckoned on having to fight inside Hue.


"STRAWBERRY PATCH"
GIA HOI AREA
THE CITADEL
TAY LOC AIRFIELD
PALACE OF PEACE
FLAGPOLE
MACV COMPOUND
QUOC HOC HIGH SCHOOL
CITY HOSPITAL
UNIVERSITY APARTMENTS
Perfume River
TU DAM PAGODA
PHU CAM CATHEDRAL
ATTACKS ON HUE CITY
TET 1968
Axis of attacks, January 31, 1968
½ Mile
800 Meters

The one advantage afforded by the unfavorable weather was that the wind continued to blow from the right quarter, and the two battalions came to believe that the CS gas was about the most useful weapon they had on hand. They employed it in every available form, the E8 that sprays out of multiple canisters, the hand grenade and so on. They also arrived at a mix of the CS canister and the 4.2 mortar, throwing out four or five of the CS containers to make the enemy jump for the open air (he would do so even when masked) then following up quickly with the killing shell. By the end of the battle, the Marines in Hue had exhausted the CS supply in South Vietnam and the Western Pacific.

The main tactical advantage of the broader front, other than the saving of lives, was that, when put against the checkerboarded defense, it doubled the prospect that a probe would find one of the soft spots. But it could not measurably speed up the advance. The undefended buildings still had to be searched room by room, as was done, for example, when moving from cubicle to cubicle through the four floors of a nunnery; and the defended buildings had to be gassed and then breached, usually through a sidewall, either by tank fire or a hand-fired rocket.

The Marines went to Hue well supplied with the LAW and believing it would be useful in blowing down buildings and breaching walls. It simply would not work against concrete or stone of any thickness. The 3.5 rocket, however, would do the work. The mass of the projectile was enough to open a hole of some use. It crumpled or cracked stone walls and the sides of buildings on which the LAW had practically no impact.

The 106 recoilless was a highly serviceable weapon toward the same end--even better than the 3.5 rocket.

When the sweep first began, the Marines made the mistake of using both weapons to fire either through windows or against a door. It seemed the logical way. However, though the blast would blow out part of the far wall, it would not flush or greatly rattle the occupants, apart from occasional cases of concussion. The defenders would lie down next to the wall when the heavy weapon fire came on. Once this was learned, the trick became to expand the window or door by putting the missle against the wall right next to the aperture. In blowing out a hunk of the wall, the missile was likely to eliminate several of the defenders. Between the larger residences in the French Quarter was usually a stone wall, tall as a man and up to 18 inches thick, hence as resistant as some of the walls of the newest business houses, such as banks or a corner jewelry. To break into a backyard through such a barrier, or to breach the wall of a defended business structure sufficiently for a man to enter, the Marines would fire three or four rounds of 3.5 against it, followed up with one shot of C4. One difficulty was that their few demolitions experts were killed or wounded early in the battle. As the operation lengthened, it was learned out of experience that practically every fighter in line had to become a handler of demolitions.

The battalions conventionally operated with two companies in line facing the fire and the third company either in reserve or guarding toward the flank, if there was a manifest threat from that direction. By night the main body of the battalion would attempt to quarter in some of the houses that had been swept and some of the men would sleep in beds or on lounges. But a third or so of the force would make a perimeter defense of the area, though the size of the outguard would vary according to the conditions. For example, if the closing of the day's operations embraced

a walled compound, the covering force would be relatively light. At the key points in the perimeter were placed the crew-served weapons.

While these tactics were evolving within the two U.S. Marine battalions during the first week through trial and error, various movements had taken place among the ARVN forces within the Citadel and in the countryside outside Hue, none of which is very pertinent to this report. They had some minor setbacks offset by a few small successes: in sum, they barely held their own. During the early morning of 7 February, however, the enemy succeeded in destroying the seven-span bridge over the Perfume, the last solid link between the Citadel and the U.S. Marine battalions.

By the end of seven days G-2 estimated there were two NVA battalions within the Citadel, another in southeast Hue, a fourth in the opposite corner of the New City. While all of these units had taken battle losses, there was practically no shrinkage in tactical strength, due to the fact that replacement packets filtered into the positions from outside Hue every night. Another NVA battalion still maintained the roadblock north of Hue on Highway No. 1 and the NVA capability to feed more men and supply into the fight from the piedmont to the west remained undiminished. Both at the roadblock and within the city the NVA soldiers were deeply dug in, that is, entrenched. In their defense of the built-up blocks, however, they took care to organize their positions vertically. Snipers operated from the rooftops and so did observers. In some instances, machineguns and rocket crews were posted in the upper stories to give them lengthened coverage of the street.

On 12 February the 1st and 5th Battalions of Vietnamese Marines (they were flown in from Saigon where they were summoned during the early days of the Tet offensive) deployed to the southwest corner of Hue. They brought with them six 105mm howitzers which they used largely for point blank fire

against any block to their progress. Their mission was to sweep toward the southeast Citadel (a distance of around 1400 meters). They arrived just at the end of a lull in the attack, enforced by the tempestuous weather. While it lasted NVA had forwarded replacement packets and fighting supply to the besiegers within the Citadel. Hence when the battle was renewed, with both sides refreshed, the fighting was no less savage than at the start. Advantaged by their higher ground atop the wall, the NVA held the Citadel unshaken.

The 1st Battalion, 5th U.S. Marines, attempted to storm a vital gate on the southeast wall, only to be repulsed by a sheet of fire from atop the wall, this on 14 February. But on the following day, in an attack much better organized, they had a limited success. The position was first softened up by five and six-inch naval gunfire with some help from the field artillery. Then air strikes were laid on by Marine and U.S. Air bombers as well as the VNAF. While the shock was still on, the Battalion advanced to within two or three blocks of the southeast wall.

The Vietnamese Marines, who had been making a tedious, block-by-block drive from the southwest corner of the old city, on 17 February stormed and captured a school house, the grounds of which not only afforded them some space for maneuver, but brought them within one block of the Palace.

Next day, intelligence learned that the NVA commander within the Citadel had been killed during the bombardment, and that his replacement had asked permission to withdraw forces from a position he no longer considered tenable, but had been denied. Even so, the enemy stayed full of fight. That same day--18 February, the 4th Battalion, Vietnamese Marines, arrived in the Citadel and were given the mission of sweeping to the southwest wall to close the channel by which the NVA replacements were

arriving. Resistance was so stiff that in two days the Battalion advanced less than one-quarter mile. There were developments elsewhere. The Black Panther and Reconnaissance Companies of the ARVN 1st Division headquarters moved to the right flank of the 1/5 U.S. Marines along the northeast wall of the Palace and the 4th Battalion of Vietnamese Marines, fighting within the Citadel, reorganized for a determined push to the southwest wall.

At this stage the attack by the U.S. Marines was forefronted by the heavy fires of the Pattons and the Ontos vehicles, an arrangement that was continued until 21 February, by which time the advance element was within one block of the southeast wall. Coincidentally four infantry battalions of the 1st Cavalry Division Airmobile were making a sweep from the west that by the afternoon of 22 February brought them to within four kilometers of the northwest corner of Hue, where they got into a fire fight.

In the face of this threat from a new direction, on the morning of 22 February the NVA forces within the Citadel launched their heaviest counterattack through the southwest wall against the two battalions of Vietnamese Marines and the 3rd ARVN Regiment. The eight-inch guns that had come along with the 1st U.S. Cavalry column to the northward and the six 105 howitzers brought along by the Vietnamese Marines finally beat back and scattered this attack after a two-hour bombardment. Then in a spirited counterattack by all of the engaged Vietnamese units, 198 of the NVA were killed and 23 weapons were captured.

On the following night, the NVA made their last desperate try. First, a heavy bombardment by rockets and mortars was laid on the French Quarter's western side which the U.S. Marine attack had been clearing. Then an infantry assault force sortied from the wall, but barely got started. The fire from the ARVN 105mm howitzers first stopped it, then drove it back. Within the

Citadel developments were equally favorable. One battalion of the 3rd ARVN Regiment staged a surprise night raid toward the southeast wall, captured and held the area around the flagpole while it was still dark, then after daylight hauled down the Viet Cong flag and ran up its own. At about that same time, other ARVN main force moved to the southwest wall, and meeting only light resistance, first beat it down, then surmounted and secured the wall as a whole. By this time sections of the wall were badly battered. General Truong therafter ordered the Black Panther Company and another battalion of the 3rd ARVN to attack and clear the Palace. It was done in a two-hour fight which ended just as dark fell. No NVA resistance then remained within the Citadel except from one small group trapped within the southwest corner. At 0500 on 25 February after the howitzers put a 70 round shoot on the place, some of the Vietnamese Marines followed it up and rubbed out the few survivors, thereby ending the battle.

The Marines had expected to have trouble with radio interdiction while fighting through city streets where the buildings were fairly tall. To their surprise, no such problem developed. Reception and sending was hardly more difficult than when fighting in open country. Not only did the PRC 25 work sufficiently well, but in the average engagemental situation, the leaders, from platoon up to battalion, were usually within shouting distance of one another. The one difficulty was in keeping sure touch with the small groups of three to four men who were doing the room search-and-clearing, either well forward or to the flank.

Due partly to the foul weather, there was little support from the air and very little use was made of helicopters. But there was another constraint: the chopper was thought to be too vulnerable during the approach and retirement phases. The NVA habitually stationed observers atop the tallest buildings

as well as heavy machine guns that were under their direction.

The heaviest handicap on the infantry, when it moved along with the armor to give it close-in protection, was that the tank invariably attracted a shower of B40 rockets or RPG7s and the foot soldiers would get slashed by ricochets that bounced off the hull. The rockets damaged the tanks, though none was destroyed by them. On the other hand, the rifleman learned the hard way, but very quickly, that in city fighting one never steps deliberately from a building into the open street, or walks through a door because it is open, without first testing who may be inside. Either of these motions invites sudden death.

The Marines did their planning and operating off city maps of the kind sold to tourists. They proved to be not only accurate and practical but wholly satisfactory to the purpose.

AUTHOR'S OBSERVATIONS

There are certain threads to be followed throughout these ten narratives of city fighting in which they are quite consistent, despite the extreme contrasts in scene and situation. There is practically no exception to the rule that in urban warfare, both sides choose not to engage at night, whether because they are too exhausted by the stresses of the day, or rate the risks excessive. This changes little or none when one side is on friendly soil and familiar territory, and the other is not. Point No. 2 is that the scheme of defense is usually empirical rather than based on long-term study of what is best in view of the ground, the structures and the advantages deriving therefrom: this is hardly less true of forces in the attack. Point No. 3 is that advance via the street is as common, if not more so, than advance via the cover afforded in ripping along from building to building, or moving through the backyards, when such are present. Point No. 4 is that there is relatively little use of sewers or underground works of any kind, though the digging of tunnels to connect strong points and for use as escape routes is common enough. Point No. 5 is a general failure of intelligence, in that there is such infrequent mention of informational or other kinds of help sought, or provided, by the local people, irrespective of whether they be neutral, friendly or enemy. All of these indices are to one point: That in modern armies, there is a lack of doctrine as to the attack on, or defense of, cities and the methodology usually evolves out of experience gained in the early stages of the fight, which is rather costly.

APPENDIX C

URBAN POPULATION TRENDS AND LOCATIONS

INTRODUCTION

The growth in the size of cities and the number of people living in them has led some to conclude that the incidence and importance of city fighting in future wars will increase. This appendix examines the evidence available on population growth in West German cities since WWII to provide some insight into this question.

After the end of World War II, about 25 percent of the 1937 land area of Germany was placed under Soviet and Polish administration. The remaining German territory was divided into two states--the Federal Republic of Germany (Bundesrepublik Deutchlands; West Germany) and the German Democratic Republic (Deutche Demokratische Republik; East Germany). West Germany includes about 70 percent of the area and 73 percent of the population.(169: pp. 67-92).* Of the territory in West Germany, as of 1972, "33 percent consists of farming land, 29 percent of woodland, 23 percent of meadows and pasture ground, and 15 percent of built-up areas (174: p. 88).

POPULATION

Significant alteration in population densities took place in West Germany during and immediately after the World War II. Alterations in

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*This notation identifies references listed in the Bibliography in Appendix H.

population and population distribution were caused by the loss of life, destruction of cities, evacuation and return of urban population, and the inflow of expellees and refugees. In 1970, West Germany had a population of 61.5 million inhabitants, 9 million of them expellees from the East (189: pp. 86-91) and (174: p. 88). In addition, the human losses during the war, about 4 million dead or missing, led West Germany to attract 3 million foreign workers (121: Section E, p. 5). Overall, population has grown only 36 percent from 1939 to 1970, with somewhat slower growth in recent years.

Table C-1 gives population densities for the states and the administrative districts of West Germany for the years 1939, 1946, and 1970. Density is expressed as the number of inhabitants per square kilometer. The percentage changes in population densities from 1939 to 1970 are also shown. Few districts have population density increases outside the range of 30 percent to 60 percent.

The table reflects, in a general sense, the redistribution and dislocation of the native population and the resettlement of immigrants from 1946 to 1956. Comparing the 1939 and 1946 columns of Table C-1 shows the general decline in population density in Hamburg, Bremen and Nordrhein-Westfalen caused by air raids and civilian evacuation. The states of Schleswig-Holstein, Niedersachsen and Bayern received nine-tenths of the expellees and refugees immediately after the war (189: p. 91). But, after 1950, these three states were generally states of net emigration and lost population due to expellee and refugee redistribution. In 1970, with the exception of Berlin, Hamburg, and Bremen, only two states had a population density of over 400 inhabitants per square kilometer. The two

TABLE C-1

POPULATION DENSITY FOR THE FEDERAL REPUBLIC OF GERMANY FOR STATES AND ADMINISTRATIVE DISTRICTS FOR 1939, 1946, 1970

States and Subordinate Administrative Districts	Population density (number of inhabitants per square kilometer) 1939[a]	1946[a]	1970[b]	Percentage change in density from 1939 to 1970 (+ increase, - decrease)
Schleswig-Holstein	101	164	159	+57
Hamburg	2,293	1,880	2,382	+ 4
Niedersachsen	96	132	149	+ 6
Hannover	155	188	234	+51
Hildesheim	120	183	185	+54
Lüneberg	50	83	97	+94
Stade	59	92	93	+58
Osnabrück	83	100	126	+52
Aurich	94	116	129	+37
Braunschweig	182	251	276	+52
Oldenburg	107	137	155	+45
Bremen	1,394	1,209	1,790	+28
Nordrhein-Westfalen	351	344	497	+42
Düsseldorf	763	687	1,022	+34
Köln	401	367	602	+50
Aachen	249	217	328	+32
Münster	220	232	333	+51
Detmold	172	213	268	+56
Arnsberg	350	355	480	+37
Hessen	165	188	255	+55
Darmstadt	211	233	339	+61
Kassel	106	101	147	+39
Rheinland-Pfalz	149	138	184	+23
Koblenz	131	127	167	+27
Trier	92	81	98	+ 7
Rheinhessen-Pfalz	212	193	265	+25
Baden-Württemberg	153	163	249	+63
Nordwürttemberg	184	209	330	+79
Nordbaden	248	268	373	+50
Südbaden	124	119	188	+52
Südwürttemberg-Hohenzollern	102	104	161	+58
Bayern	100	125	149	+33
Oberbayern	118	142	198	+68
Niederbayern	73	101	94	+29
Oberpfalz	71	91	99	+39
Oberfranken	108	143	149	+38
Mittelfranken	141	158	195	+38
Unterfranken	99	116	139	+40
Schwaben	93	122	146	+57
Saarland	354	332	436	+23
Berlin (West)	5,716	4,182	4,420	-23
Federal Republic	173	187	244	+41

SOURCES: [a](249: pp. 33-39), [b](250: pp. 26-30).

states are Nordrhein-Westfalen and Saarland. Saarland contains only one large city, Saarbrücken while Nordrhein-Westfalen contains 25 of the 59 cities in West Germany with populations in excess of 100,000 inhabitants.

