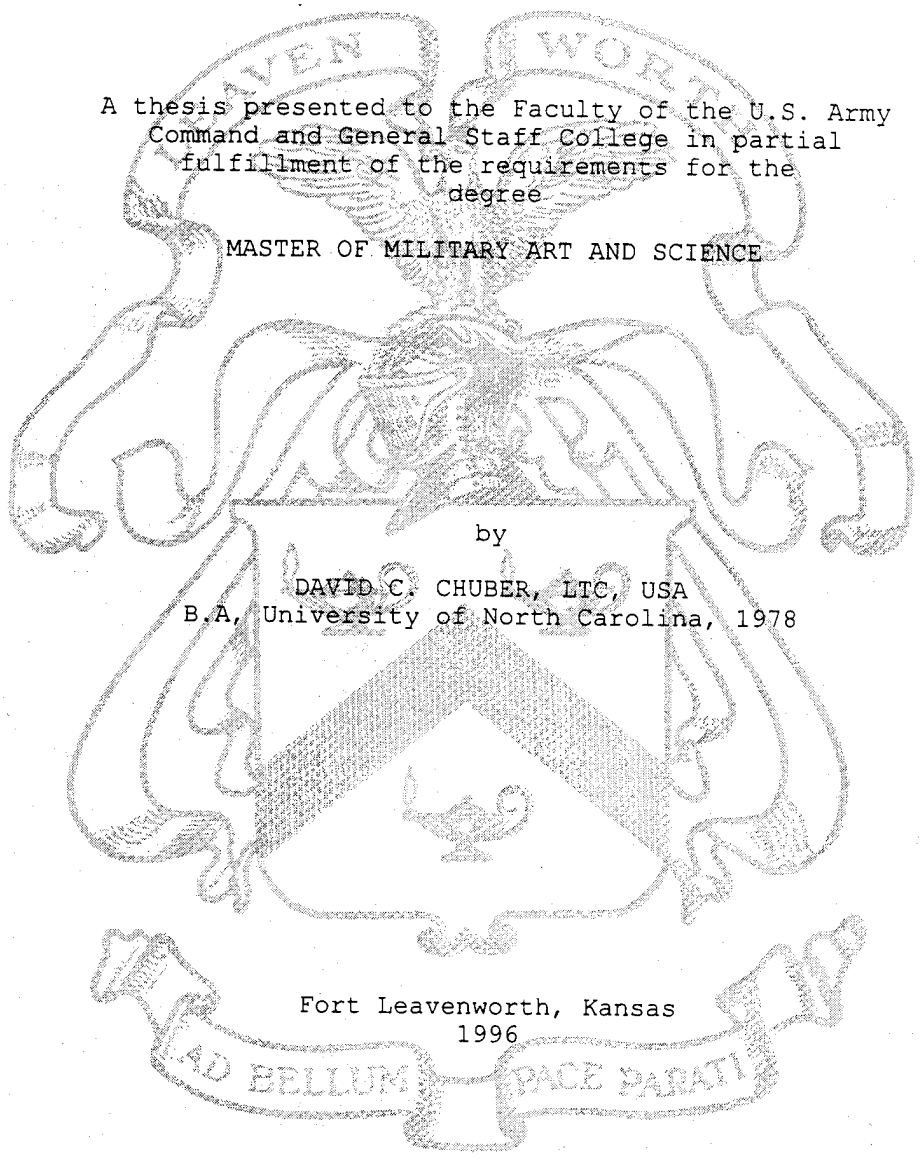
# FIELD FORTIFICATIONS DURING THE AMERICAN CIVIL WAR: A TACTICAL PROBLEM

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

DAVID C. CHUBER, LTC, USA
B.A, University of North Carolina, 1978

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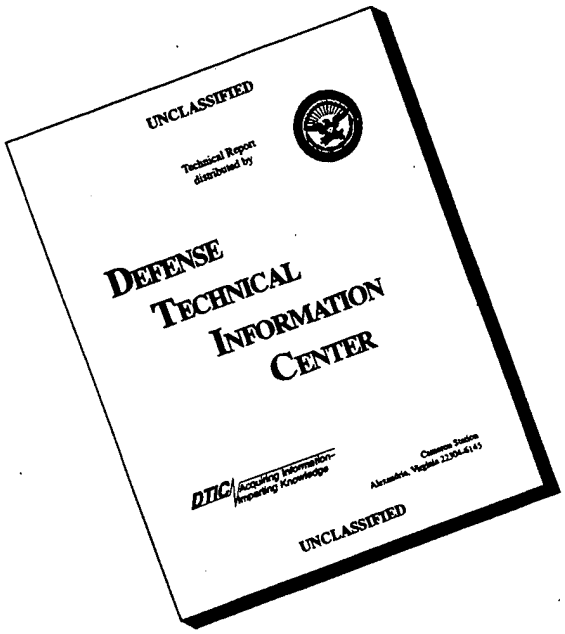


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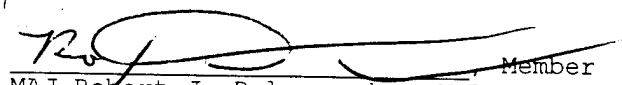

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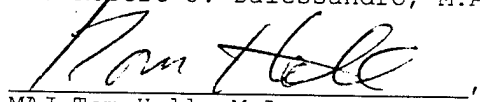

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

FIELD FORTIFICATIONS DURING THE AMERICAN CIVIL WAR: A TACTICAL PROBLEM by Lieutenant Colonel David C. Chuber, USA, 141 pages.

This study analyzes field fortifications and their effects on combat operations during the American Civil War. This study is divided into three areas. First is the instruction and practical training on field fortifications available to the future Civil War officers. Second is the construction of field fortifications including the different types of fortifications and their integration into defensive lines with obstacles. Finally, are the lessons learned in combat operations using field fortifications during the Civil War and how they helped to change and develop U.S. tactics creating new, usable doctrine.

At the start of the war, commanders found that few officers had any first-hand experience with field fortifications. Although many of the regular army officers had studied engineer concepts at West Point, few had any experience other than with static defenses or coastal fortifications. When Union and Confederate armies conducted large-scale operations, defensive positions were built to protect supply lines. Small forces used field fortifications to multiply their combat power against any larger force. Commanders were forced to realize that the tactical manuals of the day were just parade drill manuals and could not help them when it came to using field fortifications.

ACKNOWLEDGMENTS

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First of all, I must thank my wife, Rhea, who accepted my preoccupation and absence with her usual understanding and support. Without her assistance, this study would never have reached a successful conclusion.

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Finally, I must thank the Civil War Reeactment Committee for the 1995 Battle of Bee Creek in Weston, Missouri. They allowed me the opportunity to use my research for a hands-on experience to build over 500 yards of field fortifications and obstacles.

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# CHAPTER I

## BEHIND THE HEAD LOG

During the American Civil War, the odds of a Union soldier becoming a casualty during battle were tremendous. One out of every 42.7 men was killed outright; one out of 38.1 died of wounds; one out of 6.7 men was wounded; and one out of 10.2 was captured. Of every seven men captured, one died in prison.[1] The statistics were similar for Confederate soldiers. Total Union deaths were more than 110,000 of 640,000 casualties while Confederate forces suffered 94,000 battlefield deaths. The Union and Confederacy combined suffered 623,026 deaths. To put these numbers into perspective, one out of ten able-bodied men living in the north was killed or incapacitated in battle. This compares with 405,000 Americans who were killed in World War II. If the same percentage of the U.S. population had been killed during World War II as died in the Civil War, 2.5 million men would have been killed.[2] The total combined cost in dollars for both sides has been estimated at more than fifteen billion U.S. dollars.[3] The American Civil War was tremendously costly in human life. Because there was no doctrine or how to fight manuals, leaders repeated the same mistakes over and over at the cost of casualties. When that leader was promoted or killed, a new leader took charge and the cycle would start over. It is amazing that neither side developed true tactical doctrine to defeat the other. What was used and refined was only drill manuals. Without military doctrine there was no standardization between the Regular Army, Volunteer, and Militia. This lead to disaster over and over again in operations using field fortifications.

The American Civil War was only a few months old when the Union army suffered a stunning defeat along Bull Run Creek in northern Virginia. After this battle, both Union and Confederate leaders realized that the war would not be won after just one battle. The commanders on both sides realized that short-term enlistees of the volunteer armies would have to be molded into professional soldiers. This training would require time. The governments which pushed the armies into early battle now bowed to commanders' wishes for time to train. To protect themselves and to calm the nerves of politicians and civilians, the armies began to dig in. The first large-scale positions were dug around the capitals (only 100 miles apart) of the two opposing forces after the Battle of Bull Run in 1861.

While working to encircle their capitals with defensive field works and fortifications, commanders found that few personnel had any first-hand experience with field fortifications. Although many of the regular army officers had studied engineer concepts at West Point under a professor named Dennis Hart Mahan, few had any experience other than with static defenses, mainly in the coastal fortifications area.[4] The war with Mexico introduced field fortifications, but they were not applied on a large scale in U.S. operations. One officer who would become a Union Army commander had observed operations in the Crimean War and reported his findings in 1857 to the Secretary of War. This officer Captain George B. McClellan studied the organization of engineer troops and their equipment and developed a detailed dictionary of terms for siege materials.[5] Many of the these definitions were later placed in the Military Dictionary by the Inspector General of the U.S. Army, Colonel H. L. Scott. This manual was not only a dictionary of terms, but an instruction book.

Confederate General Robert E. Lee, a West Point graduate and former West Point commandant whose early career experience included

constructing coastal fortifications, became the commander of the new Army of Northern Virginia. Lee ordered his soldiers to build earthworks along a sixteen-mile line to protect Richmond from the Union army and its new commander George B. McClellan. Lee's extensive field fortifications led his men to complain that they had not joined up to fight with spades and picks. Lee would receive the nickname "King of Spades" because of his orders to build such vast field fortifications.

In the west, as the Union pushed down southern rivers, Confederates designed and built numerous elaborate fortifications along their supply lines. Southern cities and ports were protected by earthen fortifications with miles of infantry entrenchments and artillery positions. This was especially true at Vicksburg and Atlanta. Union troops found that every road crossing and railroad bridge in every city they captured, had to be protected from Confederate cavalry and raiders. Union soldiers were forced to build massive block houses to guard bridges and railroad trestles to protect their supply lines. These undertakings took large numbers of men and a great deal of time away from the front, slowing the advance and pulling out combat troops from the front. The city of Nashville was ringed with forts to protect the Union's giant supply base. After the battle of Chickamauga, the Confederate Army laid siege to the defeated Union army with a ring of entrenchments on the high ground above Chattanooga. This operation cut off their supplies and forced Union soldiers to eat what they could get.

Once Union Generals William Tecumseh Sherman and Ulysses Simpson Grant broke out of Chattanooga, they found that Confederate General Joseph Eggleston Johnston, Army of Tennessee, had dug in once again. Sherman complained to Washington that "the whole country is one vast fort and Johnston must have at least fifty miles of trenches with abatis and finished batteries."[6] Because of the Confederate trenches, Union losses were high in any attack. At the Battle of New Hope Church,

Georgia, Union Brigadier General Alpheus A. Williams received "the most effective and murderous fire." In twenty minutes, he lost 745 men out of a force of 7,500 who took part in the attack.[7] During the Battle of Picketts Mill, Georgia, 400 men of the 49th Ohio took a Confederate trench and lost 203 men.[8] Sherman complained that he was bogged down in "a big Indian war in which every tree and log seemed to shelter a enemy sharpshooter."[9] The Union army was firing 200,000 rounds a day, hitting little more than logs, rocks, and dirt.

Frustrated by heavy losses and political problems from the Lincoln administration, Sherman left casualty lists out of his official reports and later his personal memoirs. When Confederate General Joseph E. Johnston lost the confidence of President Jefferson Davis because he believed the delaying tactics were not aggressive enough to save Atlanta, Davis replaced him with General John Bell Hood on July 17, 1864. General Sherman welcomed the change in commanders and said, "this is just what we wanted . . . to fight in open ground, on anything like equal terms, instead of being forced to run up against prepared entrenchments."[10] When Hood attacked on July 20, 1864, he hit Union General George Thomas' men who had built up and dug in with little more than a few logs and rocks, forming the beginnings of a parapet. General Hood sent 19,000 men into the attack, and lost 4,796 men while, Thomas' losses were only 1,779 at this Battle of Peachtree Creek, Georgia.[11] At the next battle, in Jonesboro, Georgia, Hood still had not learned his lesson, and ordered 24,000 exhausted soldiers, who had marched all day and part of the night in the hot August weather, to attack Union General Oliver O. Howard's 17,000 soldiers. Howard's men were dug in behind breastworks. Confederate losses were 1,725 compared to 170 Union losses.[12]

In the east, General Ulysses S. Grant moved his Army of the Potomac out for the spring campaign of 1864. He ran into General Lee's

army positioned behind field fortifications. The human cost in the first twenty-eight days was 31,000 Union soldiers.[13] Grant's nickname the "Butcher" was still holding true. In an eight-minute attack, Union forces left 7,000 dead and dying men in front of the rebel works at Cold Harbor, Virginia. Confederate casualties numbered only 1,500 men.[14] Grant had attacked with three Union corps of 50,000 men against a rebel force of 30,000 dug in along a two-mile field fortification. One of Grants aides viewed a unit preparing to attack and found, "the men were calmly writing their names and addresses on slips of paper and pinning them on the backs of their coats, so that their bodies might be recognized and their fate made known to their families at home."[15] Confederate General Evander Law said: "I have seen the carnage in front of Marye's Hill at Fredricksburg, and on the 'old railroad cut' which Jackson's men held at the Second Manassas; but I had seen nothing to exceed this. It was not war; it was murder."[16] Grant, incredibly, ordered another attack. The soldiers, looking out over the acres of dead in the Confederate abatis and palisades, refused to obey. Captain T. E. Barker said, "I will not take my regiment in another such charge if Jesus Christ himself should order it."[17]

After the war, Union Brevet Major General J. G. Barnard prepared a study of the defenses of Washington and Richmond. In A Report of the Defenses of Washington to the Chief of Engineers, he reviewed an attack by Union General Wright, the Sixth Corps commander at Petersburg. He stated that

> an attack in broad day against a simple infantry cover, which cost us, in killed and wounded, a number equal perhaps that of the entire force of the enemy actually opposed to us. It was an attack of nearly two divisions against a picket line covered by a simple trench and parapet; but had it been held by two ranks of good troops, it is doubtful if it could have been carried even by and entire corps.[18]

The lessons learned after four years of bloodshed by the Union army finally paid off at the breakthrough at Five Forks, Virginia, in

the Petersburg line. By stretching the Confederate trenches to the point that only one line of infantry stood behind the parapet, the Union forces could create a breakthrough. In this attack, pioneer troops chopped holes into the obstacles (abatis). Then attacking columns fought their way to the parapet. General Wright, waiting the attack time and day to be carefully picked said, "Early gray of a foggy morning, when there is just light enough to enable the men to see where to step." But the whole attack would "have been a failure but for our being able to surprise the enemy."[19] The human cost was still 1,100 men. High casualty rates and the loss of many officers prevented vital information describing how to attack a fortified line without large losses of life was not widely distributed until after the war.

## Endnotes

[1]Stephen T. Foster, "Statistics of War: The Awful Arithmetic," Civil War Cards (Durham, CT: Atlas Editions, 1993), D3602 34-16.