METROPOLITAN AREAS IN WEST GERMANY

The area occupied by a city is demarcated by purely political boundaries and thus gives no indication of the extent of the urbanized area surrounding the city. A metropolitan area is an arbitrarily defined area including a number of nearby cities, communities, and counties that constitute a large population concentration. Areas of sufficient building density (i.e., areas of roughly 5,100 to 10,000 people per square kilometer or greater) to support city fighting are relatively small "islands"--usually older city center districts--within a metropolitan area.

According to one classification (14), there are thirty nine metropolitan areas in West Germany. These areas and their principal cities are listed in Table C-2 along with 1970 population (250: pp. 26-30), area, and computed population density. Note that the densest metropolitan areas have an average population density of under 3000 per square kilometer: the densest cities are about 4,000 per square kilometer (in comparison, the Washington, D. C. population density is about 4,800 and that of New York is about 10,000). Thus, even the densest West German cities can have only relatively small zones within their political boundaries that have sufficient population and building density to support large scale city fighting.

LOCATION OF POTENTIAL CITY FIGHTS

An idea of the spatial distribution of the 39 metropolitan areas can be obtained by plotting them on an outline map of West Germany as

TABLE C-2

METROPOLITAN AREAS OF WEST GERMANY AND THEIR PRINCIPAL CITIES
POPULATION IN THOUSANDS, FOR 1970,
AREA (SQ. KM.), AND POPULATION DENSITY

Metropolitan Areas and Principal Cities	Population (in thousands) 1970	Area (sq. km.)	Density (inhabitants per sq. km.) 1970
AACHEN	448.9	396	1,134
Aachen	173.5	59	2,941
AUGSBURG *	337.7	633	534
Augsburg	211.6	86	2,460
BIELEFELD	329.2	321	1,026
Bielefeld	168.9	48	3,519
BONN	826.7	1,737	476
Bonn	274.5	141	1,947
BRAUNSCHWEIG*	452.5	1,196	487
Braunschweig	223.7	77	2,905
BREMEN	770.2	1,249	617
Bremen	582.3	324	1,797
BREMERHAVEN	140.5	80	1,756
Bremerhaven	140.5	80	1,756
COLOGNE	1,344.2	1,283	1,048
Cologne	848.4	251	3,380
DARMSTADT	389.0	854	456
Darmstadt	141.2	116	1,217
DÜSSELDORF	1,037.1	769	1,349
Düsseldorf	663.6	158	4,200
ESSEN-DORTMUND-DUISBERG (INNER RUHR)	5,729.6	4,145	1,382
Essen	698.4	195	3,528
FLENSBURG	167.1	1,074	156
Flensburg	95.5	51	1,873
FRANKFORT AM MAIN	1,940.8	2,372	818
Frankfort	669.6	195	3,434
FREIBURG	162.2	80	2,028
Freiburg	162.2	80	2,028
HAMBURG*	2,188.7	2,181	1,004
Hamburg	1,793.8	753	2,382
HAMM	84.9	45	1,887
Hamm	84.9	45	1,887
HANNOVER*	1,278.9	2,043	626
Hannover	523.9	135	3,881
HILDESHEIM*	212.7	676	315
Hildesheim	93.8	33	2,842
KARLSRUHE	600.9	1,160	518
Karlsruhe	259.2	123	2,107

TABLE C-2 (Continued)

Metropolitan Areas and Principal Cities	Population (in thousands) 1970	Area (sq. km.)	Density (inhabitants per sq. km.) 1970
KASSEL*	410.5	811	506
Kassel	214.2	106	2,021
KIEL	271.7	110	2,470
Kiel	271.7	110	2,470
KOBLENZ	192.5	318	605
Koblenz	119.4	103	1,159
KREFELD-M. GLADBACH-RHEYDT	816.9	289	2,827
Krefeld	222.3	116	1,916
LÜBECK*	330.3	776	426
Lübeck	239.3	214	1,118
MANNHEIM-LUDWIGSHAFEN-HEIDELBERG	1,412.1	1,617	873
Mannheim	332.2	145	2,291
MUNICH	1,735.7	2,207	786
Munich	1,293.6	311	4,159
MÜNSTER*	320.6	861	372
Münster	198.4	74	2,681
NÜRNBERG*	802.4	1,201	668
Nürnberg	473.6	137	3,457
OLDENBURG	130.9	103	1,271
Oldenburg	130.9	103	1,271
OSNABRÜCK	283.5	668	424
Osnabrück	143.9	61	2,359
PFORZHEIM	166.1	334	497
Pforzheim	90.3	56	1,613
REGENSBURG*	129.6	52	2,492
Regensburg	129.6	52	2,492
SAARBRÜCKEN	392.5	387	1,014
Saarbrücken	128.0	53	2,415
SALZGITTER*	118.2	213	555
Salzgitter	118.2	213	555
STUTTGART	1,770.2	2,065	857
Stuttgart	633.2	207	3,059
WIESBADEN-MAINZ	483.5	534	905
Wiesbaden	250.1	164	1,525
WILHELMSHAVEN	102.7	61	1,684
Wilhelmshaven	102.7	61	1,684
WUPPERTAL-SOLINGEN-REMSCHEID	970.6	296	3,279
Wuppertal	418.5	151	2,772

SOURCE: From (251: pp. 26-30) and (14: pp. 95-96).

*Metropolitan Areas within 100 kilometers from eastern border of West Germany.

shown in Figure C-1. From this figure, the greatest concentration of metropolitan areas occurs near the west central border of West Germany on an arc from the Inner Ruhr southwest to Stuttgart. These areas could not become the scene of city fighting against Warsaw Pact invaders until the invaders had thrust across most of West Germany, i.e., until the collapse of most of the NATO defense involved.

Only five of these major areas are within 50 kilometers of the eastern border of West Germany (only ten are within 100 kilometers). They are identified in Table C-2 and Figure C-1 by an asterisk.

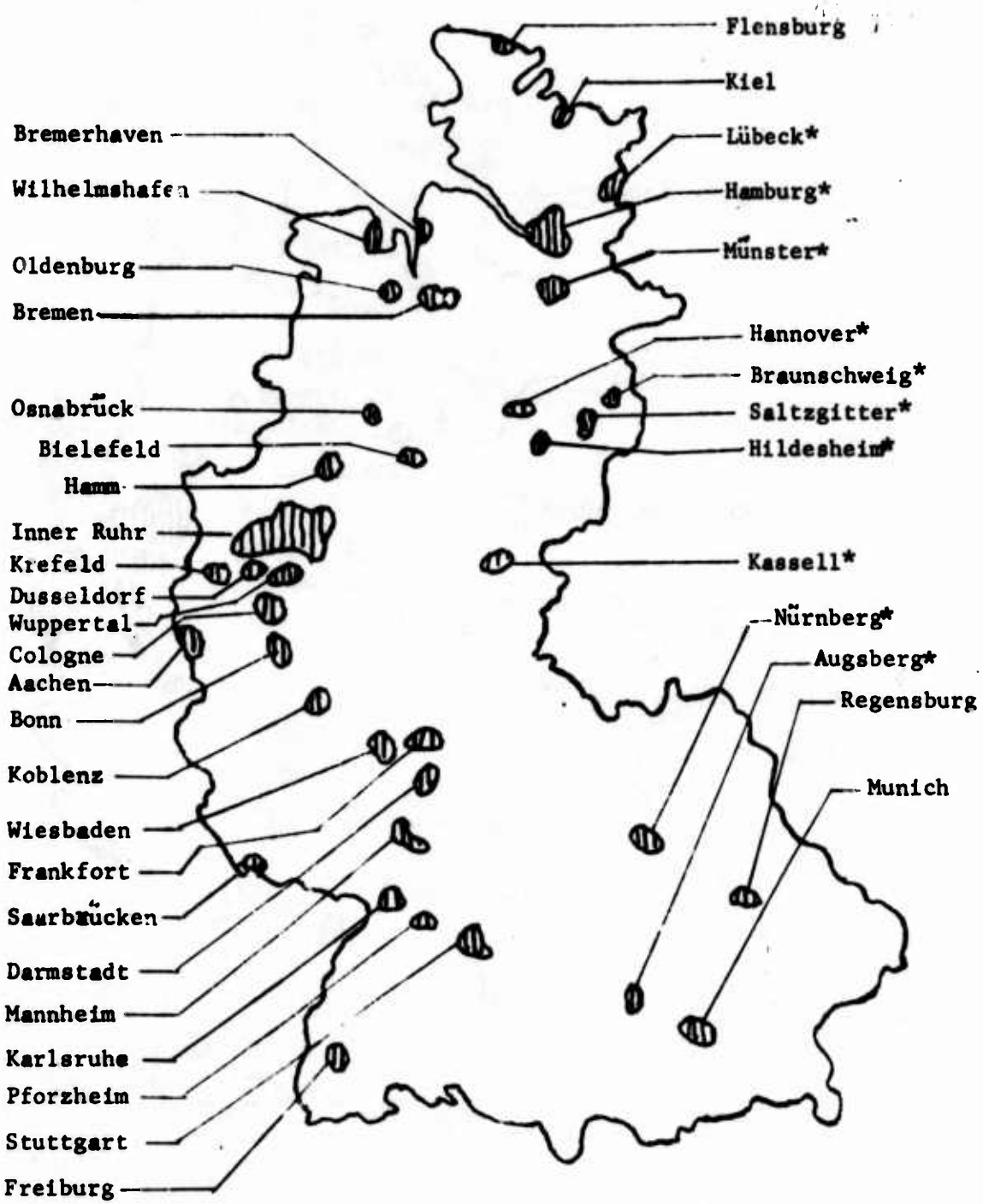
Figure C-2 shows the possible invasion routes from the East (as determined from terrain maps) together with those forward metropolitan areas that might become the scene of city fights used to delay major Warsaw Pact forces.

INSIGHTS

The population of West Germany had not increased greatly since 1939--the increase amounts to about 36 percent between 1939 and 1970. There are 59 cities of over 100,000 inhabitants in West Germany; the large majority of these cities are in the vicinity of the western border. No more than 8 to 10 are located near enough to the invasion routes that major Warsaw Pact forces could take to serve as potential sites for large scale city fights intended to delay the Pact forces (if they choose not to bypass). The areas of sufficient building density to support building-to-building city fighting are city center "islands" within these cities--islands which are unlikely to be significantly larger or denser than they were before WWII and whose newer buildings are generally lighter and "softer"

FIGURE C-1

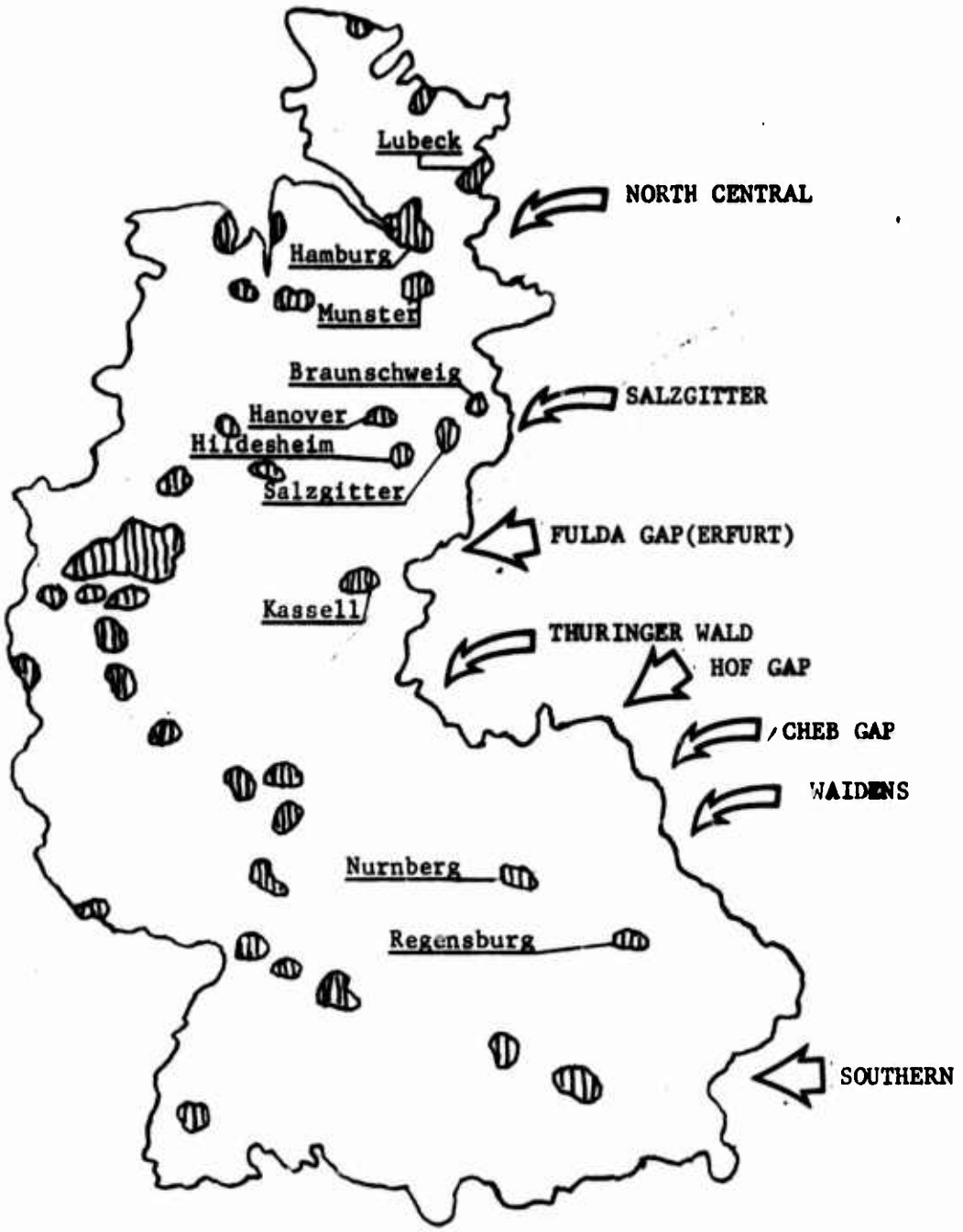
METROPOLITAN AREAS OF WEST GERMANY



SOURCE: Table C-2

FIGURE C-2

POSSIBLE INVASION ROUTES FROM THE
EAST AND FORWARD METROPOLITAN AREAS THAT MIGHT
BE INVOLVED IN DELAYING MAJOR INVADING FORCES



in construction than the pre-WWII buildings they replace (see Appendix D). The major increases in urbanization in West Germany have taken place in the metropolitan areas outside these city centers, areas of lower building density and wider, straighter streets. Fighting in these relatively suburban areas, which may well increase, is more likely to resemble WWII rural and village fighting than city fighting due to their extensive open areas and trafficable streets.

APPENDIX D

BUILDINGS AND CONSTRUCTION METHODS IN WEST GERMANY

INTRODUCTION

This appendix examines the standard construction types encountered in European cities in order to contrast them with familiar American construction types and to establish a basis for selecting representative building targets for weapons effects testing.

Building characteristics of primary interest in city fighting are the type of construction and the thickness of walls and floors. Buildings in an urban area vary as a function of the availability of construction materials, the topographic environment, the climate, the size of population, cultural patterns, etc. It is impossible to discuss in detail the many variations in buildings found in Central Europe. What is attempted, however, is a short discussion of some building construction methods and some of the materials that are widely used. The emphasis is on post-WWII construction materials and methods. Justification for this emphasis is based on the widespread building destruction and damage that occurred in Central Europe during WWII resulting in an extensive program of city reconstruction (though a number of the massive stone pre-WWII buildings remain in most city centers and still form natural defensive strongpoints).

BUILDING CONSTRUCTION METHODS*

For our purposes, a building can be characterized by describing the following components: foundation, exterior walls, partitions, roof, floors, doors, and windows. Descriptions of these components can be made more understandable when related to the way the vertical loads of a building are distributed to the ground. Until about 1900, all buildings had vertical loads carried by the exterior and interior walls (partitions) of the building. This type of construction is known as bearing wall construction. Bearing walls at the base of a building have to be extremely thick to satisfy the demand for taller buildings. An alternative solution was devised by engineers in the development of the skeleton frame with columns (vertical members) and beams (horizontal members) of steel or concrete. The frame supported all the walls and floors and distributed the load over a wide area of the ground. The walls in this type of construction are termed non-load bearing.

That part of a building below the surface of the ground is called the foundation and its function is to provide a stable base for the entire structure. It has to distribute the weight of the building and its supports, as well as all live loads over an area of ground large enough to prevent uneven settling or collapse. All foundations have three parts: the foundation bed, the rock or soil the building rests on; the footing, the section of the foundation resting on the foundation bed; and the foundation wall, the portion of the foundation rising from the footing to a distance above the ground.

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*More detailed discussions can be found in References 12, 35, 51, 58, 69 and 81, listed in the Bibliography in Appendix H.

Building Materials

Concrete, by itself, has good compressive strength. For example, each square inch of concrete can be designed to support loads of 10,000 pounds or more. Its shear strength is also large, varying from 35% to 80% of the compression strength. On the other hand, concrete has almost no resistance to tension loads, while steel has a tensile strength of 50,000 psi or more. To take advantage of the high compressive strength of concrete and the high tensile strength of steel, they are combined to make reinforced concrete. Concrete is cast around the reinforcing steel; as it hardens it grips and forms a bond with the steel. Concrete members are reinforced by using steel bars or steel mesh, depending upon the function the member is to perform in the structure. The steel bars are usually placed on 6 to 8 inch centers. Reinforced concrete is significantly more difficult to breach or destroy structurally with weapons than ordinary concrete, because the reinforcing bars have to be cut at the same time the concrete is being broken or penetrated.

Concrete wall slabs, floor slabs, roof slabs, and structural concrete members can be cast at ground level. After hardening, they can be tilted, or lifted into place and attached by devices embedded in the slab. All precast concrete slabs are reinforced with steel bars or steel mesh.

A prestressed concrete beam or member is composed of steel and concrete where the steel is put in tension before or after the concrete is poured. When the concrete has set, tension in the steel is released and transferred through its bond to compression on the concrete. A prestressed concrete member can be designed to use one-half of the concrete and one-quarter the steel required in a conventional reinforced concrete member. Material savings lower the weight of the building and thus reduce the foundation

size needed. These weight and thickness savings, of course, reduce the defensive protection offered by the building.

The hardest and least vulnerable buildings in European cities are the older stone buildings, now significantly reduced in numbers due to bombing and redevelopment. Because of new material developments and new construction methods, little stone has been used since WWII except in the form of thin decorative facing slabs offering little defensive protection.

Brick construction varies greatly in protection capability. Building bricks are classified as adobe, kiln burned, sand-lime, and concrete. Adobe bricks are made of natural sun-dried earth or clays. Kiln burned bricks are made of clays or shales and fired to hardness. Sand-lime bricks are a mixture of sand and lime and are hardened under steam pressure and heat. Concrete bricks are solid or cored and are made of cement and a variety of aggregate. All of these bricks are penetrable by all current rifles and machine guns, though the number of rounds required to "punch through" varies greatly, depending on type of brick and round.

Walls made of masonry may be either bearing walls or non-bearing walls. Solid thick walls (8 to 24 inches thick) of brick can be constructed by bonding two or more thin walls of brick together. A faced wall is a facing of brick masonry units bonded to a backup wall of some other material. The backing may be brick, concrete, hollow structural clay tile units, or hollow concrete-block units. In many residential houses, the backing is plywood.

Steel Construction Types

Wall-bearing, skeleton-framing, and long-span construction are the three basic types of steel construction. A single building can have one

or more of these types used in its construction. In wall-bearing construction, exterior or interior masonry walls support the ends of structural elements carrying the floor and walls. The walls have to be thick enough to carry the loads. This method of construction is restricted to relatively low structures. Taller structures require massive load bearing walls.

A tall building with a steel frame is often referred to as skeleton construction. Dead loads (e.g., the walls) and live loads are supported by this steel skeleton. Exterior walls are non-bearing and sometimes called curtain walls. For this type of construction, windows can comprise one-half or more of the area. The remaining wall material can be stainless steel, aluminum, porcelain, plastic, enameled steel, precast concrete, etc. Because they bear no weight, the exterior walls can be extremely thin and penetrable even by small arms. This construction is unusual in Germany because of thermal insulation considerations.

Large industrial buildings, sports arenas, exhibition halls, auditoriums, aircraft hangers and similar structures requiring large distances between supports can be spanned by long-span construction. A girder, truss, arch, rigid frame, or cable-hung frame can be used when beams are unable to span distances between supports.

Interior Walls

A large variety of materials can be used to construct interior walls or partitions. Masonry blocks, wood, lath and plaster, and plasterboard are a few of the materials. The partitions can be solid or have hollow spaces with sound insulation. They may be load or non-load bearing. In contrast to the U.S., most partitions in Germany are of permanent masonry construction.

CHARACTERISTICS OF BUILDINGS IN WEST GERMANY*

During World War II, most of the large cities in West Germany were sixty to ninety percent destroyed and in the American zone of occupation only one factory in ten was functioning (119: p. 747)**. Of the approximately 11 million dwellings that had been in existence when the war started, 20 percent were completely destroyed and another 40 percent sustained considerable damage (174: pp. 210-211).

From 1949 to the end of 1970, about 11.6 million new dwelling units were built, averaging about 4½ rooms each. Dwelling units include both apartments and separate residences. The recent decline in the number of new dwellings built reflects the stabilization of population increases and the gradual elimination of housing shortages.

Apartments constitute about 60% of the housing units in Germany (250: p. 258). They are found in separate high-rise buildings and on the top floors above business establishments. The vast majority of apartments are in the central area of a city. Some high-rise apartments are located in the newer satellite towns; for instance, those near Munich and Hamburg. Separate apartment buildings seldom exceed twelve stories in height and are mostly located in cities with populations greater than 300,000.

In those areas where vast destruction occurred, new residential buildings generally followed highly standardized construction methods. Only about 2% of the houses in Germany are built with wood as the main

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*Much of the material in this section is based on conversations with members of the Economics Division, Embassy of the Federal Republic of Germany, Washington, D.C., 18, 20 June 1974.

**This notation identifies references listed in the Bibliography in Appendix H.

material. These houses are rarely more than two stories high and are found only in heavily wooded regions. Other new single residential buildings, seldom more than three to four stories high, have load-bearing walls usually backed with cement blocks and with brick facing.* Outside walls of these buildings have a minimum thickness of 24 centimeters but normally the thickness is between 30 to 36 centimeters--considerably greater than equivalent U.S. building wall thicknesses.

Steel frame construction is used for buildings more than four stories in height. Reinforced concrete slabs for walls and floors are used extensively in the construction of these buildings. When pre-cast (stressed and reinforced) outside walls are used, they are 20 to 25 centimeters thick. When steel-reinforced walls are cast on the building site, the lower outside walls can be up to 50 centimeters in thickness and the outside walls for the upper floors can be up to 30 centimeters thick. A common construction practice is to build the lower floors of steel reinforced concrete and the upper floors of masonry. In this case, when a building is more than four stories high, its lower floor or floors will be reinforced concrete. Floors are almost uniformly made from reinforced concrete slabs 7 to 9 centimeters thick placed on reinforced concrete beams 27 to 35 centimeters deep by 9 to 15 centimeters thick and supporting beams are from 40 to 60 centimeters apart. Interior walls are made from masonry and are 24 centimeters thick if load-bearing and 15 if not. Inside walls are reinforced concrete or masonry,

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*The information on building specifications included in this discussion was provided by the Joseph Rapp Corporation, Ulm (Donau) Free Republic of Germany.

not light partitions as in the U.S. German building construction standards lead to much heavier residential walls and floors than the American equivalents.

Interior areas and volumes of all types of residential units are less than those present in comparable American units. The small amount of wood used in construction makes German residential units more solid than comparable American units. Exterior walls are considerably thicker and more heavily insulated. In German residential units, very little of the vertical wall area is window space so that American "picture windows" are seldom present. All windows are double paned for insulation, and virtually all can be covered by built-in shutters of slats of wood or thin steel that roll down from the top.

Industrial buildings in Germany and America are practically identical in construction and use of materials. Steel frame construction is used with cement and concrete blocks for walls and reinforced concrete for both walls and floors. Prestressed concrete is used for beams and columns. Walls are not particularly massive because they are not load-bearing; typical thicknesses are 50 to 75 centimeters.

Modern large office buildings in Germany are similar but heavier than those in America, and steel frame is used as the method of construction. Reinforced concrete is used for floors and, usually, for exterior walls. Cement and concrete blocks are used for both exterior walls and partitions. An increasing amount of glass is used, not only for the many windows in office buildings, but also as outside facing.

Other man-made structures are found in cities in addition to streets and buildings. Such structures, for example, include underground systems, highway interchanges, railroad yards, athletic fields, zoos, and airfields.

Underground systems include subway, sewer, and utility conduit systems. Subways may be for vehicular or foot traffic and could be private or public systems.

In many German towns, a great deal of effort and money has been spent on rebuilding the old, massive landmark buildings exactly as they were before the war. These landmarks include castles, churches, theaters, and galleries (119: p. 17).

Thus, significant numbers of massive stone walled buildings continue to exist in city centers and to provide the best-protected strongpoints for city defense.

APPENDIX E

FIRER/TARGET RANGE MAP ANALYSIS

INTRODUCTION

This appendix derives upper bound estimates of target range frequencies for city fighting, based on lines of sight taken from city maps.

The most accurate maps available for the study were from the 1:12,500 German Military City Maps series prepared by the U.S. Army, Europe. These maps show the locations and widths of streets, as well as locations and plan view outlines of buildings. They also show terrain contours at 2 meter intervals. Other maps available were commercially prepared city maps. These maps are not as detailed as the U.S. Army city maps, but show street widths, building locations, and building outlines.

One potential problem encountered in using city map data concerns the absence of building height information (some Russian city maps include both height and construction materials, which significantly enhances their military usefulness). While any building shown on the map can safely be assumed to be a mask for ground or street level lines of sight, without height information it is impossible to know whether it masks street level to upper story lines of sight.

This problem is more apparent than real. First, the weapons which can be used in the upper stories of buildings are by and large mostly small arms. This is not only because heavier weapons are difficult to get into upper stories (or because back blast limits the places from which they can be fired) but also because once they are emplaced they are difficult to move and, thus,

are more likely to be lost if withdrawal from the building is required. More importantly, however, the existence of even a one story mask between the higher building and the street level significantly reduces potential weapons fields of fire at street level (which is where advances take place). A cursory analysis shows that masked areas -- except for those directly down long straight streets which, in any case, the attacker will avoid as an avenue of approach -- are very large. Thus, the only area of significant line of sight underestimation is firing from the upper story of one building over lower buildings to an upper story of another, which is not a normal part of an attack-defense situation.

ANALYTICAL PROCEDURES

To get representative line of sight distributions, random locations of target and firer would be misleading; instead, this analysis uses a sample of tactically reasonable defensive positions and avenues of approach.

Figures E-1* and E-2** show the locations of typical defensive positions and potential avenues of approach analyzed. The following principles were used for selecting firing positions:

- They must be part of a general line of defense which is practicable.

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*Shown on a section of the map: Amtlecher Plan der Stadt Ulm (Donau) and Neu-Ulm, 1972. 1: 10,000.

**Shown on a section of the map: U.S. Army, Europe, Munchen, Sheet 3; German Military City Maps 1: 12,500. U.S. Army, Europe Engineer Topograhic Center, 1965.

- There is at least 100 meters between adjacent positions.
- Together, all positions cover all avenues of approach into the defensive line.

The attacker was assumed to be able to find, for each avenue of approach to a defensive firing position, routes which would minimize his exposure to defender fire. Although this might not be a reasonable assumption in non-urban warfare, it is in city terrain. Fields of fire are so restricted and the possible avenues of approach so well defined that to make any other assumption is unreasonable. This assumption results, for each defensive firing position in the defended line and each avenue of approach, in a single "target appearance" point which represents the point at which the attacker can no longer advance unexposed to the defensive firing position. Measurements were made from each defensive position to the longest and shortest target appearance points, considering all feasible avenues of approach to that position. This was done for five situations in downtown Ulm (Donau) and one in downtown Munchen.

RESULTS

There were no significant differences between target appearance ranges in Munchen and Ulm (Donau). The distribution of line of sight range for these avenues of approach (one avenue per defensive firing position) which resulted in the closest target appearance points are shown in Figure E-3; the distribution for the avenues of approach resulting in the furthest target appearance points is shown in Figure E-4. These represent upper bounds on engagement ranges that could be encountered in city fighting -- actual firing ranges, of course, are much shorter and frequently are as

short as arms length -- due to the necessity to assault buildings and fight inside them.

In addition, newly developed areas around Munchen and Ulm (Donau) were surveyed to determine if they lent themselves to the same type of defensive organization. The circled areas in Figure E-5 are apartment house complexes typical of new housing in Germany; they and the nearby group of separate houses clearly do not canalize movement in the way that the central city does, and therefore do not create the typical city fighting situations discussed in this report. It proved impossible to lay out defensive positions in these new areas that were based entirely on building strongpoints.