[2]Bruce Edward Hall, "The Cost of War: The North's Price for Unity," Civil War Cards (Durham, CT: Atlas Editions, 1993), D3 602 52-20.

[3]Stephen T. Foster, "The Cost of War: The South's Expensive Struggle" (Durham, CT: Atlas Editions, 1993), D3 602 44-20.

[4]Paddy Griffith, Battle in the Civil War (Mansfield, England: Fieldbooks, 1986), 34.

[5]Captain George B. McClellan, Report of The Secretary Of War Communicating The Report of Captain George B. McClellan (First Regiment United States Cavalry,) One of the Officers Sent to The Seat of War in Europe, in 1855 and 1856. (Washington: A.O.P. Nicholson, Printer, 1857), 27-32.

[6]Ronald H. Bailey, Battles for Atlanta: Sherman Moves East (Alexandria, VA, Time-Life Books, 1985), 18.

[7]Ibid., 52.

[8]Ibid., 56.

[9]Ibid., 59.

[10]Stephen T. Foster, "Battle of Peachtree Creek: An Inclination to Fight," Civil War Cards (Durham, CT: Atlas Editions, 1993), D3 602 10-08.

[11]Ibid.

[12]Stepen T. Foster, "Battle of Jonesboro: The Last Defense of Atlanta," Civil War Cards (Durham, CT: Atlas Editions, 1993), D3 602 08-07.

[13]Stephen T. Foster, "Battle of Cold Harbor: I Am Killed," Civil War Cards (Durham, CT: Atlas Editions, 1993), D3 602 06-06.

[14]Ibid.

[15]Griffith, Battle in the Civil War, 32.

[16]Stephen T. Foster, "Battle of Cold Harbor: Not War but Murder," Civil War Cards (Durham, CT: Atlas Editions, 1993), D3 602 10-07.

[17]Ibid.

[18]Brevet Major General J. G. Barnard, A Report on the Defenses Of Washington to the Chief of Engineers, U.S. Army (Washington: Government Printing Office, 1871), 150-151.

[19]Ibid., 152.

## CHAPTER II

## THE ART OF WAR

> The Military Art, in all its branches, is founded upon a comprehensive thorough knowledge of the exact and physical sciences.[1]
>
> Dennis H. Mahan, Field Fortifications

The officers of the American Civil War, both volunteer and regular Army, looked to history and to the great leaders of the past to develop their theories of warfare. In most cases, these theorists and instructors looked toward European conflicts for their studies. These men studied tactics, drills, and army organization of the Napoleonic Period. Napoleon was the principle general and Jomini the principle theorist studied, while Dennis Hart Mahan, William Halleck, General Winfield Scott, William Hardee, and William Casey were the writers and tactical instructors for most of the career Army officers of the American Civil War.

The Napoleonic tactics used in the European conflicts prior to the American Civil War were based on the smoothbore musket and cannon. Both weapons required the use of concentrated volleys and tight elbow to elbow infantry formations. Bayonet charges were feasible and successful because the firing range of small arms permitted the attacker to get within fifty yards of the defenders before incurring or sustaining heavy casualties. Defenders could get off only one or two shots before the attacker was within bayonet range. The short effective range of the infantry musket also permitted the attacker's artillery to move very close to the defenders and fire shot gun blasts of canister rounds to destroy defending infantry units. The cavalry was used as a screen and

for raids and reconnaissance missions, but, more importantly, they were used to exploit the routed infantry units when the artillery and infantry had penetrated the defenders' defensive position. These tactics should have changed with the invention of the rifled musket and the cylindro-conoidal bullet by Captain Norton from England and Captain E. C. Minie' from France.[2]

U.S. officers also studied fortifications from the popular Napoleonic doctrine textbook E'cole Polytecnnique. This book on tactical theory, maintained that "although an offensive war, may, strictly speaking, be carried on without the use of fortifications, temporary fieldworks were useful for an army's tactical defence." In a defensive war, the manual stressed "fortresses become essential." Napoleon went on to write that, "to avoid battle against superior forces, it is necessary to entrench every night and to occupy always a good position of defence."[3] Napoleon made strong-point fortifications throughout Europe. One of Napoleon's best divisional commanders, General Maximillem Sebastion Foy recorded that "all Europe has been covered by redoubts and entrenchments."[4] Napoleon believed in victory through offensive operation but understood field fortifications were key.

The European generals on the defensive developed a concept called fortified camps. The tactic which required the building of fortified camps was one that was overwhelmingly cautious and one that many future generals of the U.S. Army would use with poor results. These temporary fieldworks protected entire armies during halts and during slow retreats. Future American officers studied Britain's Lord Wellington who ordered his engineers to build fortified camps in September-October of 1809 during his retreat to Lisbon. They built fortified defensible lines around the army as it moved. Each line provided mutual support for the others. The first two fieldworks lines

stretched 29 miles and 22 miles long respectively.[5] In the American Civil War, General Halleck, protégé of Mahan and interpreter of Jomini, used the concept of fortified camps after the Battle of Shiloh in his march toward Corinth, Mississippi.[6]

It is important to note that forts and fortified lines were designed and constructed to provide interlocking fields of fire on all sides. Star forts and zig-zag entrenchments and salients supported the weapons range and technology of the day. It was not until the later half of the American Civil War that engineers and commanders realized they could use the range of the rifle to aid in the design and placement of field fortifications. Time was needlessly wasted in building many of the forts and earthworks positioned close together in the model of interlocking fields of fire for smoothbores. Even after technology had proven that rifled weapons had devastating effects on permanent masonry forts, Union engineers clung to the old ways. This was most evident in the building of the largest masonry fort inland, Fort Negley in Nashville, Tennessee. Fort Negley was built as the center piece of the Union's Nashville defenses. Union General Don Carlos Buell ordered Captain James St. Clair Morton, on August 6, 1862 to select sites for redoubts for the protection of Nashville. Buell also told Morton that the fortifications must all be simple, so that they could be constructed quickly and troops could quickly occupy them. In several ways Fort Negley was obsolete at its completion. First, it was not "simple" as General Buell had directed. Morton had built it as a monument to himself and in a fashion that came out of the Napoleonic period. In a May 15, 1865, report to Union General George H. Thomas, the fort was described as "a complex fort" having a square wooden stockade in the center flanked by two half sections of a star shaped salient making v-shaped redan projection.[7] Second, much of the fort was built with cut stones while other supporting fortifications were the newly proven

earthen forts. Third, its design supported interlocking fields of fire from smoothbores as it was designed as a modified star fort.[8] (See figure 1.) Morton's design for this fort was a combination of sea coast defenses and western stockades. Both were out of place in the battlefields of Tennessee.

American officers who studied the Napoleonic and Crimean Wars learned how to build fortifications in support of smoothbore technology and were given examples on how to defeat them. The short range of the weapon forced the designs and the style to be built. The French successfully used deception and treachery at the battles of San Sebastian and Barcelona. These examples were shared with many future officers of the American Civil War. Another successful tactic was the three-day British bombardment of Copenhagen which forced the French garrison to surrender. Here the fort was reduced to rubble by rockets, mortars, and heavy guns.[9] The lesson that military officers, from the Napoleonic and Crimean War, found was that frontal assaults were not always the best solutions.

A tactic that impressed the professional American military student was the siege. Siege techniques were designed to blockade defenders by taking outlying forts and entrenchments, digging close to the fort, then placing heavy guns. After a direct fire bombardment rubbled the defender's walls, an infantry bayonet attack through the gaps in the wall would be carried out. This technique took a lot of time and effort but it proved to be a successful tactic. French military writings, stated, "the method of attack by skill and industry, requires indeed a considerable length of time, but it spares the blood of assailants."[10] Prominent students of the U.S. Military Academy, like Generals Grant, McClellan and Halleck, used this type of siege warfare as was evident in the Union attempts at Yorktown, Virginia, and Fort Wagner, South Carolina.

Antoine Henri Baron de Jomini, a Swiss staff officer for Marshall Ney in Napoleon's army, later defected and served in the Russian Army. Using his experiences, he developed a theory of warfare that the professional American Army officer has studied since before the American Civil War. Jomini's most important work was Summary of the Art of War, which was published in 1838. His theories were studied extensively at U.S. military academies.

Jomini's strategic principles placed emphasis on decisive points that tend to turn the attacking army's objectives toward specific geographical positions. Jomini stressed that these geographic objectives are chosen from areas where the enemy cannot collect his army quickly. He also emphasized that the attacker should bring the maximum possible force against the defender. Jomini stressed the importance of achieving and maintaining an offensive position. General George B. McClellan's peninsula campaign and his battle cry "on to Richmond" show all of the characteristics of West Point instructors' theories and Jomini's principles.[11]

The first American to study the Napoleonic Wars in depth and develop and teach his own theories was Dennis Hart Mahan. He was Jomini's American interpreter at West Point from 1832 to 1871. Mahan had a significant effect on future officers of the American Civil War. He felt that while taking the offensive was the means to victory, actions had to be tempered with caution. Mahan taught that the three fundamental dispositions for attack were: advance guard, main body, and the reserve. The spacing between these elements was 150 to 300 paces when the terrain permitted. Mahan reminded his students to be flexible. He stressed that commanders should make tactical decisions and should shorten intervals and make changes to formations under varied conditions.[12]

In his 1847 work An Elementary Treatise On Advanced - Guard Out - Post And Detachment Service Of Troops And The Manner Of Posting And Handling In Presence of An Enemy With A Historical Sketch Of The Rise And Progress of Tactics, Mahan stressed caution in offensive and defensive operations. Mahan's students knew it simply as Out Post.[13] He placed emphasis on reconnaissance elements, outposts, and advance guards. Final attacks were victorious when the linear formations came within effective range of the smoothbore. Then, through mass volleys, holes were punched into defensive lines where the infantry then charged the gaps with the bayonet.[14]

In 1856, Mahan wrote Treatise on Field Fortifications. Here, he reviewed the European conflicts in the context of field fortifications. He explained how and why fortifications were used in various defensive positions. He developed charts detailing weapons penetration, discussed field fortifications construction, and explained the use and construction of obstacles. In chapter XI, Mahan discussed how to attack entrenchments, but his discussion was still based on the tactics of the smoothbore and the bayonet.[15] This is somewhat surprising since the United States had just completed testing and fielding the 1855 rifle for the American army. Also notable is the fact that at only eight pages, this chapter is one of the shortest in the text.[16] Mahan's problem was that he was very astute with theory, but was lacking in experience and knowledge of technical advances.

In the preface of Treatise on Field Fortification, Mahan stated that he realized the effects that defensive fieldworks had on soldiers. He was fully aware of this fact with regard to new soldiers and militia. Using the historical examples of Bunker Hill from the America Revolution and the Battle of New Orleans from the War of 1812, Mahan taught that fortifications gave the untrained militia the feeling of security and confidence needed to defeat a professional army. He also realized that

defensive troops placed behind field fortifications became an additional combat power multiplier.[17] In his work he stated:

> To the militia officer, this knowledge is even of more importance than to the regular; for called upon, in many cases, to act without the co-operation of regular troops, in the defence of his own fire-side, he will require all those conservative means which add strength and confidence to irregular forces when brought for the first time befor an enemy.[18]

The effects of Jomini and Mahan were wide reaching on the future officer corps of the impending American Civil War. In 1846, Henry W. Halleck, future general in chief of the Union armies, published his concepts of theories called, Elements of Military Art. Like Jomini, Halleck praised the value of the offensive but added the caution of Mahan. This was evident in Halleck's use of field camps in his movement from Shiloh to Corinth in 1862.[19] He stressed decisive points using geographical goals rather than the enemy's army which was characteristic of Jomini. Halleck also showed concern for lines of communication and stated that concentration of force was more important than speed of movement.[20] It is not surprising that as a field commander, Halleck would fight by his principles and his book.

In 1826, a board of American officers developed a tactical manual for the infantry. The president of the board was General Winfield Scott. The first volume was completed on the March 2, 1829. Two subsequent volumes were completed and reviewed by 1835. These volumes went through many editions prior to the Civil War without any changes. Many Civil War generals were more familiar with these drill manuals than they were with the more up-to-date manuals by Hardee and Casey. Some officers admitted they drilled their soldiers with commands that were a combination of outdated and current manuals. This lead to future confusion in the ranks.

Scott's manuals were based on French drill books. As with the French manuals, Scott stressed close-order formations--two or three

ranks of men elbow to elbow in a battle line. The command of "charge" moved the soldiers at the "quick time" pace of 110 steps per minute with skirmishes forward of the main battle line.[21] This was fine for attacks against smoothbore weapons but had to be updated when soldiers fought rifles.

By 1860, artillery operations were governed by only one drill book; there was no tactical manual. The old 1841 cavalry manual was based on French sources which gave drills in close-order rank formations. The saber was the principle weapon in the manual of arms. But this weapon would have no effect against rifles.

The French battle drill adaptations worked well for the U.S. in the war with Mexico. The U.S. tactical offensives were victorious because they had already been proven successful in the smoothbore conflicts of Napoleon. Even when the Mexicans used fieldworks in the defense, the slow-loading process and the short range of the Mexican smoothbores allowed for the U.S. troops to blast holes into the Mexican infantry or fieldworks by concentrating small arms and artillery fire on the Mexican positions. Then, the U.S. infantry and cavalry would charge over the short kill zone into the gaps created by the mass volleys.

The Mexican infantry could only fire two or three volleys at the attacking U.S. troops before these troops crossed the ground covered by their maximum effective range of the Mexican smoothbores. The effective short range of all smoothbores (50 to 100 yards) forced close contact engagements and successful offensive charges that could cover the short distance through the kill zone, lessening the likelihood of high casualties.[22] This is a clear demonstration of the relationship of areas labeled technology and tactics.

The Mexican War gave tactical confidence to the U.S. Army's junior leaders--the same men who would soon lead as generals in the American Civil War. These generals believed that frontal assaults were

tactically sound. But frontal assaults would not be tactically sound against defenders behind fieldworks with rifle muskets. This tactic would only produced high casualties rates. The Union frontal attacks at Fredericksburg in 1862 produced 12,700 Union casualties in one bloody day.[23] The worst loss of life occurred in the Union frontal attacks at Cold Harbor on June 3, 1864. This battle cost the Union army 7,000 casualties in a time span of only eight minutes.[24] While Civil War officers on both sides had studied the drills and history, few had any regard for weapons technology and its effects on tactics.

Tactical confidence based on the study of Napoleonic battles and the Mexican War victories was based on smoothbore tactics. The lack of instruction in modern weapons and their effects by instructors at West Point led to the lack of understanding by the students that resulted in the bloody battlefields of the American Civil War. No one seemed to realize that rifling in the muskets and cannons had produced such quantum leaps in warfare. The effects of rifling were not discussed in the current drill manuals.

Civil War officers also did not receive or attain brigade and higher training and instruction. The lack of doctrine and staff experience at brigade, division, and corps levels also contributed to the confusion on the battlefield. Civil War officers had a book, but it was wrong. They had a modern weapon, but did not employ it wisely. They had an army without tactics.

With the 1823 invention of the cylindro-conoidal bullet, later known as the "Minie' ball," combined with a rifled musket, the musket's range and killing power was double that of any smoothbore. Smoothbore musket rounds could penetrate 18 inches of packed dirt or 6 to 10½ inches of elm boards placed in intervals of one inch. The rifled musket and the minie' ball's penetration was almost twice that of the smoothbore round.[25] The problem was that, even with the new power of

the rifled musket, the U.S. Army did little to change the thinking in terms of tactics, theories, and training.