FIGURE E-1

FIRER/TARGET RANGE MAP
ULM (DONAU)

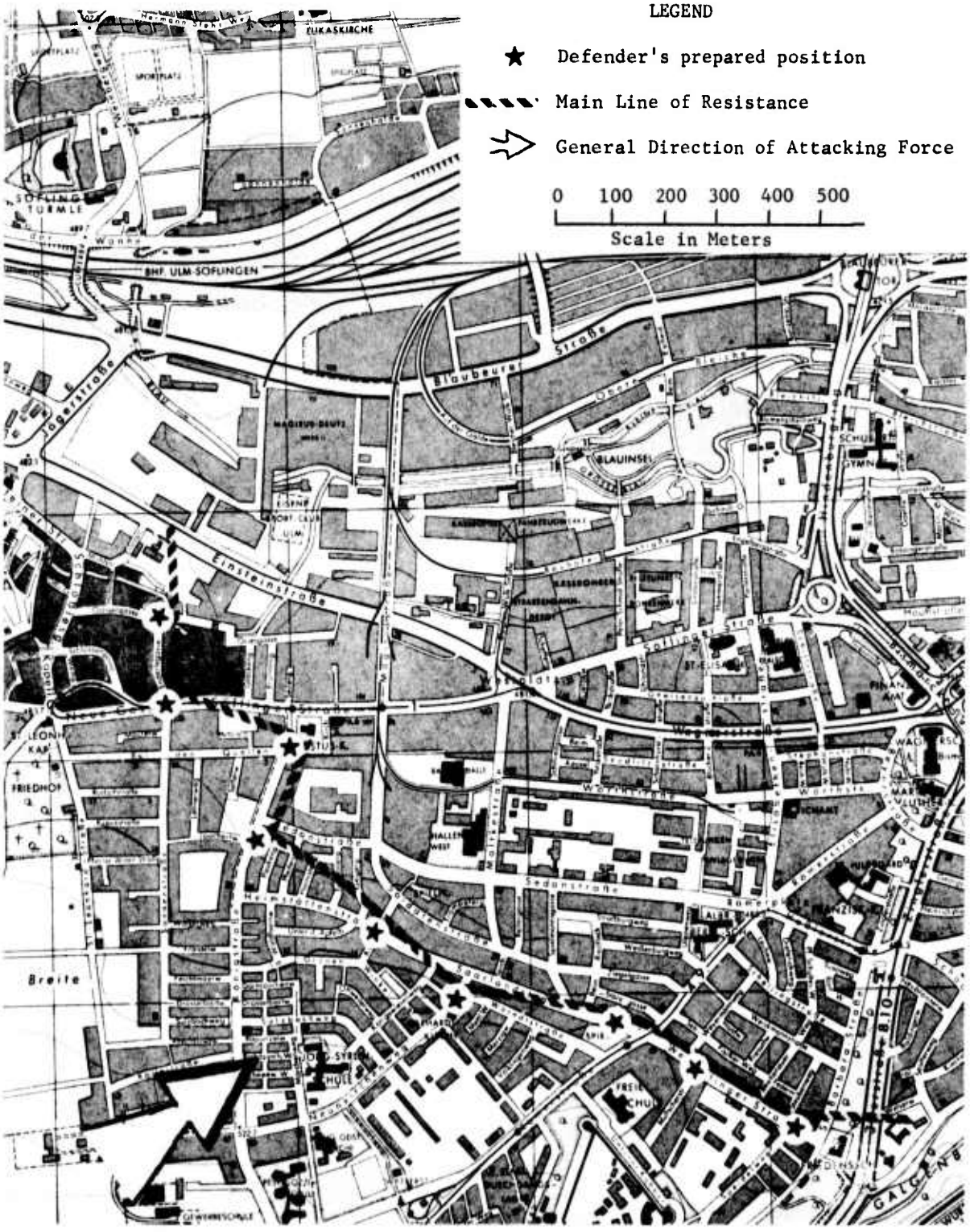


FIGURE E-2

FIRER/TARGET RANGE MAP
MUNCHEN

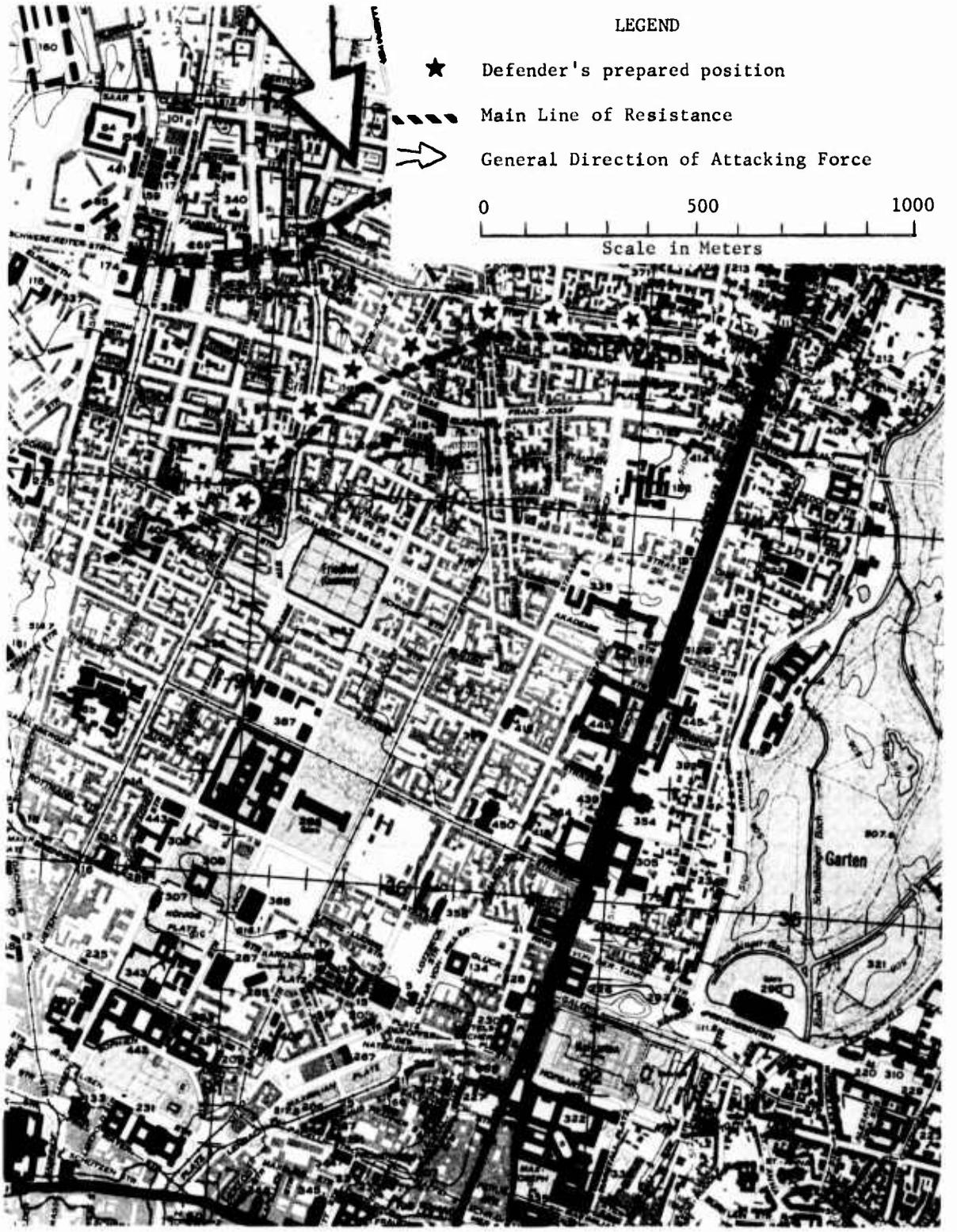


FIGURE E-3

CLOSEST TARGET APPEARANCE POINTS

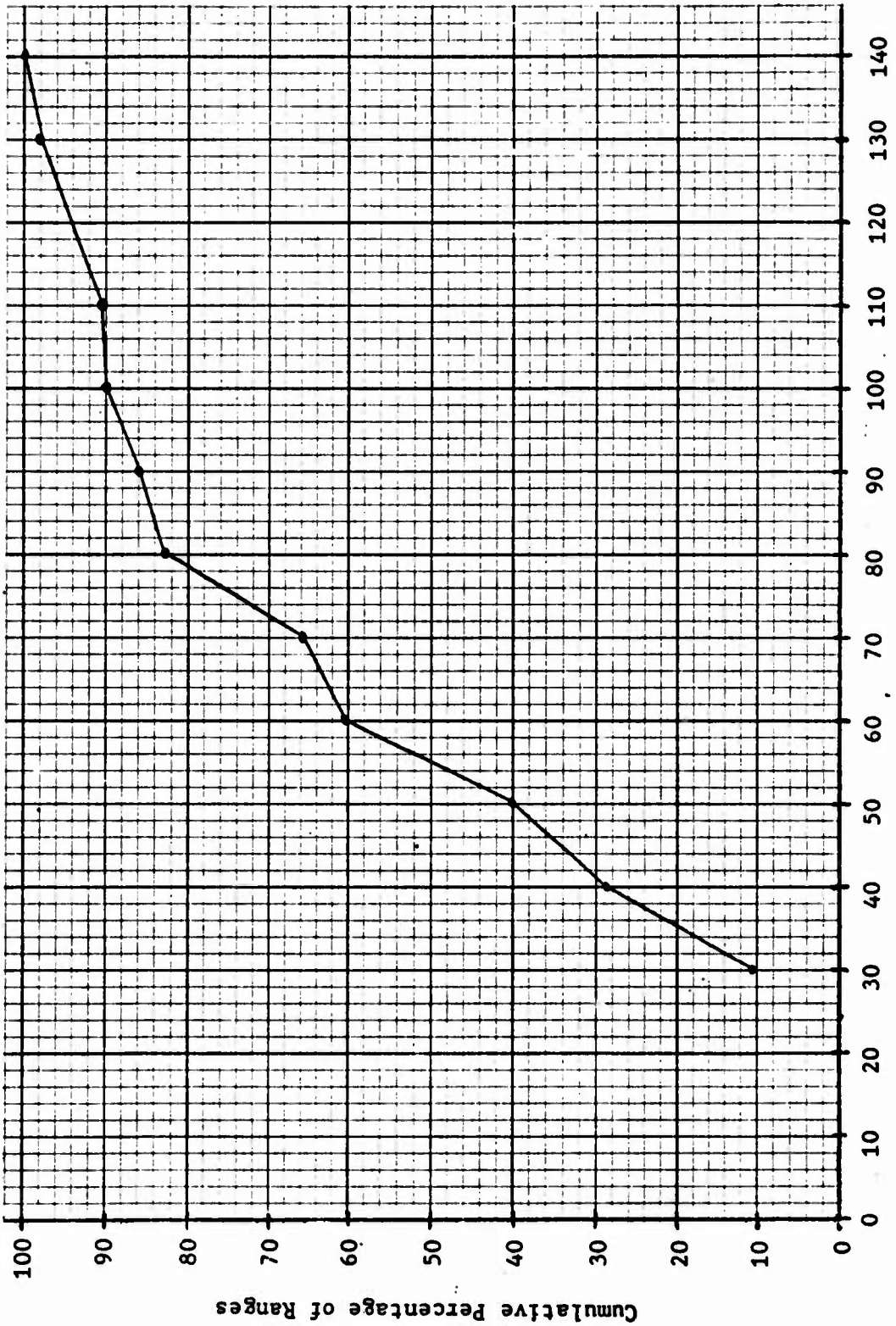


FIGURE E-4

LONGEST TARGET APPEARANCE POINTS

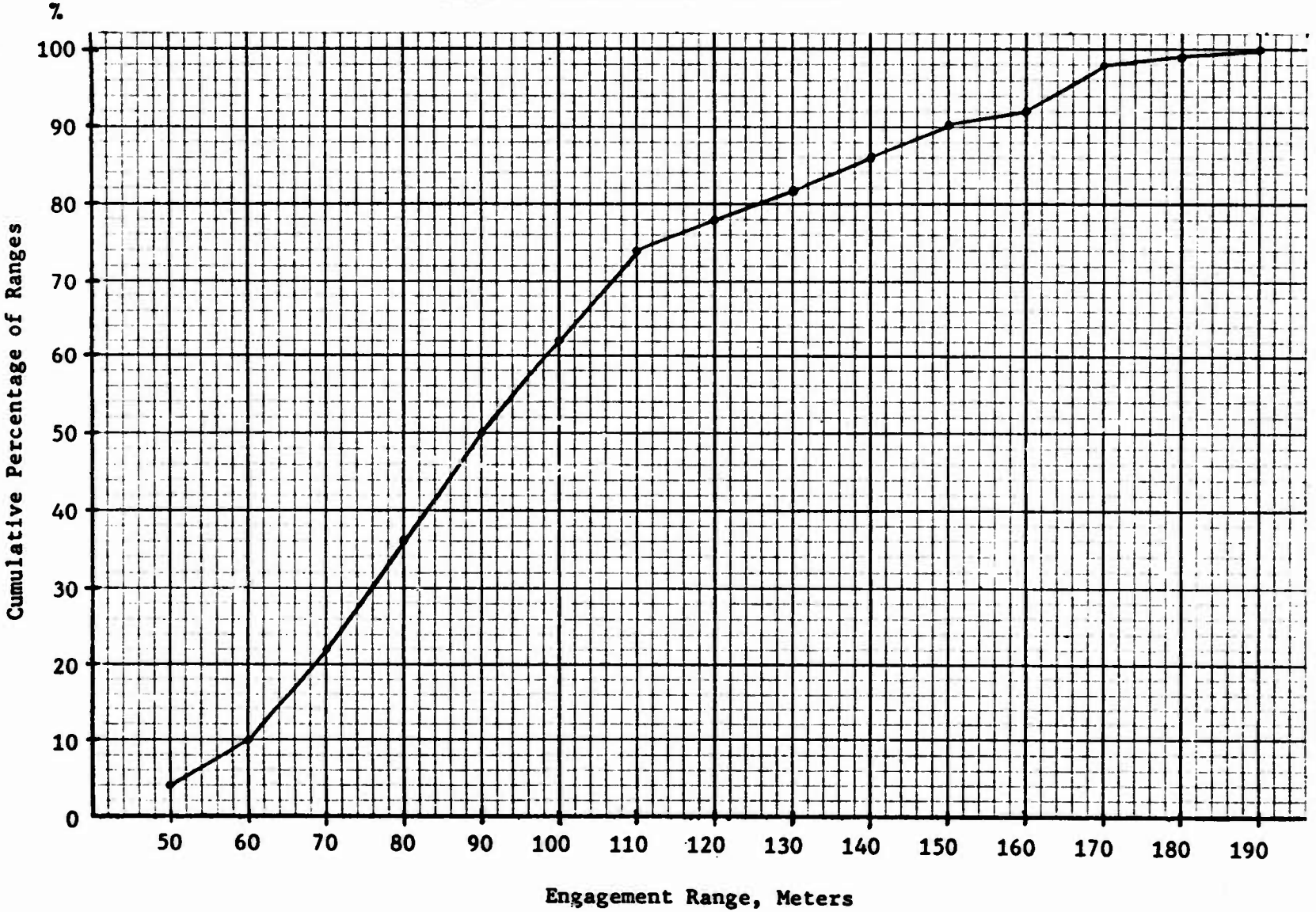
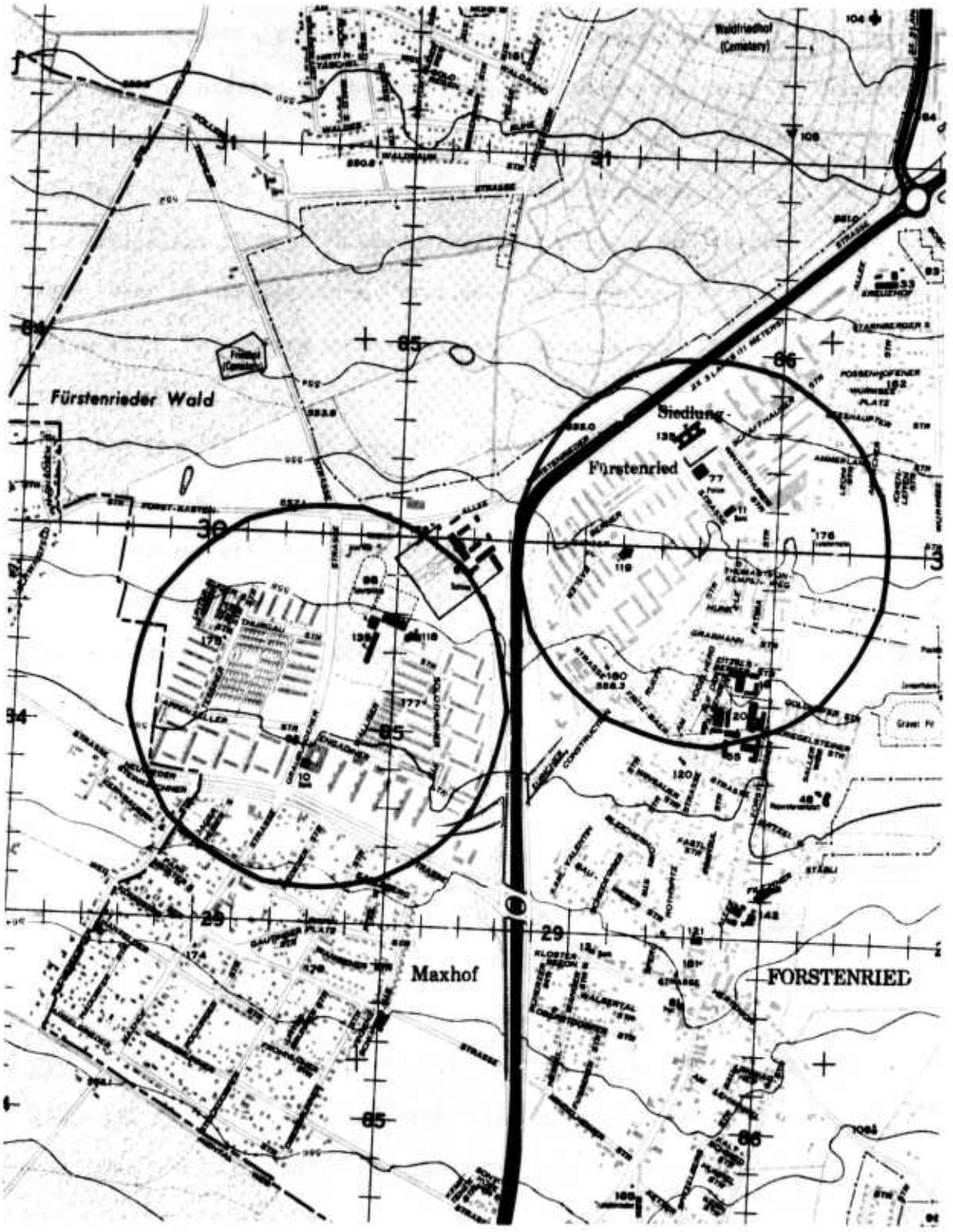


FIGURE E-5

NEWLY DEVELOPED AREAS IN MUNCHEN



APPENDIX F

WEAPON AND AMMUNITION LIST

This appendix contains a listing of a representative set of the weapons that were considered by the study together with some of their characteristics. Some foreign weapons and some obsolete U. S. weapons are listed. The purpose of the list is to indicate the scope of the weapon examination and some of the variations that exist among available weapons and their ammunition. (All types of ammunition now available for each weapon type listed are shown with that weapon except for small arms, all of which have ball and tracer rounds.)

The list is divided into the following weapon type groupings: rifles, submachine guns, machine guns, grenades, grenade and flame launchers, anti-armor weapons, artillery, mortars, flamethrowers, tank guns, mines, smoke munitions, and armed helicopter 2.75 inch rockets. (Other helicopter armaments are represented elsewhere in the list.) Bulk explosives are not listed because their characteristics do not differ in any way that is of interest. The physical and performance characteristics data presented in the following tables were derived from multiple sources such as Department of the Army field and technical manuals, weapons handbooks, test reports, studies, and publications. The sources used include the following references which are identified fully in Appendix H: (11, 30, 39, 40, 42, 43, 45, 46, 47, 48, 53, 59, 60, 62, 63, 66, 68, 71, 72, 73, 78, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 109, 128, 129, 149, 152, 155, 159, 163, 165, 171, 176, 177, 179, 180, 183, 184, 185, 186, 191, 192, 196, 199, 202, 204, 210, 230, 245,

246, 247, 254, 259, 260, 261, 263, 264, 267, 269, 270, 278, 280, 281, 282, 285, 291, 293).

TABLE F-1

RIFLES/ASSAULT RIFLES

Weapon	Caliber	Weight (lbs.)	Length (in.)	Magazine Capacity (no. of rds.)	No. of Rds. at 18 lbs. total wt.	Cyclic Rate (rds./min.)
M14	7.62mm	9.7	44	20	100	semi-auto.
M16A1	5.56mm	6.9	39	20 or 30	300	800-850
G3 (FRG)	7.62mm	9.6	40	20	100	500-600
AKM (Soviet)	7.62mm	7.7	35	30	160	600

TABLE F-2

SUBMACHINE GUNS

Weapon	Caliber	Weight (lbs.)	Length (in.)	Magazine Capacity (no. of rds.)	No. of Rds. at 10.5 lbs. total wt.	Cyclic Rate (rds./min.)
M3A1	.45	8.1	22.8*	30	60	350-450
Uzi M2A (Israel)	9mm	7.7	17.9*	25 or 40	70	550-600
Sterling (Patchett) L2A3 (UK)	7.62mm	6	19*	34	106	550

*Minimum lengths

TABLE F-3

MACHINE GUNS

Weapon	Caliber	Weight (lbs.)	Length (in.)	Cyclic Rate (rds/min.)
M60	7.62mm	23 (on bipod)	44	600
M2	.50	128 (on tripod)	65	600

TABLE F-4

FLAME LAUNCHER

Weapon	Weight Loaded (lbs.)	Length (in.)	Minimum Range (m)
66mm M202A1	(4 rounds) 26.6	27	20

TABLE F-5

40MM GRENADE LAUNCHERS

Weapon	Weight (lbs.)	Length (in.)	Type Ammunition
M79	6.5	29	HE (M406) HE (M463) smokeless and flashless
M203	3	attaches to rifle	HE (M397) bounding Dual purpose (M433) AT and APERS Illuminating (M583)

TABLE F-6

HAND AND RIFLE GRENADES

Grenade	Type	Weight (oz.)	Method of Use	
			Hand	Rifle
M31	HEAT	25	No	Yes
M19A1	WP	24	No	Yes
MK2	Frag	21	Yes	Yes
M26A1	Frag	16	Yes	Yes
M56	Frag	15.2	Yes	Yes
M33	Frag	13.9	Yes	No
MK3A2	Blast	15.6	Yes	No
MK1	Illum.	10	Yes	Yes
M8, M18	Smoke	24	Yes	Yes
M34	WP	27	Yes	Yes
B40 (Dutch)	Frag	5	Yes	No
RKG-3 (Soviet)	HEAT	34.2	Yes	No
M7A1, M7A3, M25A2 and M6A1	Chemical*	8-20	Yes	No
Gammon** (U.K.)	Blast	Variable	Yes	No

*These are riot type chemical agents.

**Actually a fuze that detonates on impact, to be used with plastic explosive. It is not now available, but the U.S. M217 impact fuze (which incorporates a one second safety delay after throwing) could be used in the same way as a field expedient.

TABLE F-7

ANTI-ARMOR WEAPONS

Weapon	Caliber	Loaded Weapon Weight (lbs.)	Ammo. Weight (lbs.)	Weapon Length (in.)	Minimum Range (m)	Ammunition
LAW, M72	66mm	5.4	5.4	35	28	HEAT
3.5" RL, M20A1B1	3.5"	23	8.9	60	10	HEAT
90mm RR, M67	90mm	47	9.3	53	10-15	HEAT, APERS (flechettes)
DRAGON, M47	5"	29	23	44	65*	HEAT
ARMBRUST 300 (FRG)	74mm	10.6	10.6	33	7-12	HEAT, HE, ILLUMINATION
RL, RPG-7 (Soviet)	100mm	20	5.5	38	not avail.	HEAT
106mm RR, M40A2	106mm	499	37	134	10-15	HEAT, HEP, APERS (flechettes)
TOW, MGM71A	152mm	220	54	87	65*	HEAT

*Based on range at which effective guidance begins--fuze arming occurs earlier, if unguided hits can be obtained.

TABLE F-8

ARTILLERY

Weapon	Type Ammunition Available*	
105mm Howitzer	HE, HEAT (High explosive anti-tank), HEP (High explosive plastic), Anti-personnel (flechettes), Illumination, Smoke	Projectile weights vary from 34 to 46 pounds
155mm Howitzer**	HE, Illumination, Smoke	Projectile weights vary from 86 to 102 pounds
8" Howitzer**	HE	Projectile weights vary from 201 to 243 pounds
175mm Gun	HE	Projectile weighs 147 pounds

*Fuze options available are superquick, delay, concrete piercing, time, and proximity (VT).

**Armored self-propelled versions exist.

TABLE F-9

MORTARS

Weapon	Weight w/base plate (lbs.)	Minimum Range (m)	Ammunition/Fuze Availability	
60mm, M19	20.5[a]	b/	HE WP ILL	Point detonating and time
81mm, M29A1	93[a]	72[c]	HE WP ILL	Point detonating, proximity, and time
4.2 in., M30	673	920[c]	HE WP ILL CML	Point detonating, proximity, and time

[a]Weight shown is with lightweight base plate.

[b]Minimum range unknown, but considered minimal.

[c]Minimum range for HE rounds.

TABLE F-10

MAN PORTABLE FLAME THROWERS

Weapon	Loaded Weight (lb.)	Continuous Flame Capability (sec.)	Thickened fuel range (m)	Unthickened* fuel range (m)
M2A1	65-69	6-9	40-50	20-25
M9E1	50	5-8	40-50	20-25

*Unthickened fuel cannot be fired into wind greater than 5 MPH.

TABLE F-11

TANK AND COMBAT ENGINEER VEHICLE GUNS

Type Vehicle	Type Ammunition Available	Remarks
90mm gun tank (M48A3)	HE* AP (armor piercing) HEP HEAT WP Cannister (anti-personnel)	Projectile weights vary from 35 to 44 pounds
105mm gun tank (M60A1)	AP HEP HEAT WP Beehive (flechettes)	Projectile weights vary from 41 to 48 pounds
152mm gun-launcher (M60A2)	HEAT MGM (shaped charge) Cannister Beehive (flechettes)	Projectile weights vary from 49 to 62 pounds
165mm gun (M728 Combat Engineer Vehicle)	HEP	Projectile weighs 68 pounds

*Fuze options for the 90mm HE round include super-quick, delay, time, and concrete piercing. Except for this round there are no fuze options.

TABLE F-12

MINES

Mine	Type	Weight (lbs.)	Comments
ANTI-TANK:			
M56	Blast	6	air-dispersed
M15	Blast	30	
M19	Blast	28	non-metallic
M21	Shaped Charge	18	
M66	Shaped Charge, Off-Route	23.8	rocket fired at side of tank
ANTI-PERSONNEL:			
M14	Blast	.3	non-metallic
M16A1	Bounding Frag	8	
Claymore, M18A2	Directional Frag	3.5	effects in a 60° horizontal arc
M25	Blast	.2	non-metallic
ILLUMINATING:			
M49A1	Flare	.7	

TABLE F-13

SMOKE PRODUCING MUNITIONS

Munition	Agent	Weight (lbs.)	Length of Burn (Min.)
M4A2 Smoke Pot	HC	38	10-15
M1 Smoke Pot	HC	12	5-8
M5 Smoke Pot	HC	33	10-20
M3A1-M3A3 Smoke Generator	Mounted on a one-quarter ton truck w/trailer, capable of continuous operations.		

TABLE F-14

HELICOPTER FFAR ARMAMENT

Type Helicopter	2.75 inch FFAR Launcher Designation	Number of Rounds*	Loaded Weight (lbs.)
AH-IG / UH-IB	M158A1	7	202
	M200A1	19	629

*Various warhead types, weights, and fuzing combinations are available.

APPENDIX G

COMBINATIONS OF WEAPON TYPE, WEAPON EFFECTS, COMBAT POSTURE AND PHYSICAL SITUATION USEFUL IN CITY FIGHTING

INTRODUCTION

This appendix presents the tabulated results of a systematic search of all combinations of weapon types, weapon effects, combat posture (attack or defense) and physical situation to identify those combinations that could be useful in city fighting. The selected useful combinations form the basis for the Chapter IV information search to define important city fighting information gaps; they also indicate under which circumstances desired weapon effects are not provided by any weapon type.

The basis for classifying weapon types, weapon effects, combat posture and physical situations is described in Chapter III. The chapter also describes the steps in the logical search for useful combinations of factors, as based on city fighting combat experience.

USABLE COMBINATIONS OF WEAPON EFFECTS, COMBAT POSTURE AND PHYSICAL SITUATION

Table G-1 shows the usable combinations of weapon effects, combat posture and physical situation, independent of weapon type used. This table is arranged with type of effect down the left side and physical situations across the top. (Thus, three factors--firer-target locations, building structure, and building density--are shown across the top.) An open block indicates that the specified combination of weapon effect and physical situation is considered usable and applicable to city fighting (e.g., anti-personnel fire from inside a building at targets outside buildings).

A blacked-out space indicates that the combination is not usable (e.g., anti-tank fire from outside buildings at tanks inside). Some of the open blocks contain diagonal dividing lines (attack/defense) which indicate that, with this combination of factors, combat posture must be considered. For instance, the firer-outside, target-inside situation is likely primarily when the firer is the attacker, and the firer-inside, target-outside situation is likely mainly when the firer is the defender. In the firer-inside, target-inside case (same building and different buildings), combat posture makes little difference in weapon performance; in the case of firer and target both outside, it may well make a difference.

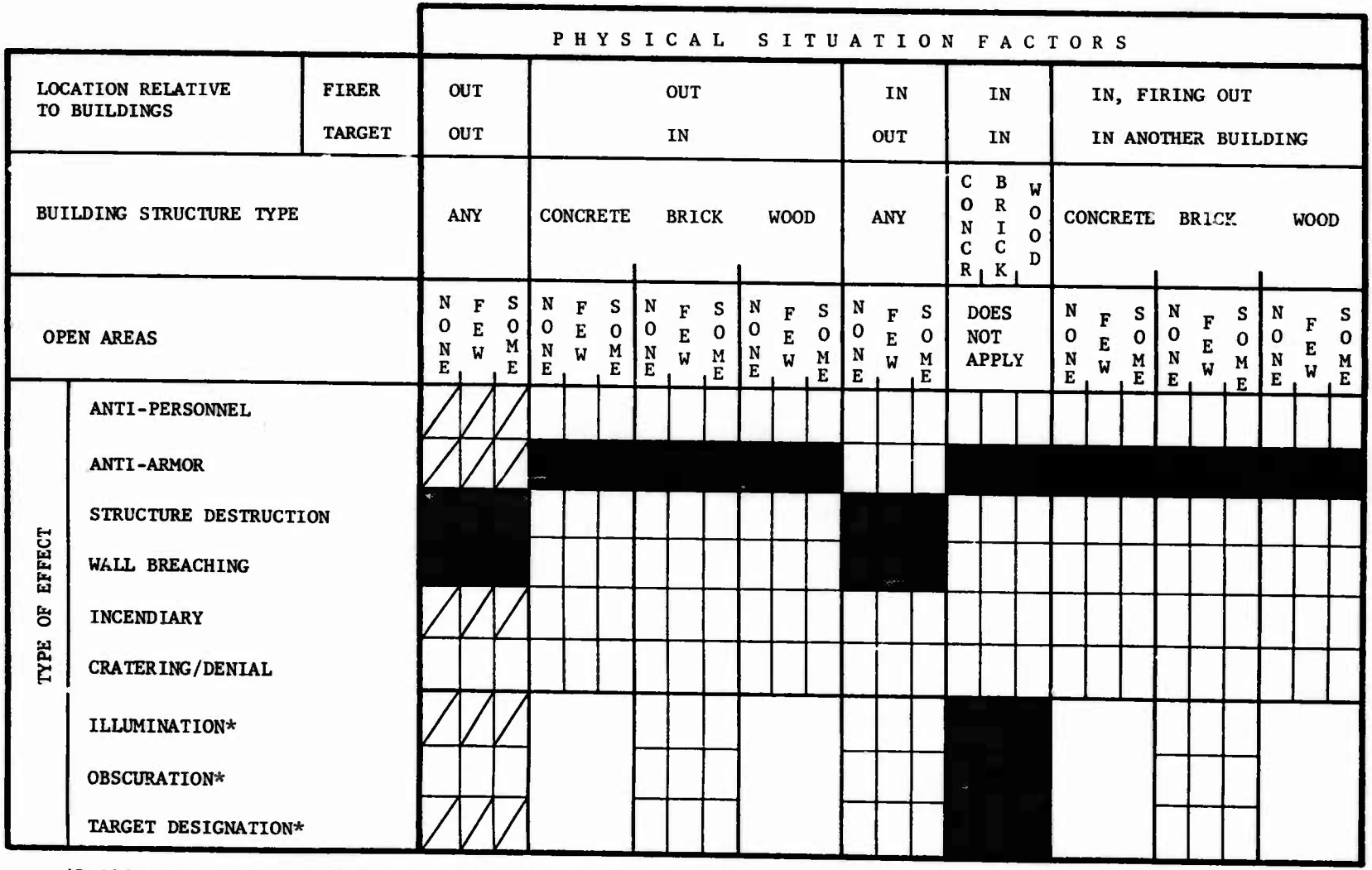
USABLE COMBINATIONS OF WEAPON TYPE, WEAPONS EFFECTS, COMBAT POSTURE, AND PHYSICAL SITUATIONS

Tables G-2 through G-12 add consideration of weapon type to the usable combinations of weapon effects and physical situations. The criteria for a usable combination of all three are: a) that some element of the weapon class be capable of producing at least a combat-useful amount of the desired effect, and b) that when the firer is inside a building, the weapon type can be physically used inside a building.