Table 1. War Time Casualties Comparison

| | Branch of service | Number serving | Battle deaths | Other deaths | Wounds not mortal | Total |
|---|---|---|---|---|---|---|
| Revolutionary War 1775-83 | Total | - | 4,435 | - | 6,188 | - |
| | Army | 184,000 | 4,044 | - | 6,004 | - |
| | Navy | to | 342 | - | 114 | - |
| | Marines | 250,000 | 49 | - | 70 | - |
| War of 1812 1812-15 | Total | 286,730 | 2,260 | - | 4,505 | 6,765 |
| | Army | - | 1,950 | - | 4,000 | 5,950 |
| | Navy | - | 265 | - | 439 | 704 |
| | Marines | - | 45 | - | 66 | 111 |
| Mexican War 1846-48 | Total | 78,718 | 1,733 | 11,550 | 4,152 | 17,435 |
| | Army | - | 1,721 | 11,500 | 4,102 | 17,373 |
| | Navy | - | 1 | - | 3 | 4 |
| | Marines | - | 11 | - | 47 | 58 |
| Civil War Union Forces 1861-65 | Total | 2,213,3 | 140,41 | 224,09 | 281,881 | 646,392 |
| | Army | 63 | 4 | 7 | 280,040 | 639,568 |
| | Navy | 2,128,9 | 138,15 | 221,37 | 1,710 | 6,233 |
| | Marines | 48 | 4 | 4 | 131 | 591 |
| | | - | 2,112 | 2,411 | | |
| | | - | 148 | 312 | | |
| Confederate forces (estimate) 1863-66 | Total | 84,415 | 74,524 | 59,297 | - | 133,821 |
| | Army | - | - | - | - | - |
| | Navy | 600,000 | - | - | - | - |
| | Marines | to | - | - | - | - |
| | | 1,500,0 | | | | |
| | | 00 | | | | |

Source: The World Almanac and Book of Facts. Casualties in Principal Wars of the U.S. (New Jersey: Funk & Wagnalls, 1995, p166.

By 1853, the U.S. Army had shrunk to 10,572 officers and men. This drop in personnel occurred because of the historical American trend to downsize its army after a war. The U.S. army had proven to Europe that it had mastered smoothbore tactics. The U.S. Congress and the professional officers felt confident that, should the time arise again, they could easily train an army in smoothbore tactics and be victorious again.[26] One soldier and politician who had vision and saw a coming

change was Jefferson Davis, the Secretary of War under President Franklin Pierce from 1853-1857. Soon to be the President of the Confederacy, Davis directed that the U.S. Army strength be raised from 10,572 to 18,000 in 1855. He directed the adoption of the new 1855 rifled musket and the development of a new manual of tactics. In 1855 Jefferson Davis appointed Captain W. J. Hardee to write Rifle and Light Infantry Tactics.[27]

William Hardee graduated from West Point in 1838. He fought through the Mexican War and was twice breveted for gallantry.[28] He submitted two manuals on infantry drill to a board of officers at the War Department in 1855. This "tactics manual," as it was called, was the one most read by officers and noncommission officers during the American Civil War. Many found it very hard to understand because it was Hardee's translation of French drills. It was not a tactical manual as the name suggested, but a list of commands for parade field maneuvers. The manual contained some differences from the 1830 General Scott manual. First, in order to facilitate the crossing of defenders' kill zones, Hardee's manual allowed for greater-crossing speed during attacks. The kill zone area was defined as the space extending from the defenders firing line to the weapon's projectile maximum effective range. The Scott's command of "Quick Time" was changed by Hardee to "Double Quick Time." This represented a change of pace for attacking forces from 110 steps (86 yards per minute) to 165 steps (151 yards per minute) in the march pace. While this pace allowed soldiers to cross kill zones more quickly, it still was not fast enough to prevent the defenders from firing many deadly volleys.

The smoothbore's kill zone was only 50 to 100 yards wide. In the minute attackers took to cross that zone, defenders could load and fire only two or three times. The rifled musket's kill zone was ten times that of the smoothbore. The new rifle musket kill zone was 1,000 yards

out, and it had been known to kill up to one half a mile. Defenders with rifle muskets could get off at least 18 volleys as the attackers crossed a 1,000-yard kill zone, compared to two or three volleys achievable crossing the kill zone against the smoothbore. Hardee's manual failed to appreciate the impact of the rifle's power and range. No one else saw its effects on other combat units, that is, artillery and cavalry. Compared to the common smoothbore field artillery cannons, this one infantry weapon range could out distance all but one type of projectile. Canister munitions were effective out to 300 yards, spherical case (shrapnel) were effective out to 800 yards, and common shell munitions were effective out to 1,000 yards. Only solid-shot munitions had an effective range longer than that of the rifle. The smoothbore cannon's solid shot was effective out to 1,600 yards.[29] Artillery no longer had the great offensive killing power it had in the past. Cavalry units would never again rout infantry units unsupported. The cavalry man's saber was no match for the rifle of the infantry. Neither Hardee, Scott, nor Mahan understood the rifle's power until it was too late.[30]

When it came time to choose sides in 1861, Hardee and his tactics manual went south. In 1862, while Hardee was a Confederate, a Union officer Silas Casey saw a financial opportunity. Casey took Hardee's manual, made a few changes, and published it in his own name. He called it Casey's Tactics. Even though the Civil War had shown the power of the rifle, Casey was looking for financial gain and did not spend any time on tactical thought. Casey retained the same emphasis that Hardee, Scott, and Mahan had with regard to the rifle. In essence, Casey had simply copied someone else's work and added a few changes. In July 1862, the U.S. Congress appropriated $50,000 for Caseys' Tactics.[31] On August 11, 1862, Lincoln's secretary of war ordered the U.S. Army to adopt Casey's manual.[32]

Casey's reprint of Hardee's work retained the old emphasis. One of the reasons that Casey was picked to develop the Union version of Hardee's Tactics was that Casey had been the chairman of the board that accepted Hardee's manual in 1855.[33] Casey's third volume was also taken by the Confederates and was published by a South Carolina company called Evans and Cogswell of Columbia. Although Southerners did not pay Casey any royalties, they praised him for his fine addition to Hardee's work in their introduction.[34]

The reprinting of tactics manuals by both the North and South allowed for the same mistakes to be made by both sides. The drills only addressed the power of the musket in the attack command movement of "Double Quick Time," which lacked the speed necessary to cover the kill zones which had been expanded by the rifle to a distance of 1,000 yards. Scott's, Hardee's, and Casey's manuals were each translations of French smoothbore manuals.[35]

Americans were fascinated with European and French drills and tactics. In 1856, Captain Henry Heth published and translated a manual which would have made a difference in the Civil War had more officers followed its guidance. It was a manual on rifle musket marksmanship. Heth's manual discussed methods of target practice. It concentrated on the basic techniques of firing and even included simulated firing exercises. Although it was adopted by the United States Army, it was rarely promoted by anyone during the Civil War. Captain Heth joined the southern ranks and was promoted to the rank of general in the Army of Northern Virginia.[36]

During his tenure as Secretary of War of the United States, Jefferson Davis realized that the war in Europe provided a place for military officers to study. Consequently, Davis sent three officers to the European front to make observations. He ordered Major Richard Delafield to observe engineers, Major Alfred Mordecai to observe

artillery, and Captain George B. McClellan to observe the cavalry. This group became known as the U.S. Military Commission to Observe the Crimean War. Each officer already had experience in the area he was to observe. The commission wrote their observations, and the U.S. Army published their reports as official records to Davis. Each report presented had many practical insights into the Crimean War. Some insights proved useful, while others compounded tactical problems of the smoothbore.[37]

Major Richard Delafield's engineer report reviewed the construction and the rebuilding of fieldworks by Russian, Prussian, Austrian, and French engineers. Delafield found that many of the armies fighting in Europe were still relying on the tactics and fortifications of past European wars. He watched and wrote detailed descriptions of sieges.[38] Delafield reviewed fortifications and concluded that earthworks were better than the old stone and masonry forts which the Europeans spent so much time and effort reinforcing. Delafield foreshadowed the future when he said, "We should not lose sight of, our practice being variable, though it is hoped the earthen parapets are gaining the ascendancy."[39]

Without tremendous regard for the infantry, George B. McClellan's observations clung to the romantic vision of cavalry charges routing the enemy without tremendous regard for the infantry rifle. His observations helped him develope ideas for cavalry improvements which later became the basic design for the McClellan saddle. In addition to the cavalry, the McClellan report investigated engineer troop unit organization and equipment and the design of field fortifications. In his observations, McClellan wrote about types of engineer and pioneer equipment and about the organization of work parties needed for building the earthworks he discussed.[40]

Major Alfred Mordecai's report encompassed reviews of military manuals by Russian, German, French, and English writers. Mordecai also reviewed the military structures and the War Departments of each country. There was even a special section on navy transportation for the armies involved in the Crimean War. Mordecai's most insightful commentary is evident in his discussion of artillery operations. In part V, titled "The Rifled Cannon," Mordecai envisioned the future of artillery that would be the standard until 1900. Mordecai wrote about firing experiments for the breech-loading rifle and steel cannons. These included Cavalli's breechloader, the Lancaster gun, Krupp's cast-steel gun, and the Whitworth cannon. He also outlined the best shell and fuse combinations for these guns in a variety of tactical situations. In his chapter on "field artillery," Mordecai explained how warring countries trained and employed these cannons. Mordecai wrote a special section on the gun that became the backbone of the field artillery during the American Civil War--the twelve-pound Napoleon gun. In his final report, Mordecai presented additional information on all major musket and rifles used by the infantry on all sides of the Crimean conflict.[41] Lastly, Mordecai had a manual on infantry rifles translated. It was called Schon Rifled Infantry Arms. This manual was translated from German by Captain J. Gorgas from the U.S. Ordnance Department. This German translation also saw and foretold the future of warfare when it stated:

> Whether military art was right in entirely abandoning the improvement of the smooth-bore arms, or whether experiments should not in time be instituted with these also, in reference to increased accuracy and force, and with improved shape of ball, is a question, the solution of which may be adverted to by the way; merely remarking now, that whoever desires to make use of the distant fire of skirmishers, recurs at once to the use of the rifle arm.[42]

Captain J. Gorgas eventually resigned from the U.S. Army and became a Confederate General and Chief of the Ordnance Department.[43]

Mordecai's work was not published until 1860. This was too late to influence the large officer corps that would eventually be needed to fight the American Civil War.

The U.S. Army moved into the next decade and the brink of war without a realistic understanding of the power of the rifled musket. Soldiers had only a vague idea of the advantages that fortifications gave to the defense and to untrained troops. Soldiers had been taught that offensive attacks would lead to victory and that America's triumph over Mexico had proven this theory. The victory over Mexico had instilled confidence in the regular army and volunteer officers alike. West Point instructors taught the future Civil War generals to look to history, be dedicated to the offensive, be flexible, and be cautious. This was good advice, but it ignored new technology. These same officers were not prepared to lead any unit larger than a regular army regiment. Little, if any, thought was given to volunteer units. There were manuals and drills at the regiment and company levels, but future Civil War officers lacked any doctrine or staff experience at brigade, division, and corps levels. The small U.S. Army of 1840 to 1850 was spread throughout the outposts of the west and had no time for any consolidated training at brigade or higher levels. Officers placed into combat had a drill manual good only for the parade field and a weapon that expanded the battlefield by tenfold. They had an army, but most of that Army's men were untrained. The only thing that soldiers knew to be true was their willingness to fight for their friends, loved ones, beliefs, and cause.

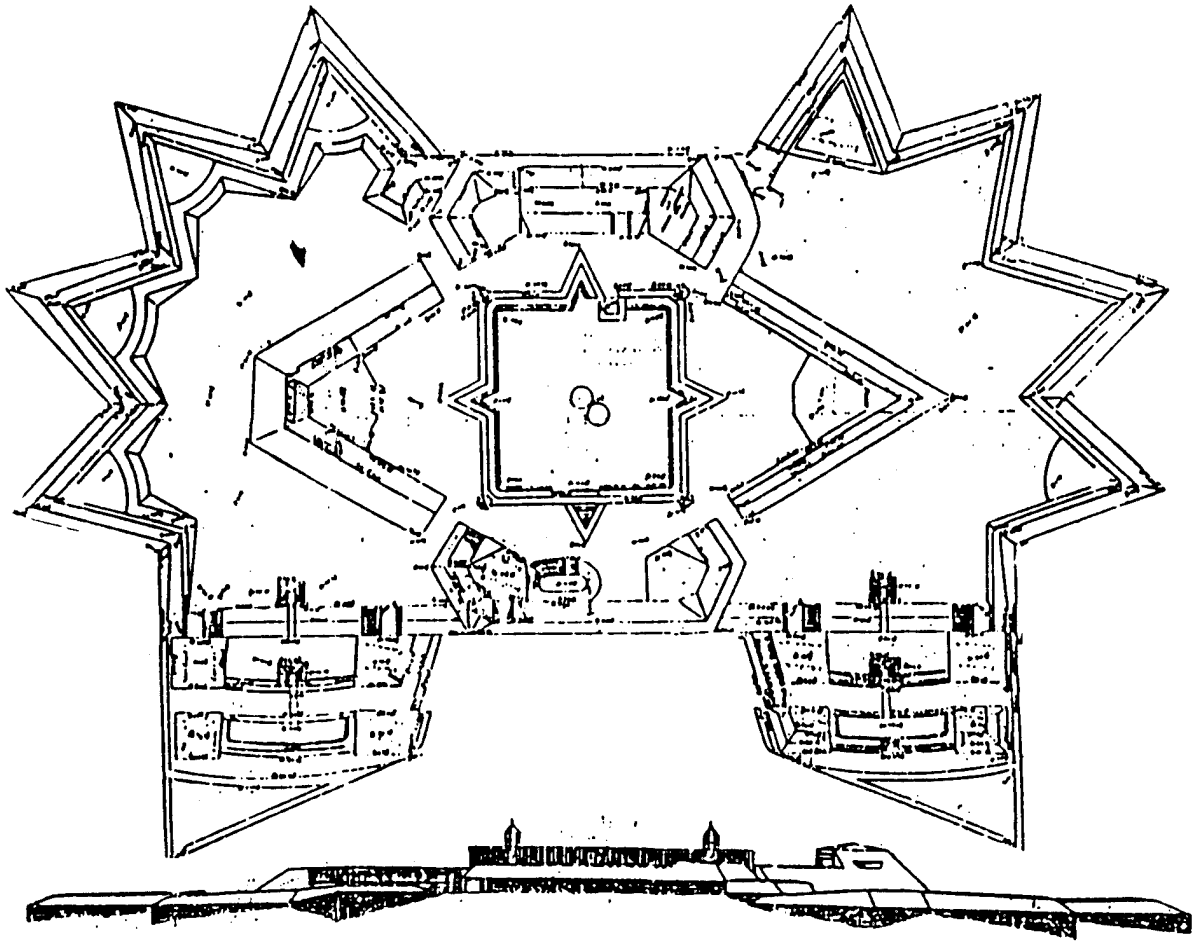

Figure 1. Fort Negley. Source: Jack R. Bergstresser, Shari More and Susan Neilsen, Fort Negley 130 Years Later: An Archaeological Assessment, (Tuscaloosa: Panamerican Consultants, 1994.)