Those weapon effects which are inappropriate to a weapon type for all physical situations or all firer-target relationships are left out of each weapon type table for simplicity; when only some of the physical situations or firer-target relationships are inapplicable, the corresponding blocks are blacked out.

TABLE G-1

PHYSICAL SITUATIONS APPLICABLE TO EACH WEAPON EFFECT



*Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-2

SITUATIONS APPLYING TO SMALL ARMS

		PHYSICAL SITUATION FACTORS																							
LOCATION RELATIVE TO BUILDINGS	FIRER	OUT			OUT									IN			IN			IN, FIRING OUT					
	TARGET	OUT			IN									OUT			IN			IN ANOTHER BUILDING					
BUILDING STRUCTURE TYPE		ANY			CONCRETE			BRICK			WOOD			ANY			CONCR	BRICK	WOOD	CONCRETE			BRICK			WOOD		
OPEN AREAS		NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	DOES NOT APPLY			NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME
TYPE OF EFFECT	ANTI-PERSONNEL																											
	ANTI-ARMOR																											
	INCENDIARY																											
	TARGET DESIGNATION*																											

*Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-3

SITUATIONS APPLYING TO SHORT RANGE LAUNCHED MUNITIONS

	PHYSICAL SITUATION FACTORS																										
LOCATION RELATIVE TO BUILDINGS — FIRER	OUT			OUT									IN			IN			IN, FIRING OUT								
LOCATION RELATIVE TO BUILDINGS — TARGET	OUT			IN									OUT			IN			IN ANOTHER BUILDING								
BUILDING STRUCTURE TYPE	ANY			CONCRETE			BRICK			WOOD			ANY			CONCR	BRICK	WOOD	CONCRETE			BRICK			WOOD		
OPEN AREAS	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	DOES NOT APPLY			NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME
TYPE OF EFFECT: ANTI-PERSONNEL																											
ANTI-ARMOR																											
INCENDIARY																											
WALL BREACHING																											
ILLUMINATION*																											
OBSCURATION*																											
TARGET DESIGNATION*																											

*Building structure type not relevant to this effect; brick category used to represent all types.

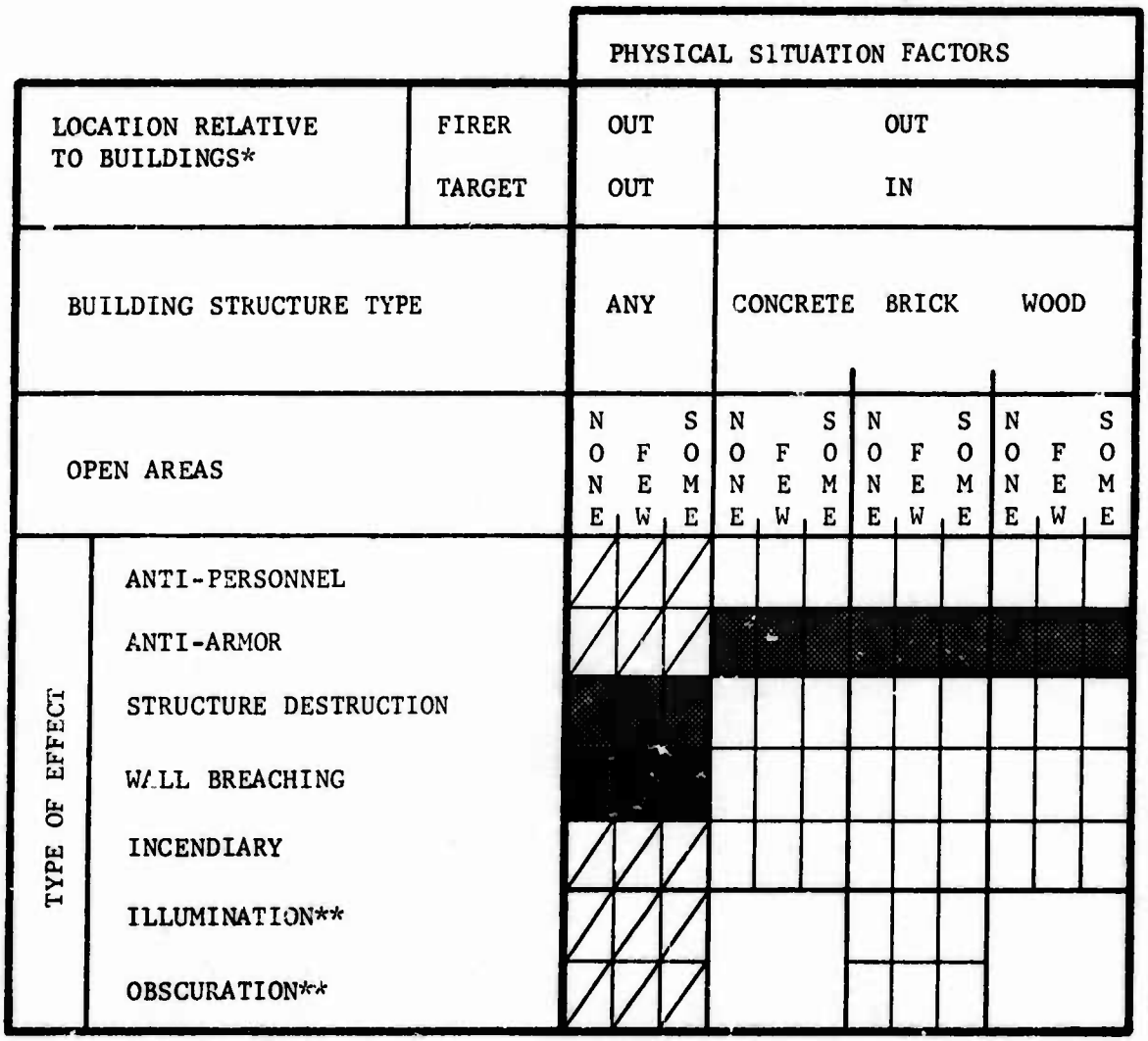
TABLE G-4

SITUATIONS APPLYING TO ANTI-ARMOR WEAPONS

		PHYSICAL SITUATION FACTORS																								
LOCATION RELATIVE TO BUILDINGS	FIRER	OUT			OUT									IN			IN			IN, FIRING OUT						
	TARGET	OUT			IN									OUT			IN			IN ANOTHER BUILDING						
BUILDING STRUCTURE TYPE		ANY			CONCRETE			BRICK			WOOD			ANY			CONCRETE (CONCR)	BRICK	WOOD	CONCRETE			BRICK			WOOD	
OPEN AREAS		NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	DOES NOT APPLY			NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME
TYPE OF EFFECT	ANTI-PERSONNEL																											
	ANTI-ARMOR																											
	STRUCTURE DESTRUCTION																											
	WALL BREACHING																											

TABLE G-5

SITUATIONS APPLYING TO ARMORED COMBAT VEHICLES

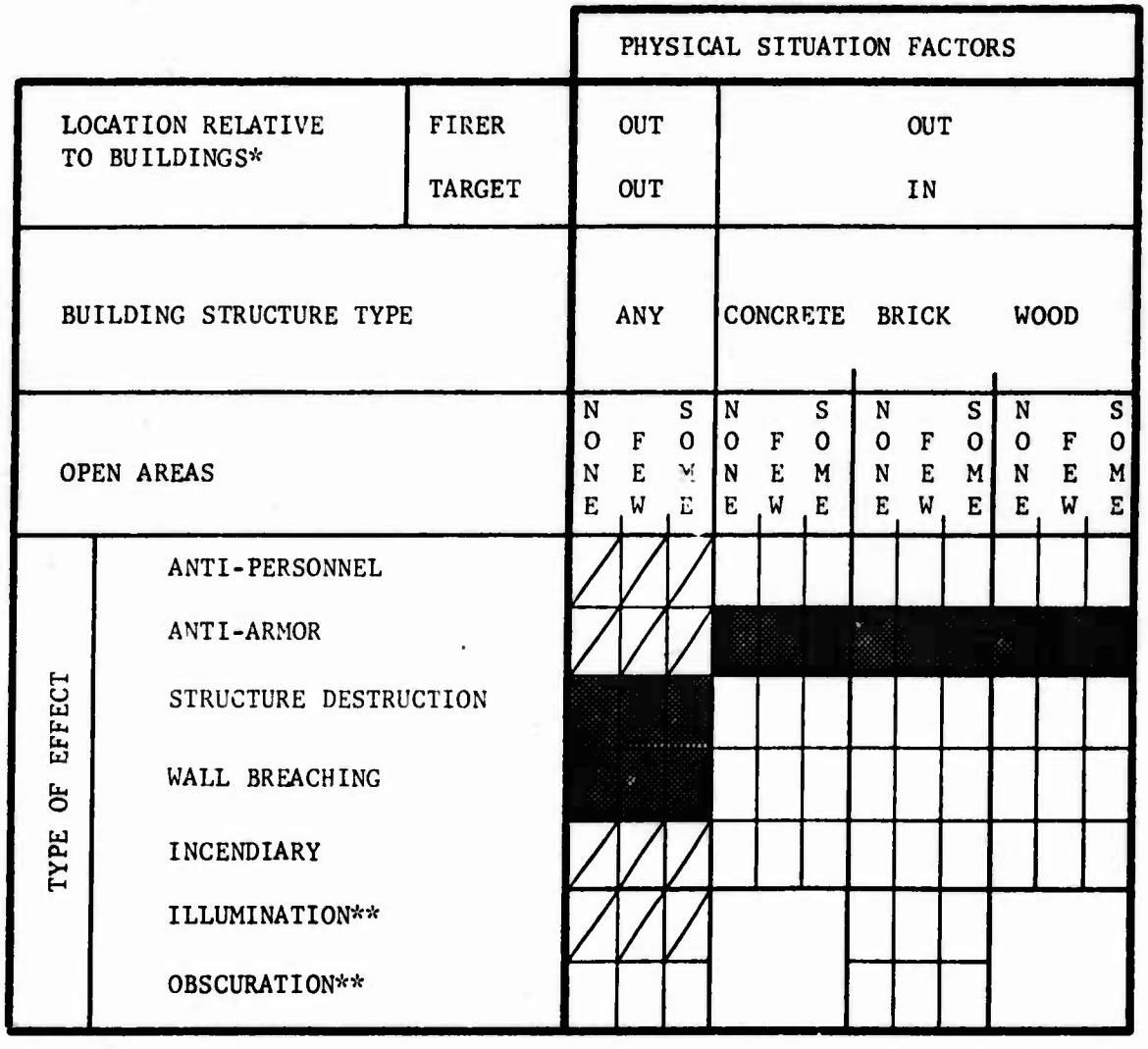


*Firer location inside of buildings is not a reasonable condition.

**Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-6

SITUATIONS APPLYING TO ARTILLERY



*Firer location inside of buildings is not a reasonable condition.

**Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-7

SITUATIONS APPLYING TO MORTARS

		PHYSICAL SITUATION FACTORS											
LOCATION RELATIVE TO BUILDINGS*	FIRER	OUT	OUT										
	TARGET	OUT	IN										
BUILDING STRUCTURE TYPE		ANY	CONCRETE			BRICK			WOOD				
OPEN AREAS		NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME
TYPE OF EFFECT	ANTI-PERSONNEL												
	STRUCTURE DESTRUCTION												
	INCENDIARY												
	ILLUMINATION**												
	OBSCURATION**												

*Firer location inside of buildings is not a reasonable condition.

**Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-8

SITUATIONS APPLYING TO EXPLOSIVES

		PHYSICAL SITUATION FACTORS						
EXPLOSIVE LOCATION RELATIVE TO BUILDINGS*		OUT			IN OR ON		
BUILDING STRUCTURE TYPE		ANY			CONCR	BRICK	WOOD
OPEN AREAS		NONE	FEW	SOME	DOES NOT APPLY		
TYPE OF EFFECT	STRUCTURE DESTRUCTION	■	■	■			
	WALL BREACHING	■	■	■			
	CRATERING/DENIAL						

*The location of explosives implies the target location because of the immobile character of explosives and their short radii of effects. All uses are considered to be in attack.

TABLE G-9

SITUATIONS APPLYING TO MINES

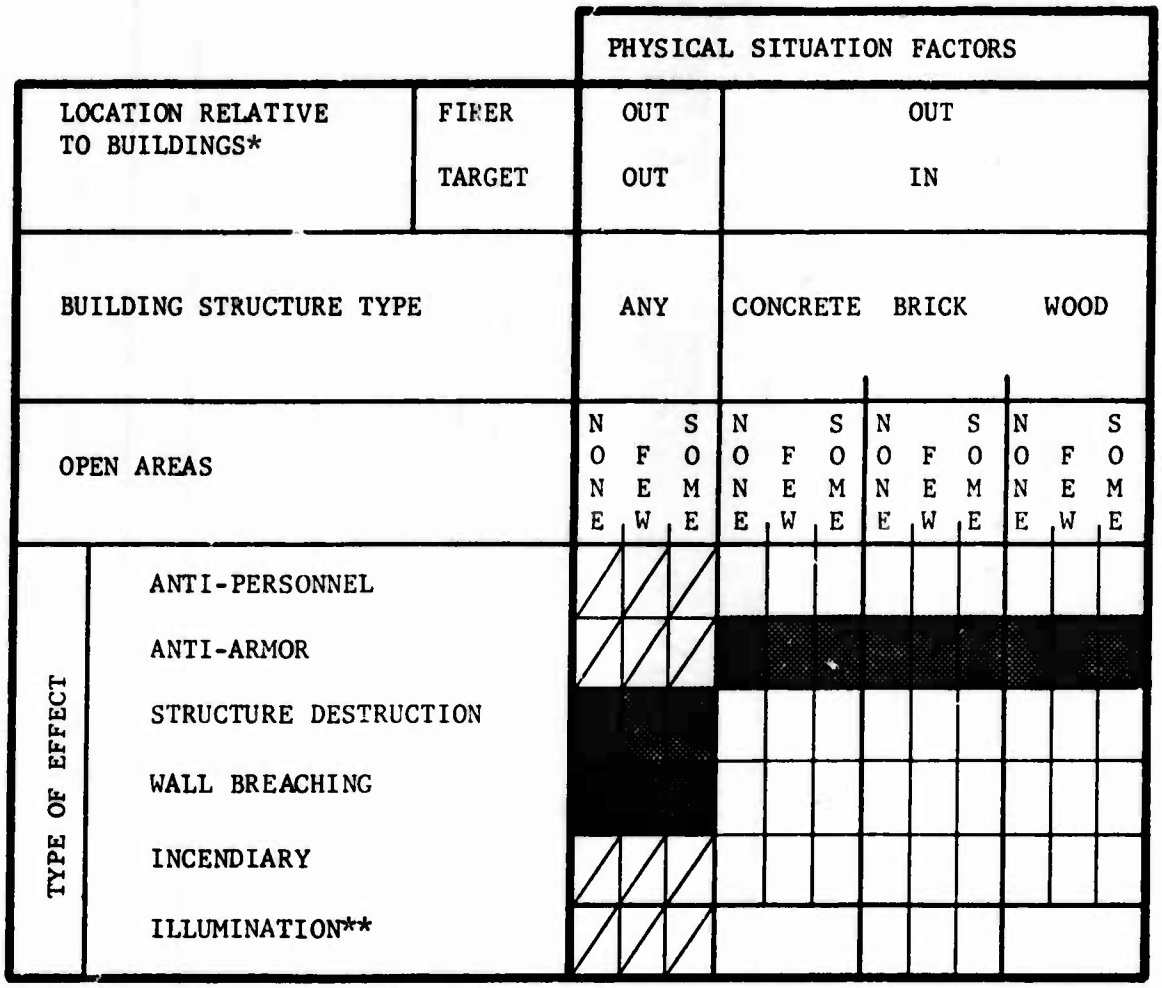
		PHYSICAL SITUATION FACTORS					
MINE LOCATION RELATIVE TO BUILDINGS*		OUT			IN		
BUILDING STRUCTURE TYPE		ANY			CONCR	BRICK	WOOD
OPEN AREAS		NONE	FEW	SOME	DOES NOT APPLY		
TYPE OF EFFECT	ANTI-PERSONNEL						
	ANTI-ARMOR						
	INCENDIARY						
	CRATERING DENIAL						
	ILLUMINATION**						

*The location of a mine implies the target location because of the immobile character of mines and their short radii of effects. All uses are considered to be in defense.

**Building structure type not relevant to this effect.

TABLE G-10

SITUATIONS APPLYING TO HELICOPTER DELIVERED WEAPONS



*Firer location inside of buildings is not a reasonable condition.

**Building structure type not relevant to this effect; brick category used to represent all types.

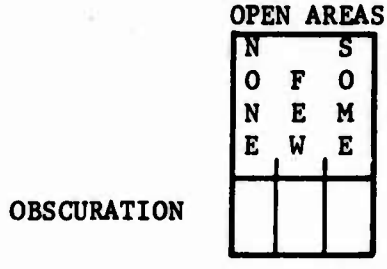
TABLE G-11

SITUATIONS APPLYING TO MAN-PORTABLE FLAME THROWERS

		PHYSICAL SITUATION FACTORS																										
LOCATION RELATIVE TO BUILDING	FIRER	OUT			OUT									IN			IN			IN, FIRING OUT								
	TARGET	OUT			IN									OUT			IN			IN ANOTHER BUILDING								
BUILDING STRUCTURE TYPE		ANY			CONCRETE			BRICK			WOOD			ANY			CONCR	BRICK	WOOD	CONCRETE			BRICK			WOOD		
OPEN AREAS		NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	DOES NOT APPLY			NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME
TYPE OF EFFECT	ANTI-PERSONNEL	╱	╱	╱																								
	ANTI-ARMOR	╱	╱	╱	■	■	■	■	■	■	■	■	■				■	■	■	■	■	■	■	■	■	■	■	■
	INCENDIARY	╱	╱	╱	■	■	■	■	■	■										■	■	■	■	■	■			

TABLE G-12

SITUATIONS APPLYING TO SMOKE POTS
AND SMOKE GENERATORS*



*These smoke generating munitions can only be used in locations under friendly control, and their massive smoke output makes their use inside buildings inappropriate. Thus only the building density variable affects their operational effectiveness.

USEFUL AND IMPORTANT COMBINATIONS OF WEAPON TYPE, WEAPON EFFECTS, COMBAT POSTURE AND PHYSICAL SITUATION

The basis for evaluating the importance in city fighting of a given combination is described in Chapter III. Tables G-13 through G-23 show the results of this evaluation of importance. These tables are duplicates of those presented in Table G-2 through G-12 except that a dot has been entered in each block representing a situation in which a weapon type was judged to be capable of significant contributions towards a desired effect.

RESULTS

Review of Tables G-13 through G-23 shows that, of the 177 combinations of factors identified as being likely to occur in city fighting, one or more weapon types appear to be able to produce the desired weapon effects in all but 33 cases, and in some of them as many as six weapon types can do so. The 33 combinations in which no weapon type appears able to produce significant weapon effects are:

- Wall breaching and structure destruction when the firer is inside a building and the target is in another building (18 combinations). The backblast limitation on firing rocket launchers and recoilless rifles inside buildings prevents the anti-armor weapons type from being assessed as a significant contributor. The artillery, mortar, armored combat vehicles and aerial weapons types are not normally fired from inside buildings. When these latter supporting weapons are available and not masked, they can fulfill the wall-breaching function from their normal outside locations.

- o Wall breaching when both firer and target are inside the same building (3 combinations). Only small anti-armor weapons and demolitions could contribute significantly in these situations, and the problem of safety to using troops makes the significance of the anti-armor weapons contribution questionable.
- o Cratering and denial in the "some open areas" level of building density (2 combinations). These cases represent a minimum level of canalization of attacker movement in a city, and the hardness of city pavement surfaces severely restricts hasty emplacement of mines or cratering explosives (except for the reported use of a chain of mines to be pulled across a street by hand just in front of advancing vehicles). Thus more of these munitions would be required and their emplacement would be difficult. However, means other than the identified weapon types can be used for denial of movement in this situation, e.g., concertina wire, rubble barricades and overturned cars.
- o Illumination inside buildings when open areas are other than minimal (4 combinations). Other than setting fires inside buildings with tracers or incendiary munitions, the only weapon type potentially capable of such illumination (which entails accurate delivery of flares through windows or other openings) is the short range launched munitions type. The "few" and "some" open areas cases imply ranges longer than those at which accurate flare delivery could be expected from such launchers.

- o Illumination of outside targets by firers located inside buildings when maximum open areas exist (one combination). The inside location of the firer limits him to the use of small, short range flares, yet the need is to illuminate large areas at medium ranges. Such targets could be illuminated by artillery or mortar flares located outside, if the supporting weapons with forward observers and communications are available and not masked. However, flares aloft are likely to cast even greater obscuring shadows in cities than in the country. Setting fire to nearby buildings can also provide illumination.
- o Obscuration of areas outside buildings by munitions launched from inside buildings in cases where open areas are other than minimal (5 combinations). No munitions capable of mass smoke production and operable from inside buildings are available (though small smoke producers such as WP grenades are available), but this target effect can be achieved by smoke pots, smoke generators, artillery and mortars located outside.

These results support a tentative conclusion that, for most of the useful city fighting tasks, at least one weapon and usually several can provide the effects desired--with the exceptions noted above.

TABLE G-13

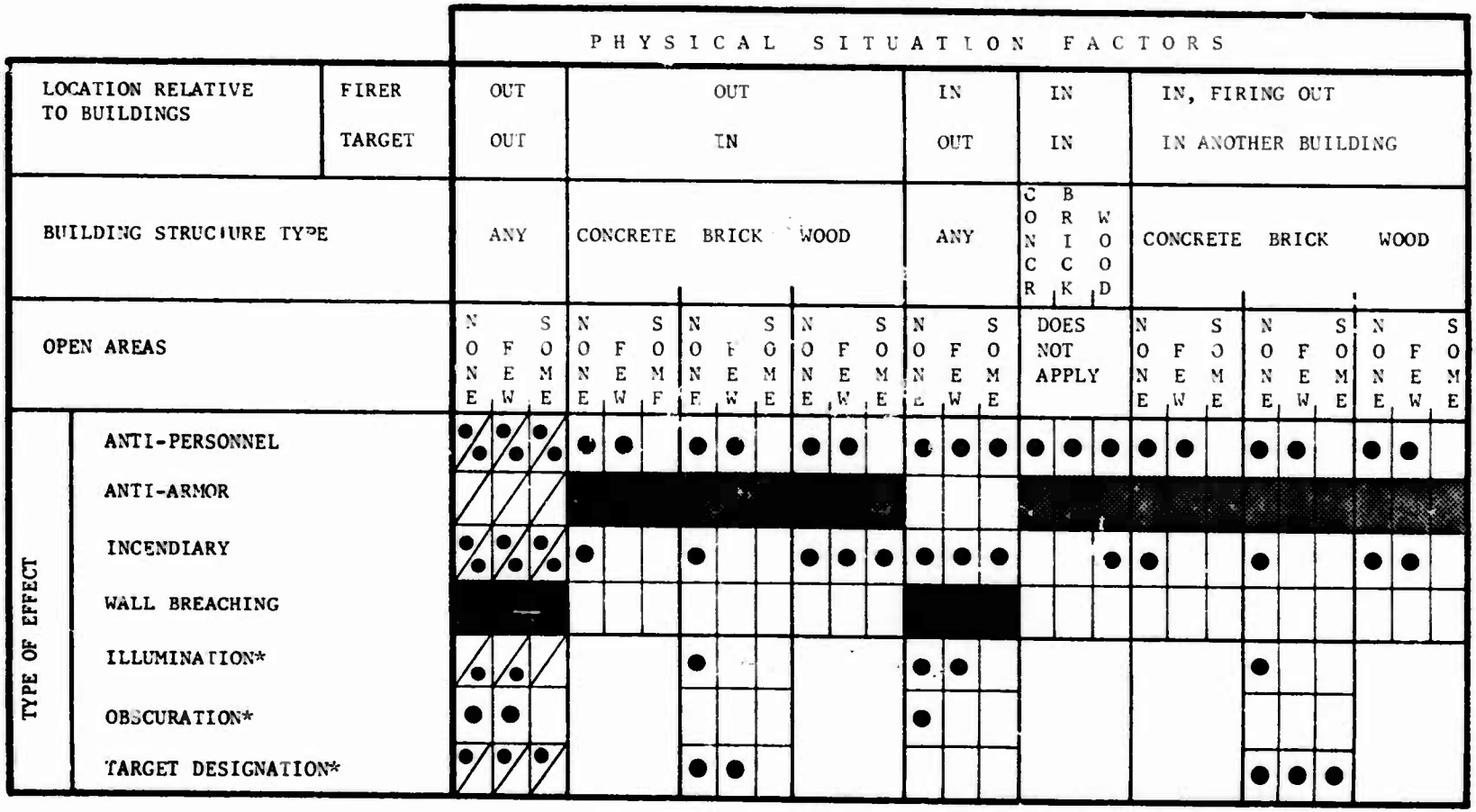
SITUATIONS IN WHICH SMALL ARMS CONTRIBUTE SIGNIFICANTLY

PHYSICAL SITUATION FACTORS																										
LOCATION RELATIVE TO BUILDINGS	FIRER	OUT			OUT									IN			IN			IN, FIRING OUT						
	TARGET	OUT			IN									OUT			IN			IN ANOTHER BUILDING						
BUILDING STRUCTURE TYPE		ANY			CONCRETE			BRICK			WOOD			ANY			CONCR	BRICK	WOOD	CONCRETE			BRICK			WOOD	
OPEN AREAS		NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	DOES NOT APPLY			NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME
TYPE OF EFFECT	ANTI-PERSONNEL	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	ANTI-ARMOR				■	■	■	■	■	■	■	■	■				■	■	■	■	■	■	■	■	■	■	■	■
	INCENDIARY				●	●	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●	●	●	●	●
	TARGET DESIGNATION*	●	●	●				●	●	●				●	●	●							●	●	●			

*Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-14

SITUATIONS IN WHICH SHORT RANGE LAUNCHED MUNITIONS CONTRIBUTE SIGNIFICANTLY



*Building structure type not relevant to this effect; brick category used to represent all types.

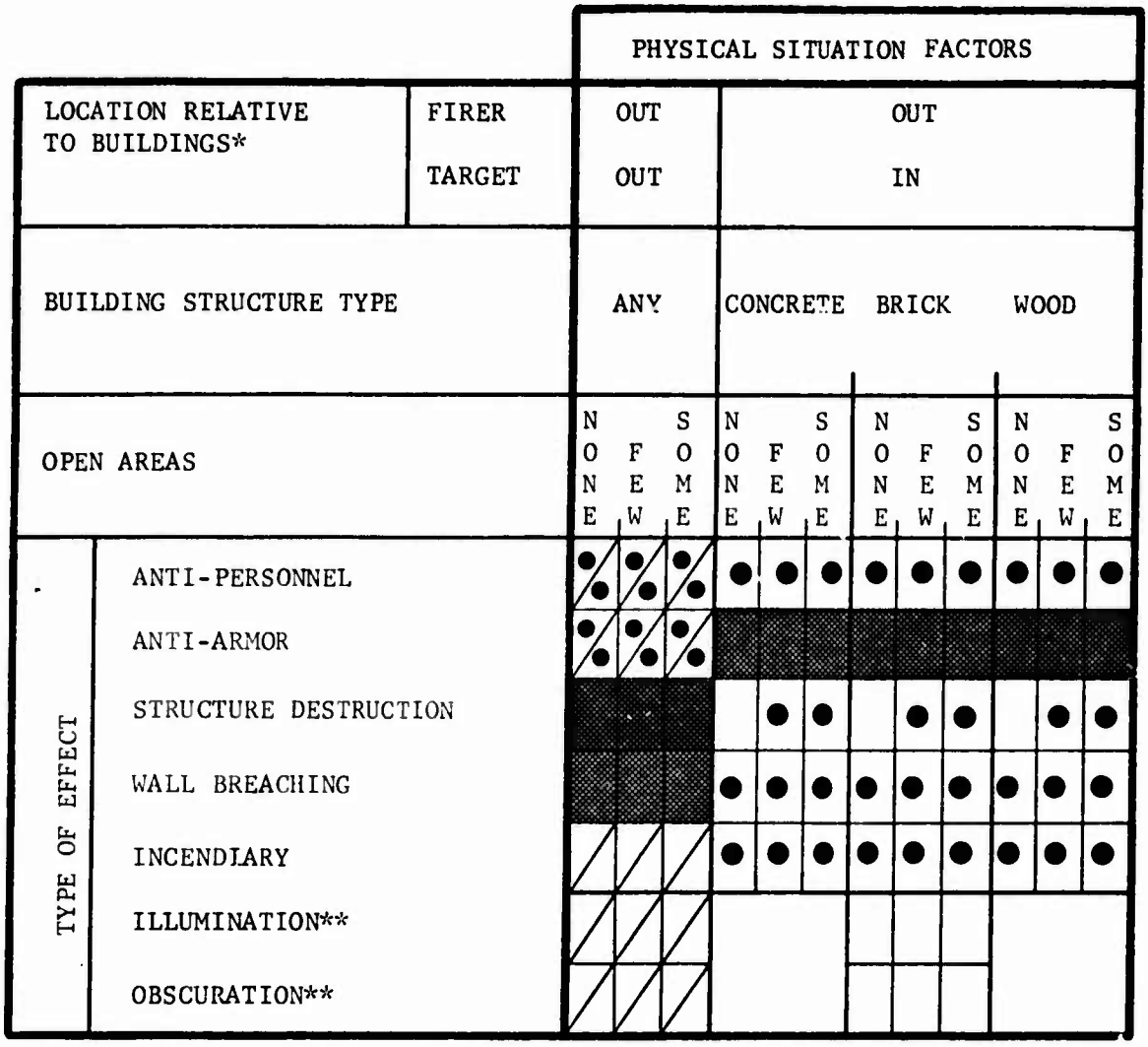
TABLE G-15

SITUATIONS IN WHICH ANTI-ARMOR WEAPONS CONTRIBUTE SIGNIFICANTLY

		PHYSICAL SITUATION FACTORS																											
LOCATION RELATIVE TO BUILDINGS	FIRER	OUT												IN			IN			IN, FIRING OUT									
	TARGET	OUT									IN			OUT			IN			IN ANOTHER BUILDING									
BUILDING STRUCTURE TYPE		ANY			CONCRETE			BRICK			WOOD			ANY			CONCRETE REINFORCED			CONCRETE			BRICK			WOOD			
OPEN AREAS		NONE	W	SOME	NONE	W	SOME	NONE	W	SOME	NONE	W	SOME	NONE	W	SOME	DOES NOT APPLY			NONE	W	SOME	NONE	W	SOME	NONE	W	SOME	
TYPE OF EFFECT	ANTI-PERSONNEL	●	●	●	●	●	●	●	●	●	●	●	●																
	ANTI-ARMOR	●	●	●										●	●	●													
	STRUCTURE DESTRUCTION																												
	WALL BREACHING							●	●	●	●	●	●																