## Endnotes

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# CHAPTER III

## GOING TO GROUND

The volunteer officers and civilian engineers of 1861 had difficulty acquiring military training and current military manuals on building field fortifications. Very few regular army officers had the opportunity to observe large-scale combat operations in the field.

The U.S. Army only sent three observers to two foreign conflicts in the 1850s to report on the new technology changes. As a young captain, Union General George B. McClellan had the chance to observe for the United States Army during the Crimean War. Although McClellan observed engineer troops in combat, he only dedicated six pages of his official report to the Secretary of War to engineer operations. This was probably because he was a member of the First Cavalry Regiment at the time, and therefore, 75 percent of his report covered cavalry operations. Most of what he reported about engineers concerned the organizational makeup of the troops and the special equipment they required. He discussed field fortifications in a small section where he reported measures, weights, and depths of fortifications. He did not make any drawings or charts regarding field fortifications as he did with the special engineer equipment.

In a section called "Arrangement of the Working Party on a Field Work," McClellan went into detail about the organization of a work crew and their responsibilities. McClellan felt that a typical four-or five-man detail could be placed into four ranks, each rank six feet apart. The distance between the men provided a safety zone so that no worker would injure another while digging. Then, while digging the

ditch, the ranks of men threw the excavated dirt in specified directions so as to simultaneously build the parapet and the counterscarp as they dug the first obstacle--the ditch. McClellan felt men organized in this fashion could most efficiently build fieldworks. The breakdown of equipment for the four- or five-man detail was one pick or mattock, four shovels, and one earth rammer. For each mile of entrenchments, McClellan's work parties, required 880 picks, 3,529 shovels, and 880 earth rammers with a work force of 3,520 men in four-man details and 4,400 men in five-man details.[1]

This equipment list and work party are notable in two respects. First, during the Civil War, individual soldiers did not carry their own entrenching tools. Second, since the soldier did not always carry these tools, the tools had to be carried in wagons. This created a logistical nightmare for commanders and engineer officers. Regiments were completely left to their own devices and eventually developed pioneer units out of sheer necessity. As is the case today, commanders had to give some degree of priority to defensive preparations, movement order, and equipment loads. Surprisingly, Civil War commanders' needs did not force the development of individual tools and a modification of the Civil War soldier's "basic load." Nevertheless, the necessity must have been there because a private contractor, who hoped to make money off the government, eventually developed and sold his tools to those units who could afford them. He took a tool that was issued to all soldiers and made it into an individual digging implement. This implement was essentially a reshaped bayonet fashioned into a digger. It fit on the weapon just like the bayonet and was designed to exploit the weight and construction of the weapon. This item did not require any additional training by the soldiers and weighed only about six ounces. The problem was that when it was used in hard ground, it bent the barrels of the weapons.[2] Soldiers who found themselves without a tool in hand and with

minnie balls flying overhead, quickly improvised field expedient methods. Typical items that the soldier had close at hand were plates, halved canteens, knives, and bayonets. These items were all employed as digging implements in the absence of an official government development program.

Captain McClellan's 1857 report and Professor Dennis Hart Mahan's instruction manual at West Point were English translation of foreign information. In the Union Army Inspector General Colonel H. L. Scott's 1864 manual The Military Dictionary, he combined foreign manuals and information learned at the front into the first manual to serve as a reference for the volunteer officers corps. Before that time, officers had to be a West Pointers or be able to read French or German to gain any information about fortifications. This was evident in the building of the Confederate defenses of Atlanta. There, a supervisor for the railroad who designed and supervised the construction of the Atlanta defenses used a French manual. His efforts led to Sherman's comment that "the whole country is one vast fort and . . . must have at least fifty miles of trenches with abatis and batteries."[3]

Scott's 1864 manual not only provided the English translation of French and Prussian manuals, it also gave detailed instructions for building any type of field fortification. Scott's manual surpassed McClellan's in all respects. Scott devoted entire chapters on how to construct permanent fortifications along with what was required for field defenses. He made extensive drawings and sketches and explained the construction materials required. He broke down the number of tools needed, the time required, and the number of personnel needed to accomplish the task. In his work, Scott offered detailed descriptions of siege operations. Had this 1864 manual been produced sooner and distribution more widely, the volunteer officers' knowledge could possibly have saved many soldiers lives.

American Civil War fieldworks were designed to protect troops or strategic locations from a superior force. The building of fieldworks gave the defending force a combat multiplier that countered the attacking force's numbers. It allowed the defender to make good use of his interior lines with the available troops. Fieldworks were used in offensive and defensive operations. They were used in keeping lines of communication open, protecting key transportation and supply centers, and developing special defenses of train and road bridges. Fieldworks strengthen armies' lines for battle. Armies that did not build these basic protective structures during halts were vulnerable to being surprised and overrun.

At the Battle of Shiloh, General William T. Sherman did not anticipate a Confederate attack. Not only did he fail to build basic field fortifications, he positioned no pickets other than camp guards. On April 6, 1862, Confederate troops overran the Union camps at Shiloh Chapel, catching the soldiers cooking breakfast or in their tents.[4] This lesson was one that Sherman would not forget, and he passed it on to his subordinates.

Fieldworks were divided into three classes. The first-class works were used at the entrance (gorge) into a bastion. They were, respectively: the redan, the double redan, the redan with flanks, the lunette, the tenaille head, and the bastion head.

Second-class works were works enclosed on all sides. They were: the redoubt and the bastion fort. Third-class works, consisting of defensive lines either continuos or at intervals, were known as: lines of redans, lines of bastions, lines of tenailles, lines at intervals and indented lines.[5] (See figure 2.)

The basic form of a field work was the parapet. It was the parapet that resisted the destructive impact of projectiles fired at it by the aggressor. It could be made of any material that would resist

the caliber of rounds fired at it. The most common composition was the one most available and the one that was unlikely to produce secondary projectiles, that is, earth. Tests indicated that the thickness of the parapet's dirt wall protected Civil War soldiers from direct fire from the weapons of the day. (See figure 3.)

Table 2. Earthworks Protection

| WEAPON | PARAPET THICKNESS |
|---|---|
| Smoothbore muskets | 3 feet |
| Rifled muskets | 5 feet |
| 6-pound Guns | 6 feet |
| 9-pound guns | 9 feet |
| 12-pound guns | 12 feet |
| 18-pound guns | 18 feet |
| 24-pound guns | 20 to 24 feet |

Source: Military Dictionary Comprising Technical Definitions. Colonel H. L. Scott, 1969 (New York: D. Van Nostrand, 1862).

To the common infantry soldier or the casual observer, it may have looked like the soldiers were just hastily digging positions when; in fact, significant testing had been completed and evaluations had been confirmed. Tests had proven that a artillery shot from a 24-pound round had deep penetration in various materials. (See figure 3 and Table 2.)

Table 3. 24 Pound Artillery Penetration

| Substance Penetrated | Range | | |
|---|---|---|---|
| | 100 yards | 400 yards | 1,200 yards |
| Good Masonry | 2 feet | 11/2 feet | 3/4 feet |
| Oak | 4 inches | 3 inches | 1 1/2 inches |
| Firm Earth | 6 1/2 inches | 5 inches | 2 1/2 inches |
| Fresh dug Earth | 12 inches | 9 inches | 4 1/2 inches |

Source: Military Dictionary Comprising Technical Definitions. Colonel H. L. Scott, 1969 (New York: D. Van Nostrand, 1862).

A parapet needed to be 20 - 24 feet thick to withstand fire from heavy guns. For protection from guns less than 18 pounds, a parapet was built one-foot thick for every pound of weight in the shot. In tests, iron plates with a thickness of 4 1/2 inches were proven to withstand 32-pound shots as close as 400 yards.[6]

The smoothbore musket round could penetrate 18 inches of packed earth, or 6 to 10½ inches of elm boards placed in intervals of one inch. The rifled musket penetration was almost twice that of the smoothbore musket in all tests.[7] The rifle effectiveness, combat range, and penetration power far exceeded the smoothbore.

There were several principles that the armies of the Civil War applied in the construction of fieldworks. They were: (1) No field work was out of supporting fire range of another work. This was set, as a minimum, within range of the artillery. (2) All angles of the defense line should be cut at right angles so that a portion of each line supported another and had good visibility of the next defensive front. This also prevented a defensive force being too far in front of another field work and receiving friendly fire. (3) All salient angles were not pointed but rounded so that artillery and supporting infantry could fill the position and have a greater field of fire. (4) Ditches were covered by fire as much as possible. This was done from a salient position in most cases to provide observation of the obstacle. (5) Fieldworks had an integrated fire plan which called for small arms and heavy guns to support the obstacles and other fieldworks. (6) Fieldworks had to be proportioned to the number of troops available. (7) The ground in front of the fieldworks had to be void of any cover to the attacker and so the defender had a clear field of fire.[8] These fieldworks' designs would work together with the range and effectiveness of the current artillery and small arms.

To build a simple parapet, earth was removed from one location and piled up to the desired depth of protection. The most likely place for parapet construction dirt was forward of the defensive line. This gave the defender two of the basic items needed for his defensive line: the dirt for the parapet and his first obstacle--a ditch. Troops were broken down into work parties. This was necessary because of time constraints involved in the preparation of the defenses, the jobs required to complete the defense, and the lack of individual tools available. It is important to note that neither side produced individual entrenching tools in any great numbers or of any great value.

Typically the tools that were required were broken down by the quartermaster into three classes. Class one was called Field Exercise Tools. This group included most of the digging implements. Class two included the tools needed for defense in built-up areas where barricades, stockades, and fortified buildings were reinforced. Class three included General Service items and demolition items: rockets, hand-grenades, explosive shells, and sandbags. [9]

The U.S. and Confederate quartermaster departments' class system had a predetermined number of tools and tool-types that were issued based on the tasks and the different types of units. For every 15 infantrymen and 13 mounted men, two spades, two axes, two pick axes, and two hatchets were issued. These items were issued in leather carrying cases to the soldiers but most likely were placed in wagons during the march.[10] This list begs the question: If there were only two shovels, where are the others? McClellen's report had suggested four shovels for every 15 infantrymen and 13 mounted men, but this seems to have been disregarded by the Army quartermaster during the Civil War. If the quartermaster list items were issued to a full 100-man company in the first days of the war, approximately one-half of the troops would have tools. In the middle to later part of the Civil War, it was

possible that all of the soldiers had something in their hands primarily due to attrition and sickness.

The leadership problem was in deciding where to place the extra weight: have all the troops carry the tools or place them in wagons that may not arrive when needed. Unit logistical problems can be illustrated by the 1st Tennessee Infantry Regiment. On January 3, 1862, the regiment was ordered to "cook two days' rations, also to carry forty rounds of ammunition and one blanket for each man."[11] The men decided to placed their packs and blankets in the wagons believing that they would follow the regiment. The wagons traveled by a different route and did not link up with the unit for 38 days. Another decision faced by commanders was in determining the priority they were going to place on tools and barrier materials. Throughout the war, commanders used what they had on hand to accomplish the mission. It was not unusual for commanders to order the use of agricultural crops, like hemp bales and cotton bales, for the construction of parapets and barriers due to either a lack of time and/or tools. Thus, initiative and imagination of the commanders often determined success of the mission.

Once an army went into a defensive position in the field, the engineers and special work units, called pioneers or Construction Corps, developed a plan and started to work on fortifying the lines. All man-made structures, such as railroad embankments, sunken roads, and stone walls, were utilized and reinforced. In areas without natural cover, a continuous trench was dug and the dirt was thrown toward the enemy. In designing and planning of the fortification, engineers included the height and width of the berms, obstacles, and types of battery fortifications. The Union Army's engineers had the distinction of being "generally confined to the most elevated branch of military science."[12]

Specialty troops called sappers, pontoniers, and miners were attached to the engineers. These troops were used in both offensive and

defensive operations by both sides. Each company was staffed with officers from the Engineer Corps. The typical company was filled with thirty-nine privates second class, thirty-nine privates first class, ten corporals or overseers, ten master workmen or sergeants, and two musicians. The total of a full strength 1861 company was 102 men. Privates first and second class could be substituted with laborers.[13] Laborers were hired by both Union and Confederate armies. These included, white males, slaves, and freemen. All were paid for their services by both sides.

The Act of May 15, 1846 outlined the primary mission for all specialty companies: to oversee and aid in the building of fortifications, while assisting in the prevention of its destruction or repair. Companies also were given the task of assisting in any work that was under the control of the Engineer Department. In the offense, engineer troops were placed forward in the attacking column to assist in movement and to open and repair roads--specifically, the building of bridges and the fortifications that guarded them.

These engineer soldiers and their skills were very important but there was simply not enough of them to go around. Regimental commanders found that they needed to detail men from each company to be placed under the control of a noncommissioned officers to assist sappers at the regimental level. These men were issued saws, axes, spades, mattocks, pick axes, and bill hooks, all of which they carried. These soldiers were always toward the front in any offensive and defensive operation. The Union Army further recognized these men by a distinctive arm patch bearing a pair of crossed axes.[14]

By doing mathematical computations, engineers staked out areas and supervised the building of outline scaffolds for the fortifications. These earthen berms, or parapets, protected the men from the direct fire of the attackers. Only a head shot would produce a casualty. Soldiers

soon learned to take heavy logs and elevate them on rocks or sandbags on top of the parapet so that their heads were protected and their muskets could be fired from under the log. These were called head logs. Head log supports were braces that protected the soldiers in the trench from being crushed if the head log rolled back from the force of a direct hit. With a head log support, the log would roll above the heads of the men in the trench.[15] The ground in front was cleared for better fields of fire and obstacles were employed to channel and slow the attackers. As time allowed, protective shelters called bombproofs and command positions were built to survive even a direct hit from heavy gun or mortar fire. The recurring problem was finding the time and resources to prepare an effective defense.

According to historical accounts a soldier could "excavate one cubic yard, i.e. 27 cubic feet, in any but the hardest soils per hour; and could continue working at this rate for 8 hours.[16] If the soil was loose or sandy, the estimate was doubled. This estimate also depended on the weather and the enemy. If the parapet was not revetted or did not have sod placed on it and a heavy rain came, the trench and the ditch could fill up again with mud and dirt. To prevent this deterioration, soldiers built retaining walls. Soldiers soon found that the easiest way to build these walls was by placing planks horizontally behind vertical posts. This could be done very quickly using local materials. These retaining walls were not effective when faced with heavy artillery fire. One direct hit would take out a large section and injure the men behind it. Pole or vertical-post revetment was considered better because a direct hit damaged only a small section, with little chance of injuries. Hurdles and gabions were wicker baskets and walls that were made of saplings or oak splits. Gabions were filled with dirt. Direct fire damage was limited to small sections. Because they were holding back dirt walls and were filled with dirt, injuries

from secondary projectiles were infrequent. Sandbags were filled with one-half bushel of dirt and were covered with tar to slow deterioration. These were used with great success if they were not in direct proximity to the flames of the artillery. Sod blocks were found to make the best revetments. There was little damage from direct fire and no secondary projectiles to injure troops. When grass was watered, it grew and strengthened the revetment.[17] (See figures 4, 5, 6, and 7.) Revetments became an important priority for the life of the fieldwork and the soldier.

With or without the required tools, the soldiers were broken into work parties. The first group of diggers worked on the ditch; while on the other side of the parapet, the second group of workers dug the trench or the firing steps. The third group worked on the obstacles or gathered items for the revetment. If laborers were hired, they did more of the digging while soldiers paid more attention to construction of obstacles and their bombproof shelters.