TABLE G-16

SITUATIONS IN WHICH ARMORED COMBAT VEHICLES CONTRIBUTE SIGNIFICANTLY

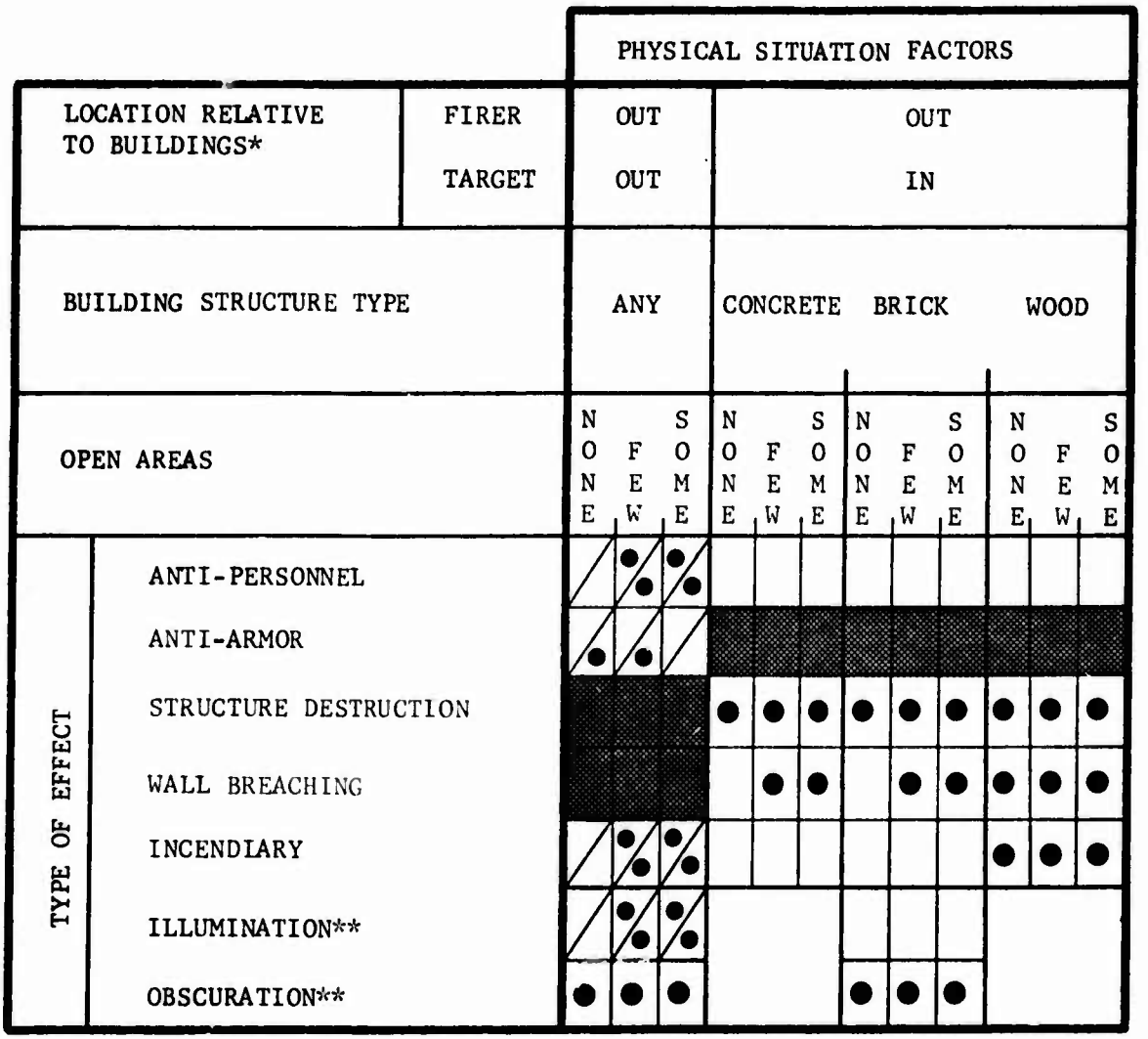


*Firer location inside of buildings is not a reasonable condition.

**Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-17

SITUATIONS IN WHICH ARTILLERY CONTRIBUTE SIGNIFICANTLY

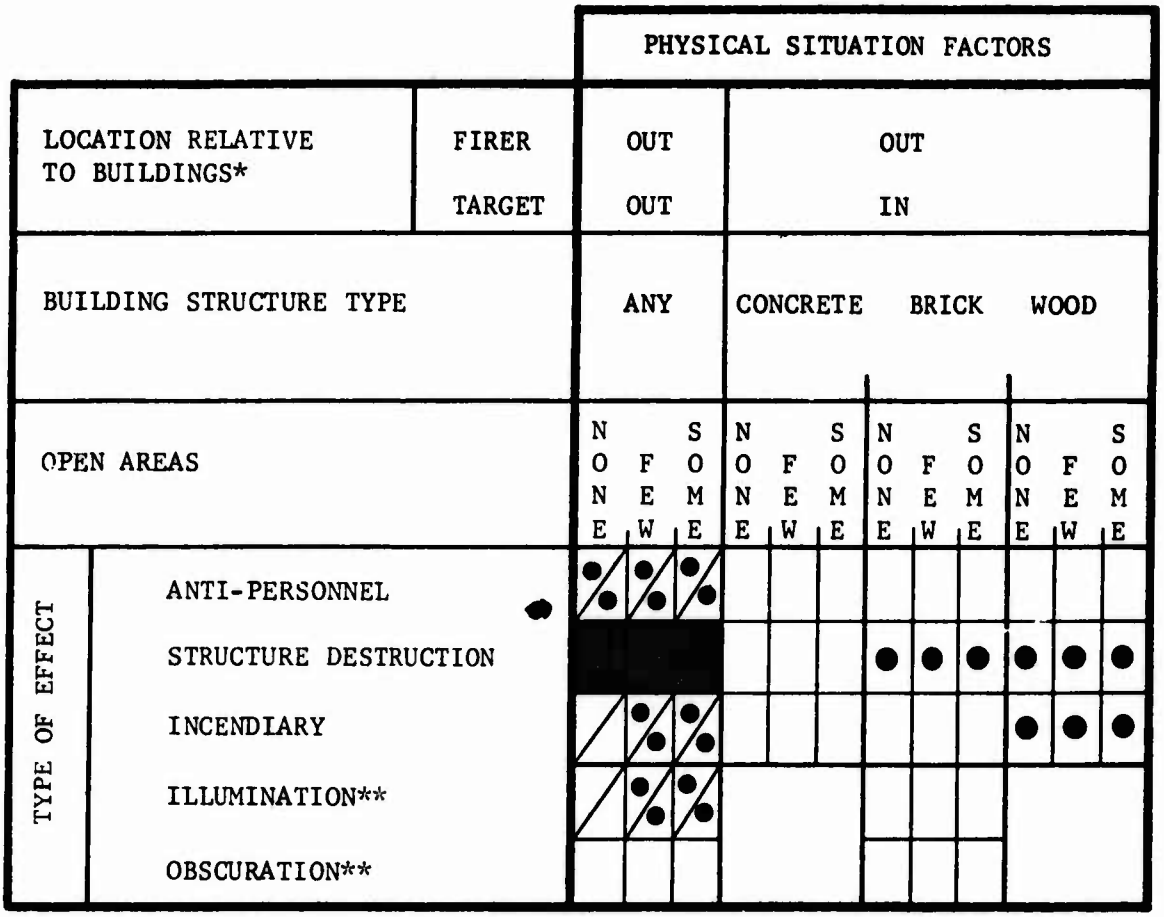


*Firer location inside of buildings is not a reasonable condition.

**Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-18

SITUATIONS IN WHICH MORTARS CONTRIBUTE SIGNIFICANTLY



*Firer location inside of buildings is not a reasonable condition.

**Building structure type not relevant to this effect; brick category used to represent all types.

TABLE G-19

SITUATIONS IN WHICH EXPLOSIVES CONTRIBUTE SIGNIFICANTLY

		PHYSICAL SITUATION FACTORS					
EXPLOSIVE LOCATION RELATIVE TO BUILDINGS*		OUT			IN OR ON		
BUILDING STRUCTURE TYPE		ANY			CONCR	BRICK	WOOD
OPEN AREAS		NONE	FEW	SOME	DOES NOT APPLY		
TYPE OF EFFECT	STRUCTURE DESTRUCTION						
	WALL BREACHING						
	CRATERING/DENIAL	●	●				

*The location of explosives implies the target location because of the immobile character of explosives and their short radii of effects. All uses are considered to be in attack.

TABLE G-20

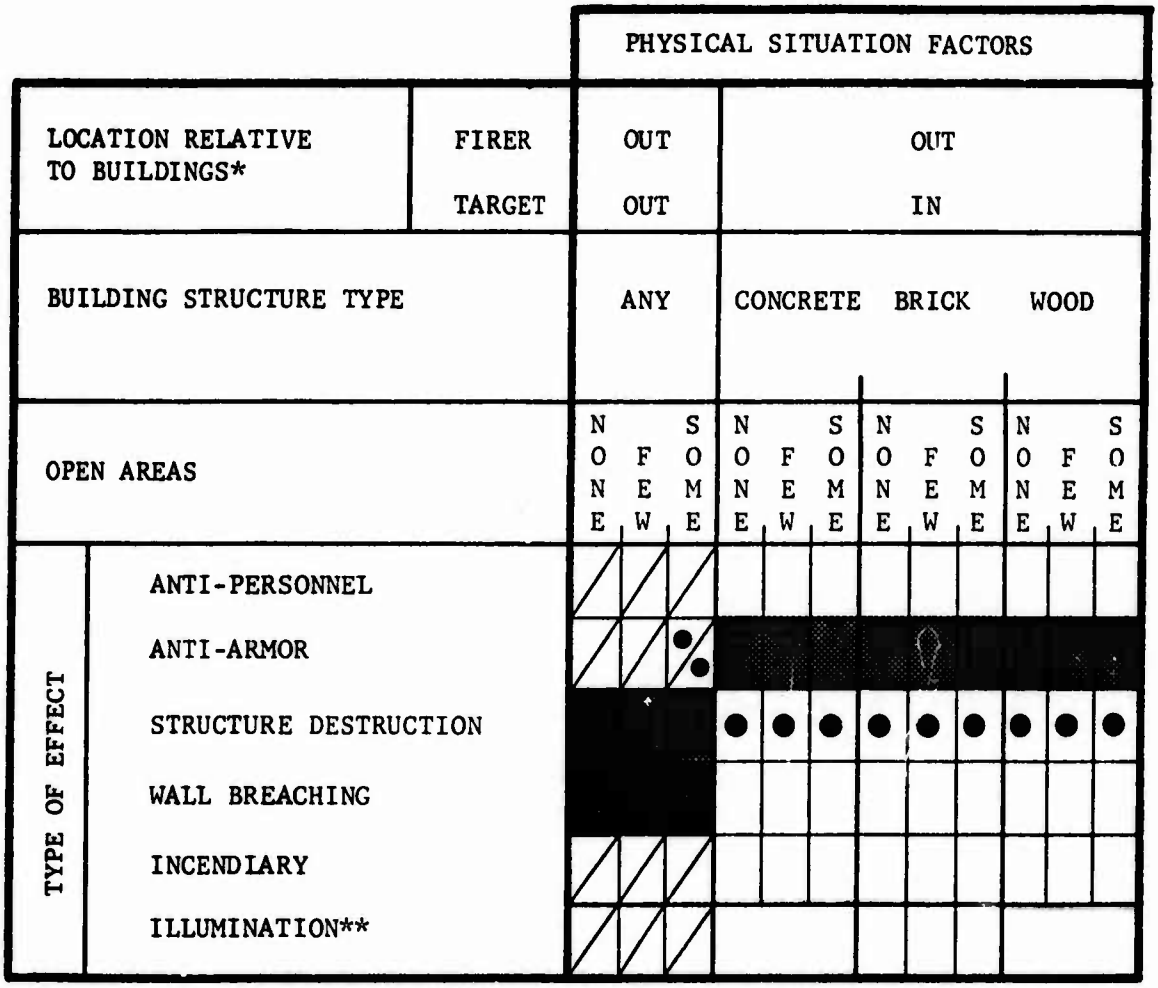
SITUATIONS IN WHICH MINES CONTRIBUTE SIGNIFICANTLY

		PHYSICAL SITUATION FACTORS					
MINE LOCATION RELATIVE TO BUILDINGS*		OUT			IN		
BUILDING STRUCTURE TYPE		ANY			CONCR	BRICK	WOOD
OPEN AREAS		NONE	FEW	SOME	DOES NOT APPLY		
TYPE OF EFFECT	ANTI-PERSONNEL	●	●		●	●	●
	ANTI-ARMOR	●	●				
	INCENDIARY						
	CRATERING/DENIAL	●	●		●	●	●
	ILLUMINATION	●					

*The location of a mine implies the target location because of the immobile character of mines and their short radii of effects. All uses are considered to be in defense.

TABLE G-21

SITUATIONS IN WHICH HELICOPTER DELIVERED WEAPONS CONTRIBUTE SIGNIFICANTLY



*Firer location inside of buildings is not a reasonable condition.

**Building structure type not relevant to this effect; brick category used to represent all types.

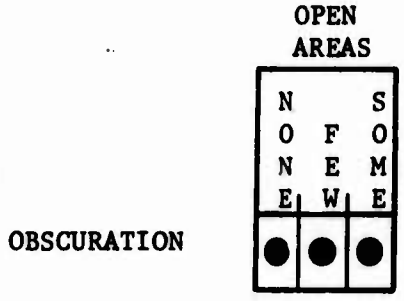
TABLE G-22

SITUATIONS IN WHICH MAN-PORTABLE FLAME THROWERS CONTRIBUTE SIGNIFICANTLY

		PHYSICAL SITUATION FACTORS																					
LOCATION RELATIVE TO BUILDINGS	FIRER	OUT			OUT						IN			IN			IN, FIRING OUT						
	TARGET	OUT			IN						OUT			IN			IN ANOTHER BUILDING						
BUILDING STRUCTURE TYPE		ANY			CONCRETE			BRICK			WOOD			ANY			CONCR	BRICK	WOOD	CONCRETE		BRICK		WOOD	
OPEN AREAS		NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME	DOES NOT APPLY			NONE	FEW	SOME	NONE	FEW	SOME	NONE	FEW	SOME
TYPE OF EFFECT	ANTI-PERSONNEL																											
	ANTI-ARMOR				■	■	■	■	■	■	■	■	■	●	●		■	■	■	■	■	■	■	■	■	■	■	■
	INCENDIARY				■	■	■	■	■	■	●	●								■	■	■	■	●				

TABLE G-23

SITUATIONS IN WHICH SMOKE POTS AND SMOKE GENERATORS CONTRIBUTE SIGNIFICANTLY*



*These smoke generating munitions can only be used in locations under friendly control, and their massive smoke output makes their use inside buildings inappropriate. Thus only the building density variable affects their operational effectiveness.

APPENDIX H

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13. ABSTRACT

The primary study objectives are: (a) to determine whether there are significant deficiencies in the information available for evaluating the city fighting effectiveness of standard U.S. ground force weapons, and (b) where physical testing could address such deficiencies, to develop the nature of the tests needed. The study analyzes combat experience since WWII to determine the major combat functions and weapon uses in city fighting. Existing U.S. weapons capabilities and the available supporting effectiveness data are examined. Findings related to the study objectives, as well as additional insights obtained, are presented.

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