Time, the most important factor for a good defense, was needed for completing fieldworks. The engineers used the following mathematical computation to find the time required to construct a trench or parapet in ordinary soil:

> Multiply the area of the section of the trench in square feet by the interval between the diggers (not less than 6 feet), and divide this product by 27, the quotient is the number of hours required for the construction of the work. Conversely, to find the area of the section of the trench or breastwork. which can be executed in a given time or multiply the number of hours by 27, and divide the product by the interval (in feet) between the diggers, the result will be the area in square feet, of the section of the trench of breastwork.[18]

Parapet thicknesses were determined by the weapons they were facing. The ditch was standard if time was available. It had to be deep enough so a man could not get out if he fell into it. It had to be wide enough that he could not jump over it. The ditch was usually eight feet deep and sixteen feet across. With the parapet height added to the

depth of the ditch, an attacking soldier would have to climb out and over fourteen feet. Obstacles like the abatis and the fougass were also placed in the ditch. Defenders easily threw hand-grenades and light cannon shells into the ditch. This made the attackers' position in front of the parapet of the ditch a particularly deadly place. (See figures 8, 9, and 10.)

Conditions in which to build the defenses were not always perfect during the war. But, any protection from the deadly rounds was better than none. Troops who were told of a possible attack were very resourceful and responsive in building partial fieldwork. When time prohibited digging a ditch in front of the parapet, a shallow trench behind the parapet could be dug. The soil dug from the troop trench was used to build up the parapet. Soldiers were provided additional protection by being dug in below the ground surface in the trench behind the parapet. Soldiers were now loading in the trench, stepping up on a firing step (barbette) and firing over the parapet. When they fired, they were protected by the dirt of the parapet. During the war, the parapet and firing trench became the norm, rather the ditch and parapet. Digging a trench, instead of a ditch, cut the time needed to create a protective parapet by one third. Trenches could be cut for one or two ranks in regular, rocky, or marshy soil.[19] (See figures 11 and 12.)

Forward of the ditch or simple parapet, rifle pits were constructed for the pickets, sharpshooters, and men designated to cover certain obstacles. Rifle pits were constructed and dug for two-man positions. They were dug down about only three feet with a small step or seat cut into the back side. The soil was dug out, and thrown forward and reinforced with sandbags so that a soldier could fire toward the front through firing slots, called loopholes, which were made with the sandbags.[20] (See figure 13.) The rifle pits had two functions. First, they gave early warning to those in the fieldwork and second,

they were used by skirmishers who could break up or disorganize an attacking force with effective fire.

Obstacles provided the defender three advantages. First, they positioned the attacker into a kill zone where the defender could focus his greatest firepower. Second, they slowed the attacker so no rush could cover ground without receiving fire from some part of the fortification. Third, they broke up and disorganized the aggressor's attack plan and schedule, thus, placing the attacker in an area where the defender would place his best effective fire.

Most of the obstacles designed during the American Civil War were constructed to prevent the attacker from making quick rushes that covered a lot of ground without being engaged by defenders. If an attacker got behind the parapets and down into the trenches they could expand the gap by attacking the defender on their flanks. Then attackers' reserves could drive through the gap and push deep into the rear area of the defenders. Defenders would have to fall back to a secondary defensive line or counterattack in order to retake the lost defensive area. With General Grant's permission, Colonel Emory Upton experimented with one of his offensive theories against the Confederate's entrenchments at Spotsylvania. The Union units were stacked one behind the other. Each unit was given special instructions regarding the completion of the breakthrough. The first unit was to break through the defense line, then turn and give enfiladed fire into the flanks of the defenders. The second unit was to push through the trench, set up a defensive position, and await a counterattack. The third unit was to lie down behind the second and become the reserve force. The fourth unit was to give fire support from outside the enemy fortification.[21] This tactic was supposed to open a gap in the field fortifications and allow reinforcements to come into it.

The drill of loading and firing the rifled musket was set at three rounds a minute. The loading count was usually a nine step, number drill that could be modified to a "fire at will" command. Both loading sequences took time that the fast-moving attacker could use to his advantage to move from his last covered and concealed position to the defender's parapet. The cavalry could move the fastest and covered the most ground. Many of the obstacles were designed to slow, stop, or injure the mounts or the men.

First, palisades were made of strong sharpened sticks that were either stationary or positioned on a moveable frame. When dug into the ground, they became a permanent obstacle. Palisades were wooden shafts, nine to ten feet long, with a diameter of six to eight inches. They could be placed at the base of the parapet to prevent horses from riding onto the berm. Palisades were sometimes placed against the forward wall of the ditch to prevent horses from jumping the obstacles. They were also placed in long lines forward of the ditch. Here, they were dug into a small, 2 1/2 foot deep ditch. Then the stakes were secured to a buried log at the bottom of the ditch. The ditch was then filled in and tamped down to prevent pioneer units from pulling them up.[22] (See figure 14.)

Chevaux-de-frizes were also used against cavalry. Theses structures were comprised of a single moveable obstacle which when tied or chained together became a permanent obstacle. These obstacles were made out of iron or wood. Each obstacle had twelve spears that were five feet long which were slid or hammered through a bar or log that was six feet long with a diameter of at least four inches. The spears were positioned in a criss-cross manner which stabilized the obstacle and made it free standing.[23] (See figure 15)

The last obstacles, which were strictly used against cavalry, were called crows-feet. These were iron spikes that looked like a

child's jack. Their spikes were arranged so that when dropped on the ground one spike always landed up. If a cavalry attack was expected, these were thrown on hard ground, usually on packed roads, around fortified gates or bridges.[24] (See figure 16.)

Although the infantry could not move as fast as the cavalry, it could cover ground in front of field fortifications at the "double quick" if they were not slowed. To slow infantrymen, the defenders built a variety of obstacles. The principal purpose of obstacles was to slow the attackers so the defender could reload and make sight adjustments. This became a factor because there is no evidence that the infantry troops used range stakes. Other obstacles entrapped or killed the soldiers. These obstacles, combined with the cavalry obstacles, broke up the attacking units' mass, threw them into disorganized groups, and highlighted them to the defenders in a field of fire devoid of any cover.

Although the ditch has already been covered in this chapter, it should be emphasized that it was the last obstacle before the parapet. If a soldier did fall in, he could not get out without help. The poor soul who did fall in also had to face a myriad of demolitions and sharpened sticks which were placed in this moat. (See photo 17.)

The abatis was the first obstacle that could stop or slow an unprepared column of troops in a restrictive area. This was especially true if the area was covered by the defender's fire. Many abatis were placed in mountain road gaps, railroad cuts, low areas, or dead space. An abatis was also made into an obstacle line in front of fortifications. It could close off alleys or doorways in a built-up area. An abatis consisted of trees which were cut down with the branches laid toward the enemy and the ends of the branches sharpened into spears. In front of a fortification, rows of trees were cut so that branches intermingled. These branches were later sharpened. They were placed in

the dead space or low areas forward of the parapet so that attackers could not use these areas for cover or consolidation before an attack on the parapet. These obstacles created the need for special units called pioneers. They were created by selecting infantrymen then giving them special tools and placing them under command of an engineer. They were placed forward with the combat units so they could cut through these abatis of tangled spikes.[25] (See figure 18.) These obstacles restricted and channeled soldiers on the offense. It also showed the army the need for specialty troops to assists the small engineer corps.

Trap-holes or trous-de-loup could be used against the infantry and the cavalry. For the infantry, a hole was dug at least eight feet deep. A large, sharpened wooden stake or abatis was positioned in the hole. If the man was not killed, the hole's depth would ensure that he would not get out without help. The cavalry trap-hole was only two and 2 1/2 one half feet deep with a large sharpened stake in the center of it. Here, the horse would have to jump or go around it. Although the trap-hole for the cavalry had little effect on the infantry, the shallow hole gave little protection from the direct fire of the defenders. Trap-holes were placed in front of field fortification in a checkerboard pattern to prevent easy passage, much like a modern day mine field.[26] (See Figure 19)

Finally, trip wire was used against infantry and cavalry. Stakes were driven into the ground. Then, wire was attached and stretched between the stakes in a crisscross pattern. The infantry had to watch their footing or they would fall. The cavalry horse would trip, possibly cut its leg, and throw its rider. At the 2d Battle of Drewry's Bluff, the Confederates under General P. G. T. Beauregard launched a four forty five morning attack in the morning fog against Union General Benjamin Franklin Butler. Although the Confederates

routed his right flank, they were slowed by "wire entanglements in the Union center."[27]

The principles of field fortifications were applied in the defensive works for cities and towns. City defenses took advantage of the terrain and buildings to support their fortification. The capitals of both armies were perfect examples of how field fortifications were used in their defenses. Washington and Richmond were surrounded with continuous lines of defensive works. Richmond had rings of defensive works while Washington "by the end of 1861, was surrounded by 60 enclosed forts, supplemented by 37 miles of trenches, 20 miles of rifle pits, and 93 gun batteries containing 762 heavy guns and 74 mortars."[28] The defenses of Vicksburg and Atlanta took advantage of outlying terrain, rivers, and buildings. Many cities built bastions, or small forts which could hold infantry and artillery. These structures connected other outer works into one continuous ring. The outer works were connected to inner defenses by communications trenches. These trenches also allowed for reinforcements to pass during battle with some protection from indirect fire. All stone or brick walls were strengthened by banks of earth and integrated into the defenses. Open areas were blocked by obstacles and covered by fire from parapets. (See figures 20 and 21.) The result was that an attacking force had to plan for a hard fight that would take a lot of time and result in many casualties.

General Lee decided not to fortify the city of Fredricksburg, but, instead, built his main defensive line along a stone wall 1,200 feet long just outside of town. Behind that wall was the sunken main road to Richmond. This gave the Confederates cover to the height of their shoulders. The brigades of General Thomas R. Cobb and General Joseph B. Kershaw lined the wall four deep with riflemen. This strong man-made feature, supported by infantry, allowed no Union soldier to get

closer than 50 yards to the wall. The Union's fourteen charges produced 7,000 Union casualties versus 1,200 Confederate casualties. Colonel E. Porter Alexander reported to General James Longstreet, "A chicken could not live on that field when we open on it."[29] General Longstreet then reported with assurance to General Robert E. Lee saying, "General, if you put every man on the other side of the Potomac line, give me plenty of ammunition, I will kill them all before they reach my line."[30]

If a city was to be defended from the inside, barricades or stockades were employed to close off streets. Stockades were permanent walls made of 12 to 14-foot logs with a diameter of 10 to 12 inches. These so-called picket works typically had gates with firing positions cut into them. Standing on scaffolds, soldiers fired through cut firing portals called loopholes. (See figures 22, and 23.)

A street barricade was a parapet made with items found in the area which could take the impact of small arms. Such items were often barrels filled with dirt or wagons and sandbags. Street barricades were temporary and could be constructed in a short period of time.[31] The barrier was a designed parapet, using local items, which could integrate moveable obstacles like palisades or chevaux-de-frise. Building these took time and some carpentry work but the principle of the parapet still remained.[32] (See figures 24 and 25)

The final strong points or goals were in the inner town. These were the strongest buildings within the city. Made of stone or brick, they were reinforced with palisades, abatis, and a ditch. Loopholes were cut in the walls, window glass was taken out,and window frames were reinforced with sandbags. These buildings were connected by communications trenches. Nashville, Tennessee,was a prime example of this type of fortification. General J. St. C. Morton of the Union Engineer Corps, fortified the Tennessee State Capitol. Besides using the building, he built gun platforms on the steps which were supported by parapets and

stockades.[33] (See figure 26.) If no strong buildings were available, earthen redoubts were built in the village. Fields of fire were cut all around the defenses of the town. These fields of fire were extended out 800 to 1,000 yards from parapet to present a flat killing field, all hedges and trees were cut down, ditches were filled with water, areas were flooded, and even the small rises in the ground were leveled by laborers.[34]

To strengthen key locations like bridges and stockades, blockhouses were built. They were two-story buildings made from vertical poles with 18-inch square logs on the ground floor and 12-inch square logs on the top floor. Each story was ten feet in height with loopholes cut in the walls. The roof had hatches for light and the release of smoke.[35] (See figure 27.)

Stronger fortifications were sometimes required. If time allowed, redoubts were connected with parapets and obstacle lines. (See figure 28.) Infantry units which were positioned behind these lines gave additional fire power and protected the redoubt's guns. The defensive lines were formed in right angles to the redoubt so that straight-line fire support could be provided. If the defensive lines could not be anchored to a strong fieldwork position, they were run into terrain that was unsuitable for enemy maneuver, that is, a swamp or high bluffs. Continuous lines required time and labor and a force which could be stationed in them. Because continuous lines are linear, a section taken by enemy forces, resulted in the loss of the whole line because the enemy force could place flanking fire on the defenders still in the defensive positions. This happened to one of the lines in the defenses of Richmond in September 1864.

The successful attack and capture of Fort Harrison forced the evacuation of the Chickahominy River to the James River line.[36] On September 29, General Edward Ord's XVIII corps attacked Fort Harrison on

the Confederate outer defensive line. Because General Lee was trying to counter one of General Grant's moves in the south, Lee left only a small artillery garrison of 800 soldiers to hold the fort. The three Union brigades under the command of General George J. Stannard attacked the fort. This division suffered 18 percent casualties, including every brigade commander and four regimental commanders. The small size of the defending force and the lack of infantry support to the artillery enabled the Union forces to capture the fort. Another important factor was that the attackers were able to cross the kill zone quickly and were not engaged by small arms fire. The Union then reorganized at the base of the parapet. This location was suitable because the cannons could not be depressed enough to fire at the attackers. The result was the loss of not only the Confederate fort, but a good part of the Confederate defensive line.[37]

To prevent the complete loss of a defensive line, continuous lines were cut in intervals. A series of defensive lines was cut into rows, one behind the other or offset, so that troops provided mutually supporting fires. Lines of intervals were usually placed at the openings of redans and lunettes. They were not more than 600 to 700 yards apart. These lines were also directly supported by fire from the larger fieldworks.[38]

The most powerful and important weapons during offensive and defensive operations were the field and siege guns. They were placed into a battery of two or more guns. The gun platforms were built below ground as well as on the surface of the ground. They could also be elevated onto an earth work to insure clear fields of fire. There were several different types of artillery batteries. Most were used in fixed or coastal positions. The most common designs for field and siege guns were the barbette, ambulant, and covered battery. These could be raised on platforms in a fort or sunken down to ground level. (See figures 29

and 30.) These positions could be used to provide enfilading or ricochet fire to the ground in front of them. A barbette battery was one that fired over the parapet, while an ambulant battery contained heavy guns mounted on carriages. The earth around the position had to be packed and reinforced so that the gun could move and would not damage its position under enemy fire no matter what the weather. The interior of the batteries and the cheeks of embrasures had to be revetted with gabions, sandbags, or sod. (See figures 31 and 32.) Sandbags were found the least desirable because the flames from the guns destroyed them. To protect the battery from damage from counter battery fire, traverses or earthen revetted mounds were built between every two guns.[39] To check the recoil and to ease the gun's movements, a platform was built under it. Hewn timbers, eighteen feet in length and not less that nine inches in diameter became the sleepers. Three inch planks fourteen feet in length were laid over the sleepers. To prevent the gun from damaging the revetment, a six inch timber called a hunter, was placed at the forward firing position on the platform to act as a forward stop. To provide drainage, two-inch holes were bored through the planks. Hewn timbers were considered better than planks for ten pound Parrotts and 12 pound guns because these guns seemed to throw their recoil weight down and break through the planks. A distance of thirty feet between guns allowed for the intermediate traverse between the guns.[40]

To support the artillery while in field defensive positions or in redoubts, magazines had to be built. These were built to the flanks of the gun line. The walls were built of vertically placed log posts that were angled into an A-frame structure. The walls were made of oak or chestnut posts that were nine feet long and one foot in diameter. The floor was raised two feet above the ground for ventilation and built with two-inch-wide planks. The standard width was twelve feet but was

adapted to the powder barrels of the weapon it supported. Additionally, a second air wall was built out of two- to four-inch-diameter poles placed horizontally on the other side of the structure. Then, the structure was covered with a protective covering of earth deep enough to protect it from a direct hit from the heaviest rounds the enemy force had. Frame magazines were also made of logs and hewn timber stacked one on top of each other in a crisscross manner. Planks were one-inch wide, tongued and grooved and painted with coal tar, resin and sand to flush the joints. Each layer of boards was waterproofed with this composition. Additionally, canvas which had this mixture mopped onto it for waterproofing was laid between the logs and boards. Then, two inches of sand covered the structured for drainage. Then two feet of clay were spread on top and packed every six to eight inches.[41] (See figure 33.)

The most important field position for the defensive line was the field fort or the redoubt. Usually an enclosed square fort, it was built on a prominent position on the defensive line. It took advantage of the terrain on what was considered a key position in the defense. The size of the fort or redoubt was proportioned to the number of guns and infantry troops that were to be stationed in it. They were connected with continuous lines of parapets and other field forts. They took advantage of their position to support the other defenses by their concentrated fires. Some of the strongest field forts were in the Nashville and Knoxville defenses. Many of the Union forts in this area were built under the supervision of General James St. Clair Morton of the Corps of Engineers. Fort Negley, later called Fort Harker, was one of the strongest. Fort Negley was unique in that it was the largest fort in the Nashville defense, and it was also the only stone and masonry structure built after this type of construction was proven to be obsolete. It was the only such structure inland. The only explanation

was that General Morton was a student of Mahan and the old school. Fort Negley is an example of old style engineering that was designed with smoothbore defense instead of rifle weapons in mind. The other forts in the western area of operations were all earthworks. Fort Sanders in Knoxville was a typical earthworks. It had eight-foot walls that were supported by large cotton bales. The fort's twelve guns and 440 men could enfilade the ground for more than 100 yards in any direction. The surrounding timber had been cleared for better visibility. The tree stumps had telegraph wire strung fifteen inches above the ground. The ditch was twelve feet wide and eight feet deep.[42]

Not initially a redoubt, Fort Wagner was first built as a battery. It later developed into an enclosed fort that had all the characteristics of a redoubt except its shape. Instead of the normal square, Wagner was 250 by 100 yards. Its parapets rose thirty feet above the beach and were supported by flexible palmetto logs and sandbags. The fort held one ten-inch columbiad along with fourteen other assorted guns. The massive bombproof was covered with ten feet of sand and could hold 1,000 of the 1,700 man garrison. The ditch was ten feet wide and five feet deep. The area around the fort was protected by land torpedos (land mines) and palmetto palisades.[43] Through the trials of fire, field fortifications developed their style and shapes to provide protection for the range and penetration power of the rifle weapons. Earthworks came into their own and surpassed masonry works during the Civil War. The art of war truly became a science in building field fortifications.

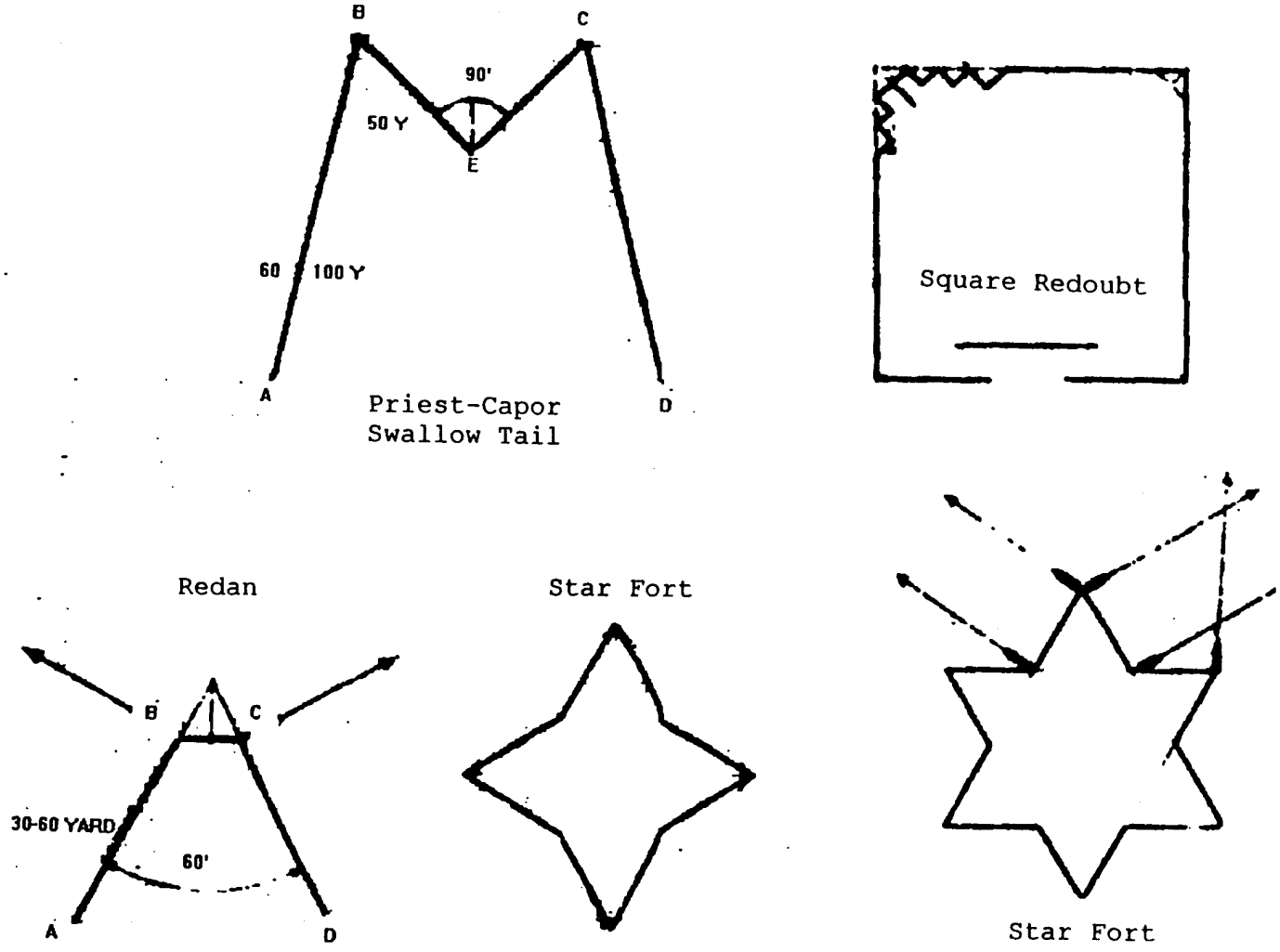


Figure 2. Field Forts. Source: Dennis H. Mahan, Field Fortification, (West Point: Wiley Long, 1836), Plate 1.

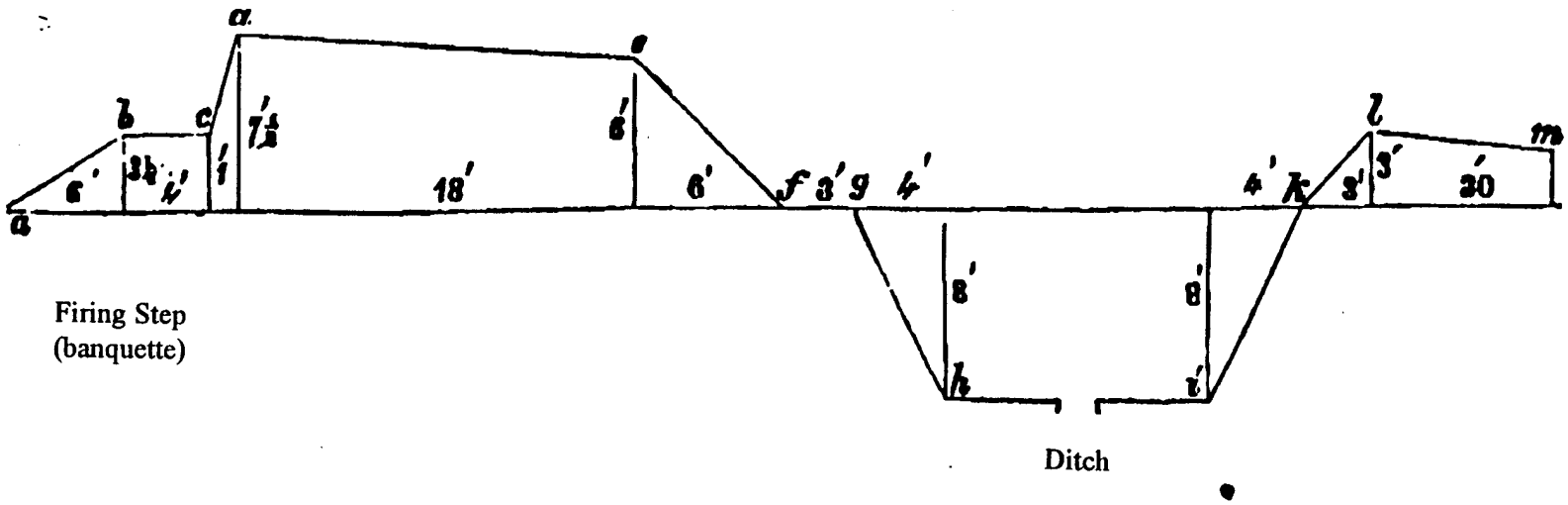


Figure 3. Dirt Parapet. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 284.

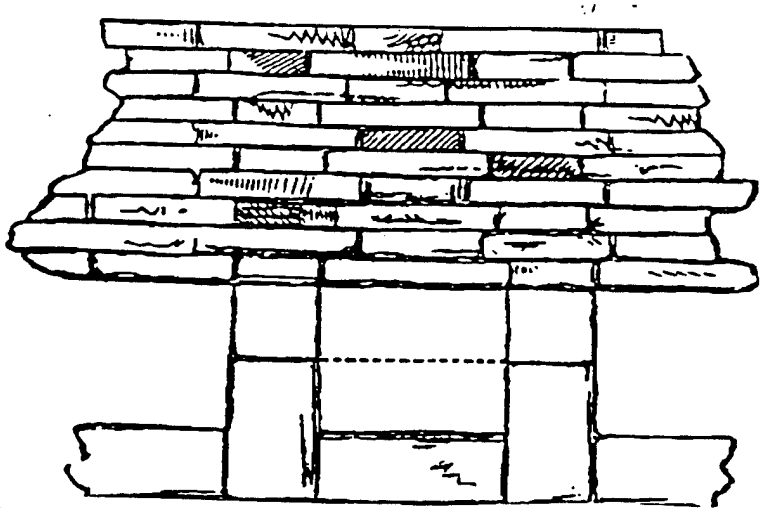

Figure 4. Sod Block Reveted Wall. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 508.

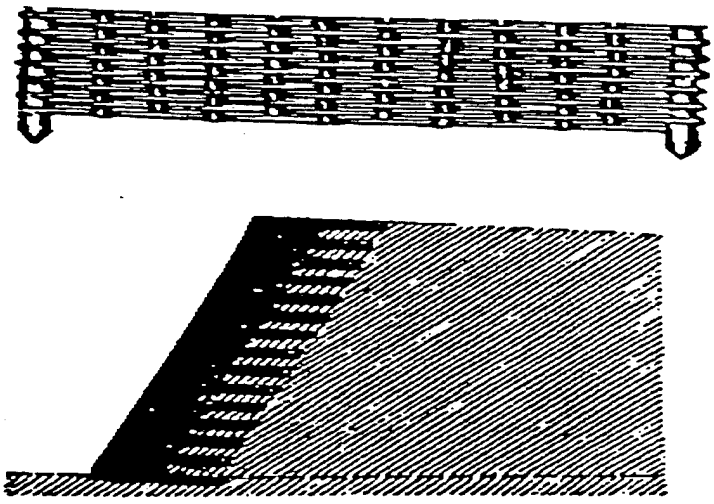

Figure 5. Hurdle and Sod Block Revetment. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 508.

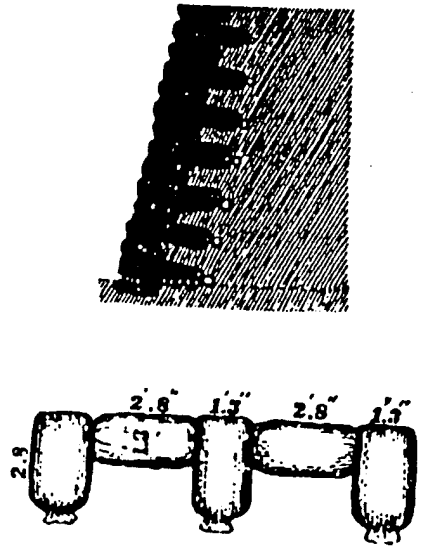


Figure 6. Sand Bag. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 509.



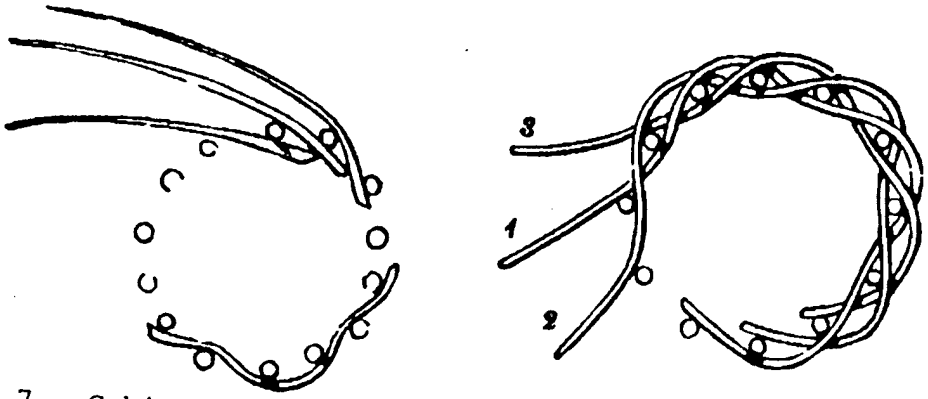


Figure 7. Gabions. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 507.

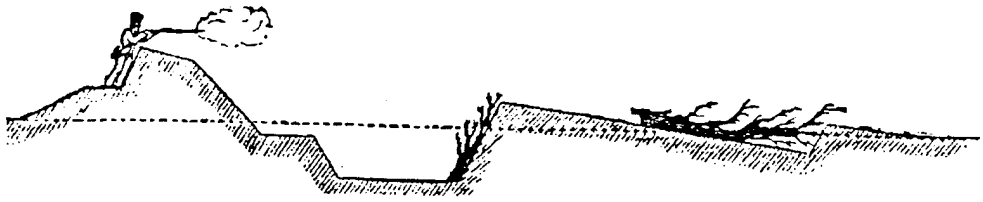

Figure 8. Parapet, Ditch, Abatis. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 9.

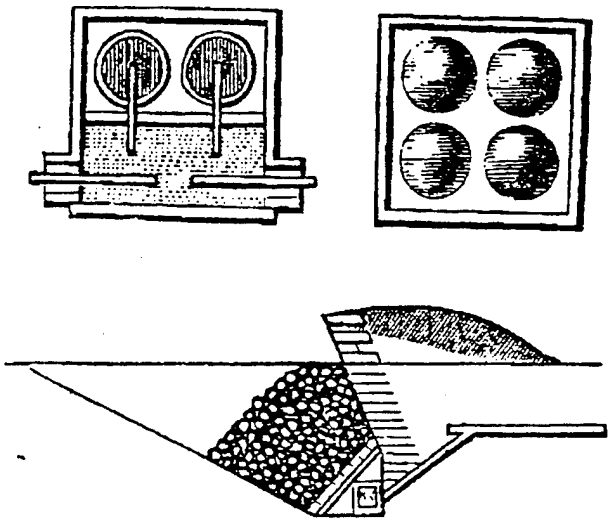

Figure 9. Fougass. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 317.

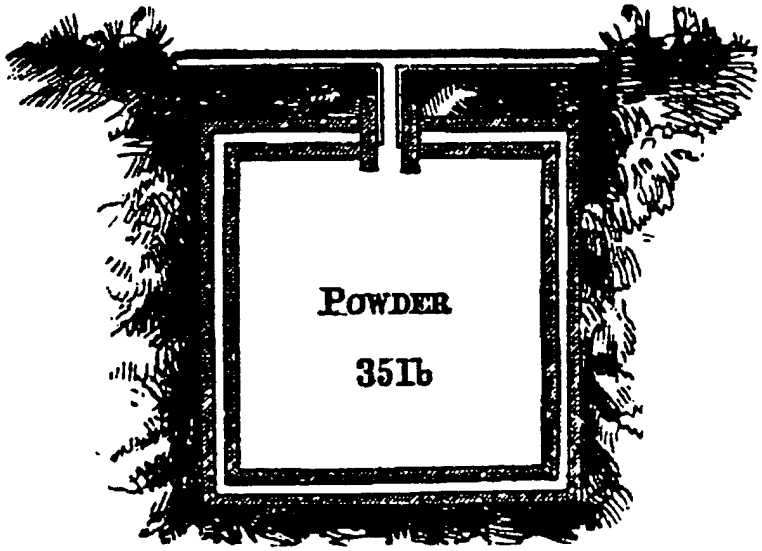


Figure 10. Torpedo (Mine)
Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 318.

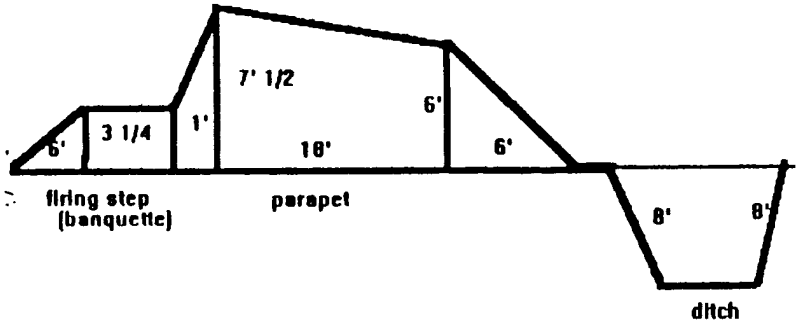


Figure 11. Parapet and Ditch. Source: Henry L.Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 284.



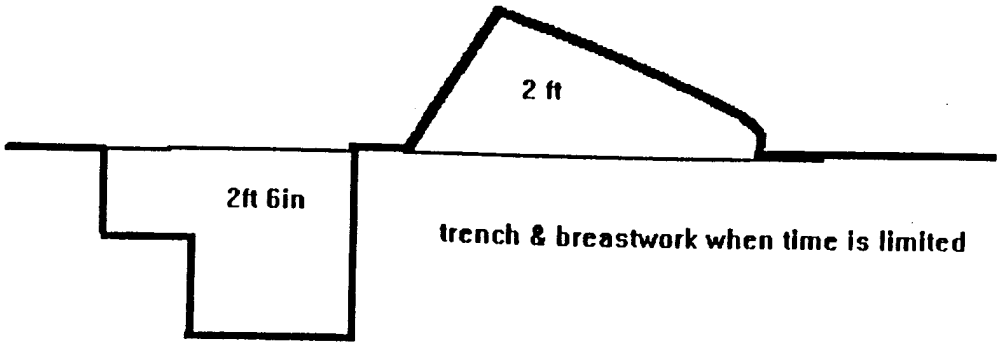


Figure 12. Parapet and Firing Trench. Source: Henry L. Scott, Military Dictionary, New York: D. Van Nostrand, 1864), 287.

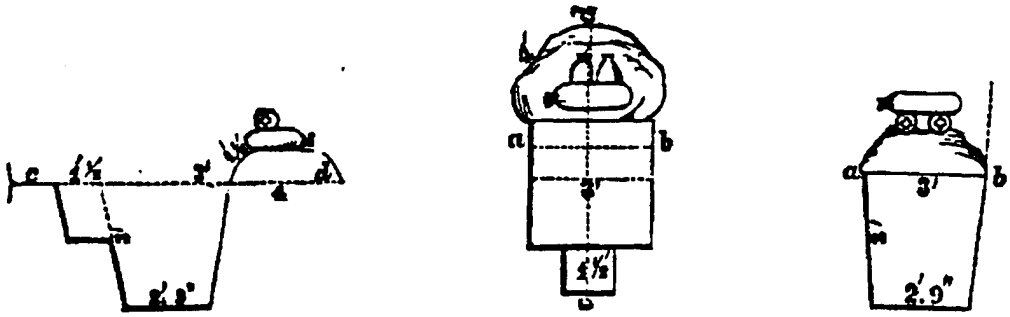

Figure 13. Rifle Pit. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 532.

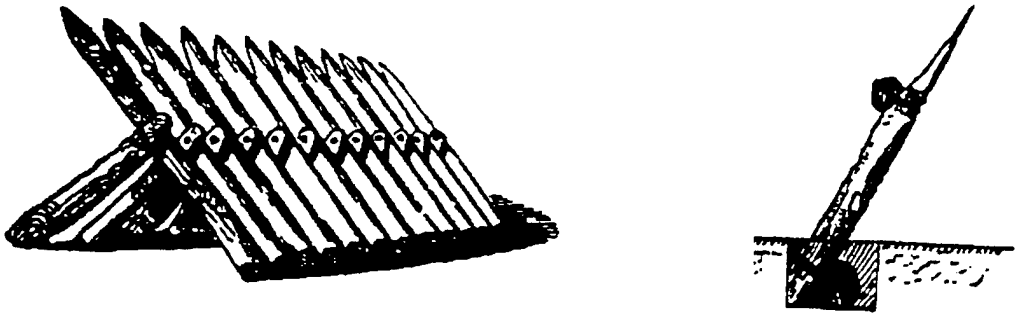

Figure 14. Palisades. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 432.

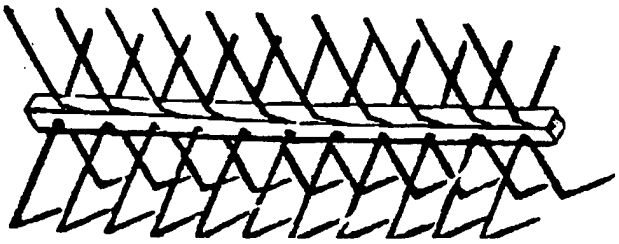

Figure 15. Chevaux de Frizes. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 432.

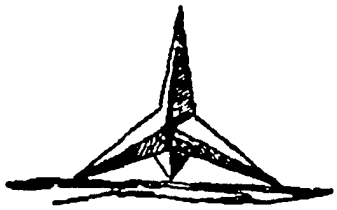

Figure 16. Crows Feet. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 431.

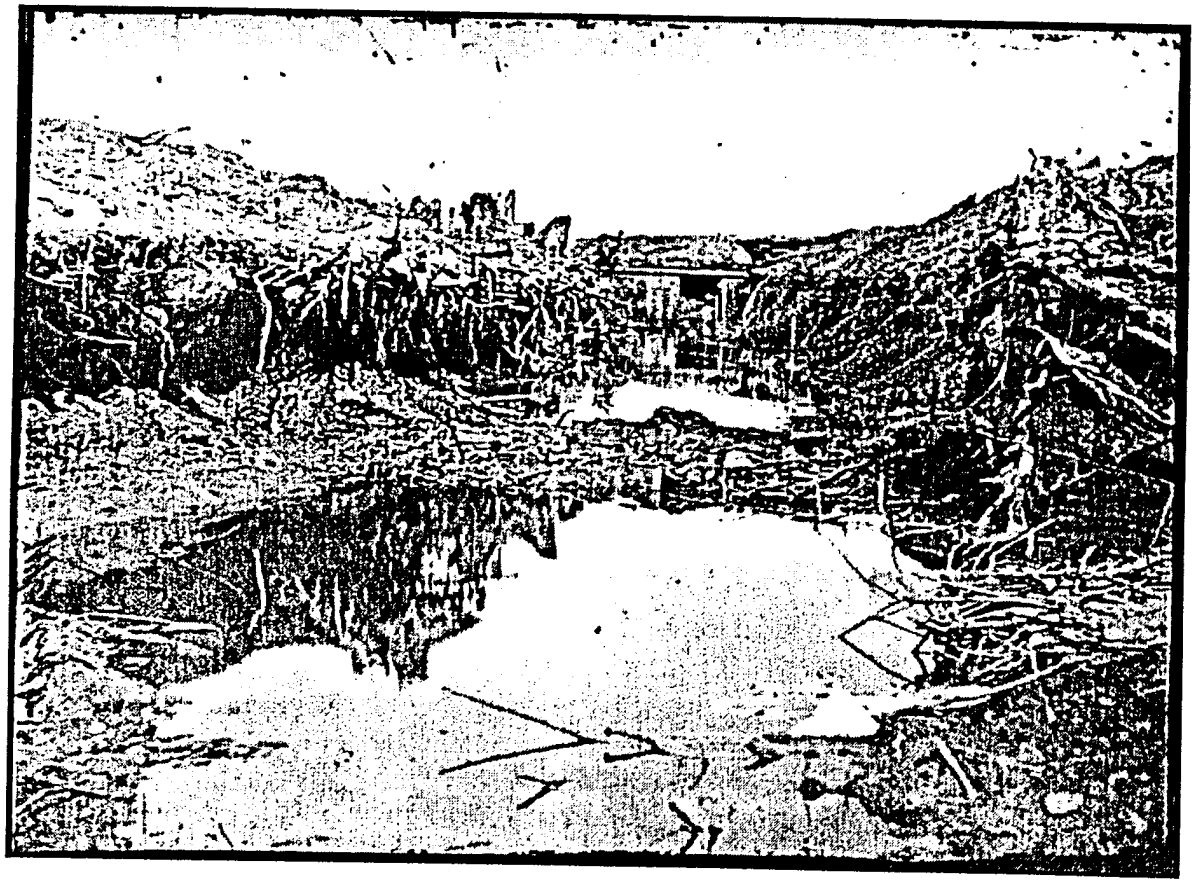

Figure 17 Photo Ditch West Side of Fort Sedgwick. Source: Civil War Photographs 1861-1865, Library of Congress. #3194

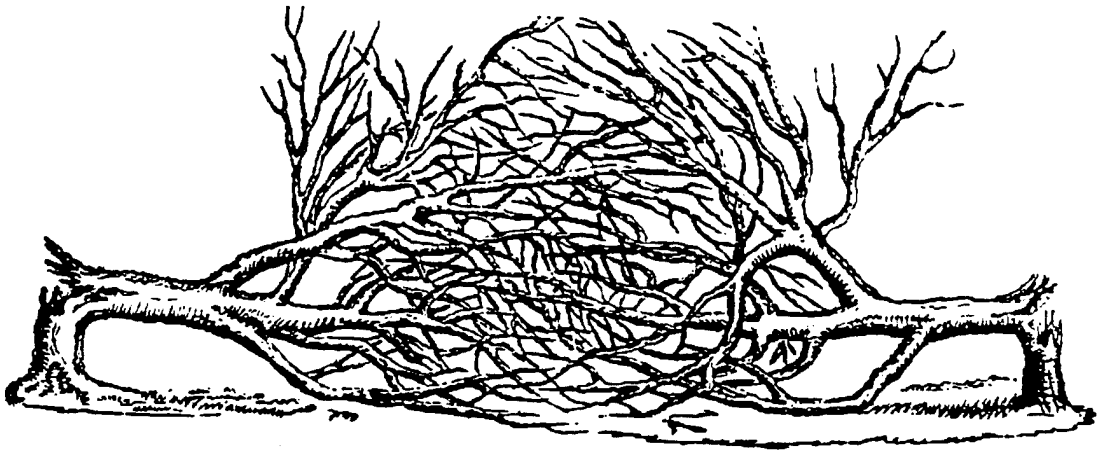

Figure 18. Abatis as a Road Obstacle. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 9.

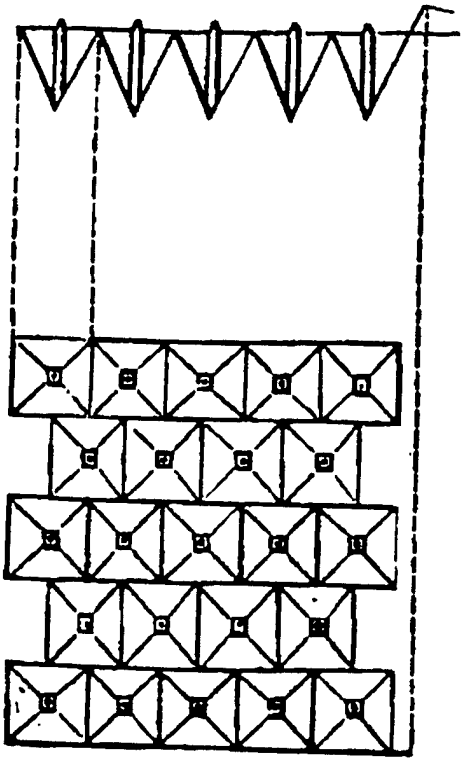

Figure 19. Trap-holes. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 638.

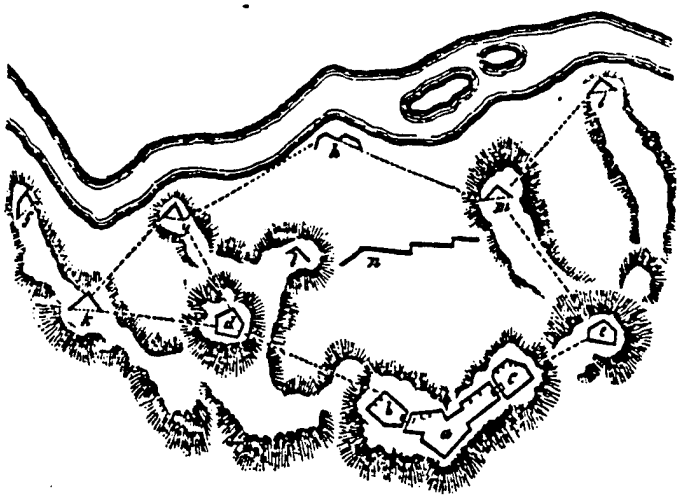

Figure 20. Supporting Field Fortifications. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 299.

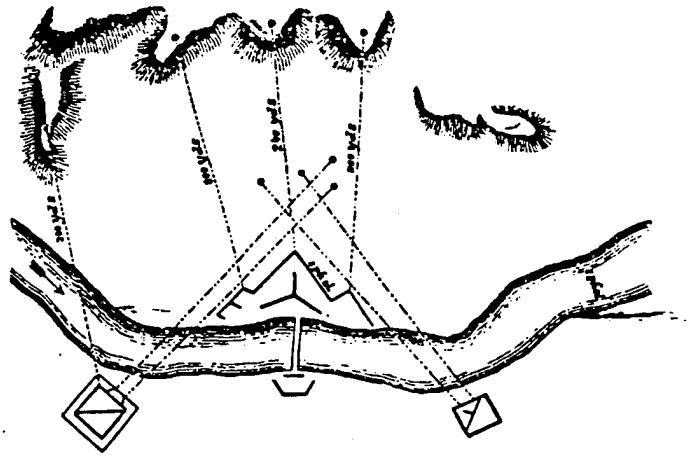

Figure 21. Redoubt Supporting a Redan. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 497.

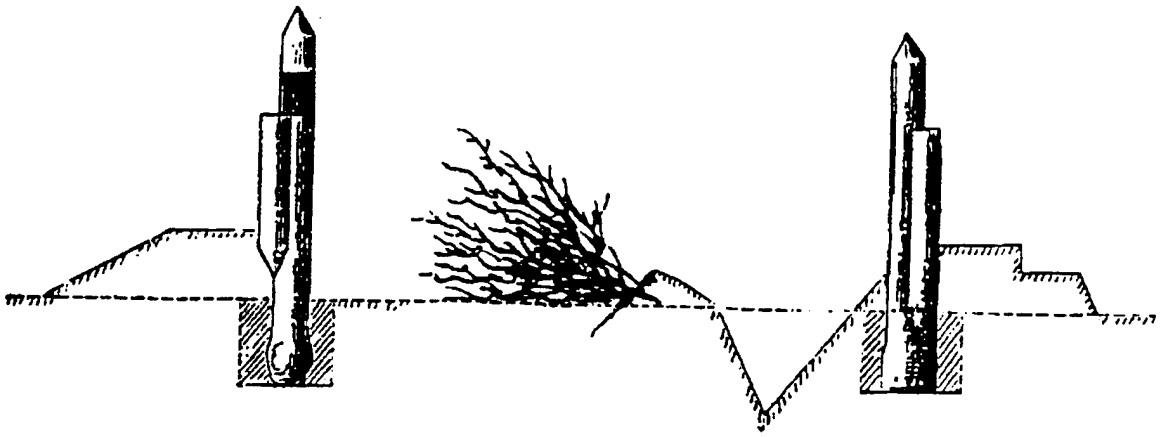

Figure 22. Stockades. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 573.

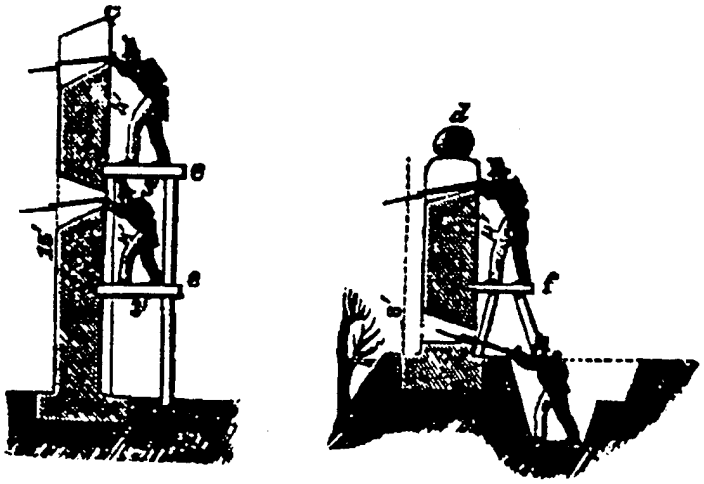

Figure 23. Stockade and Scaffolds. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 290.

Figure 24. Barricades. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 80.

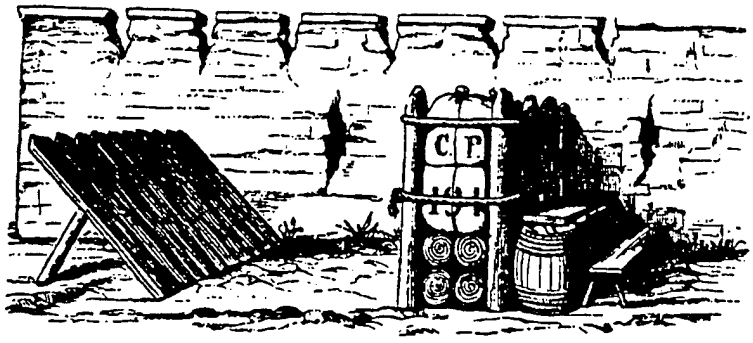


Figure 25. Barricade and Obstacle. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 81.

Figure 26. Strong Points. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 126.

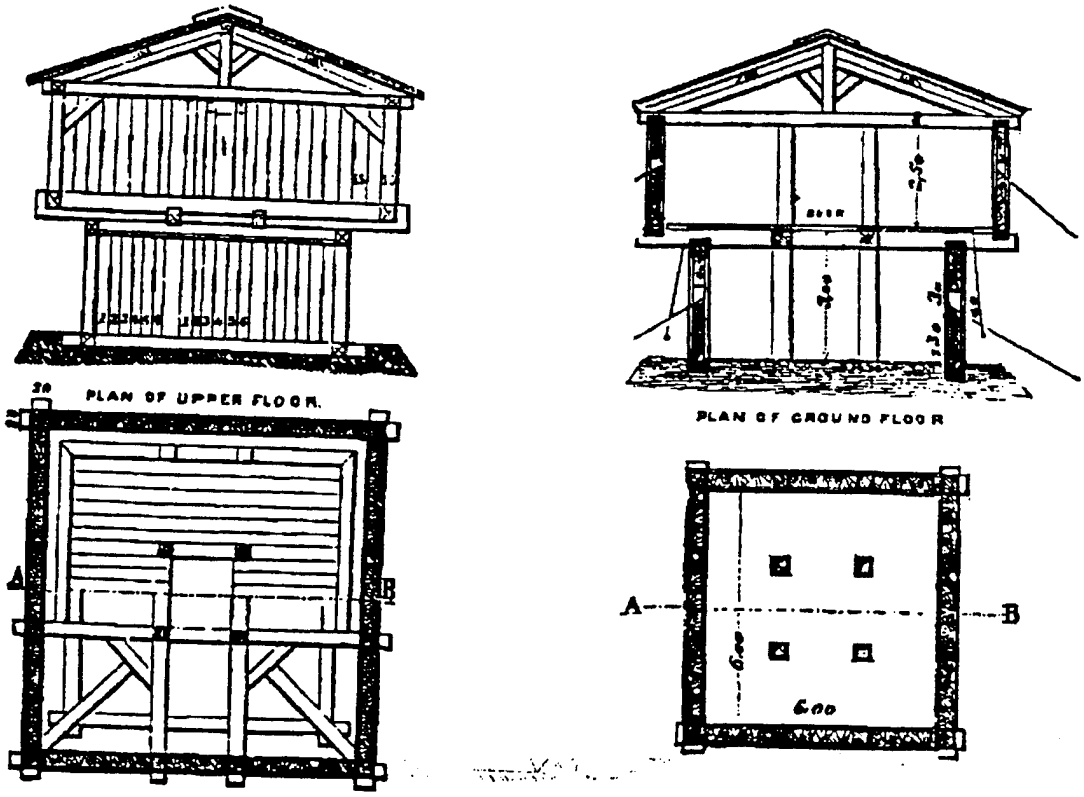


Figure 27. Blockhouse. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 88.

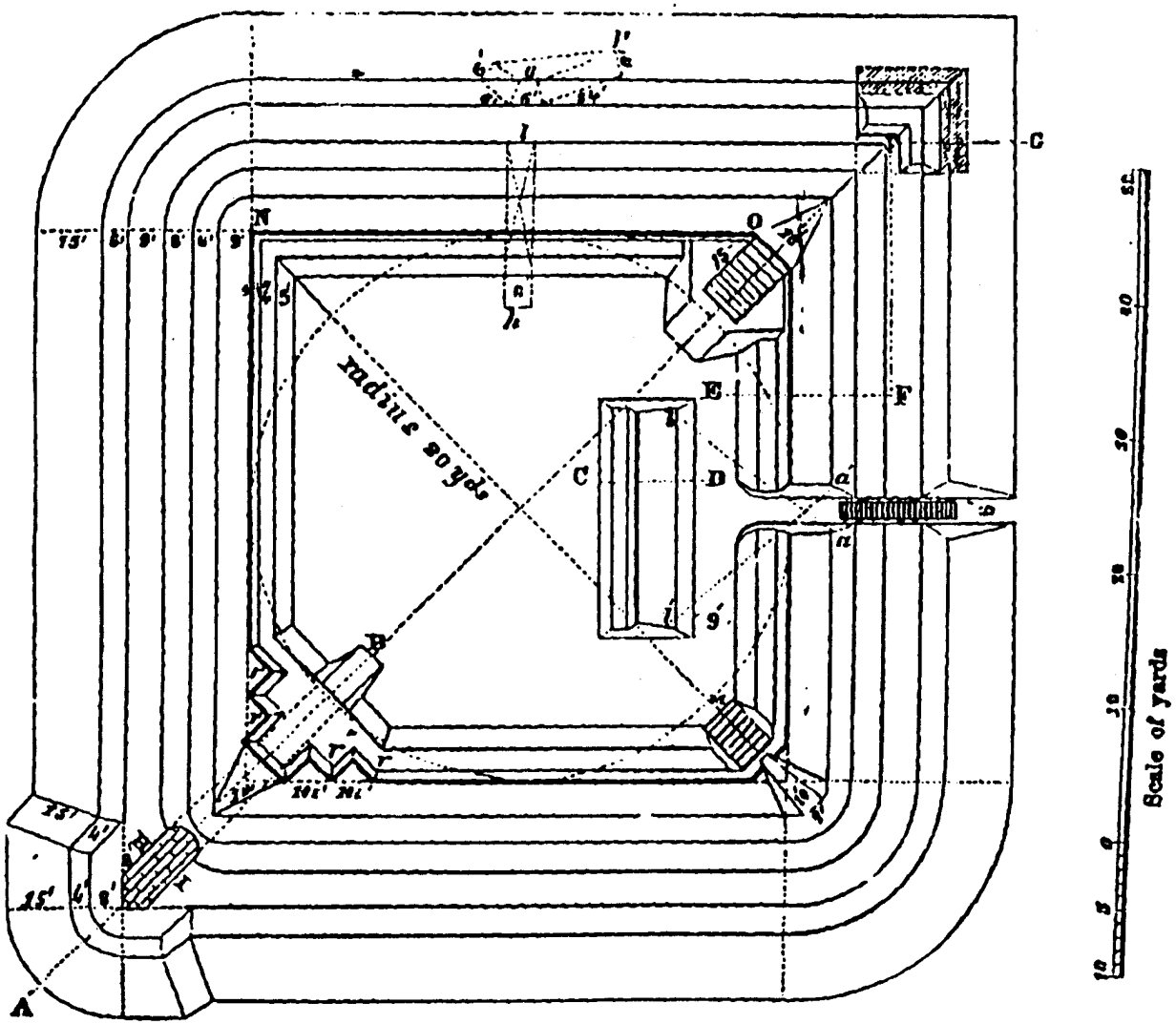


Figure 28. Redoubt. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 498.

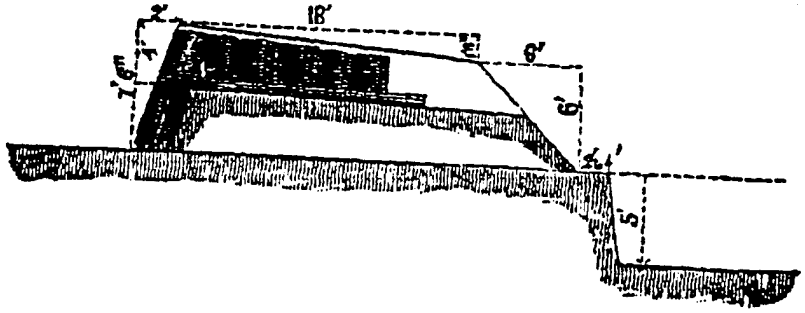


Figure 29. Raised Battery. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 83.

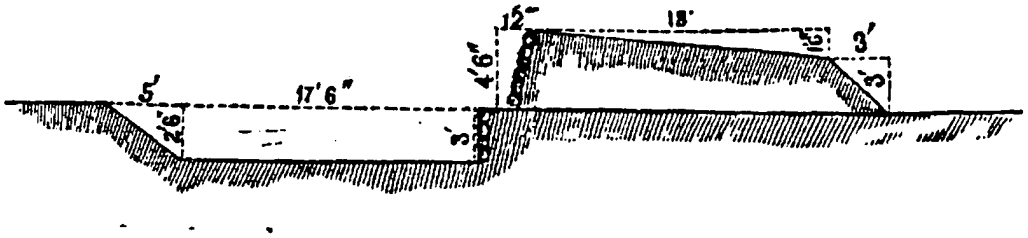


Figure 30. Sunken Battery. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 84.

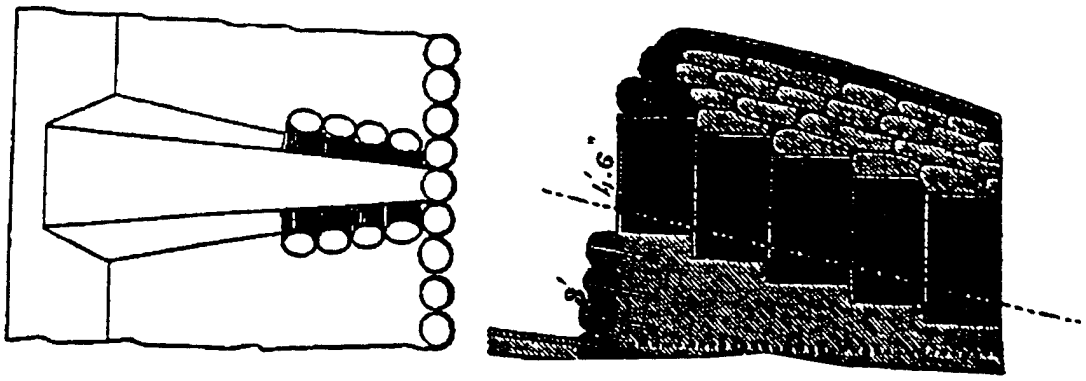

Figure 31. Embrasures Cheeks. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 259.

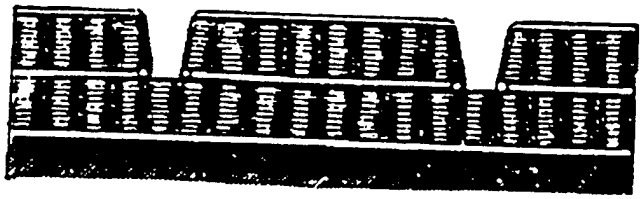

Figure 32. Front Embrasures. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 255.

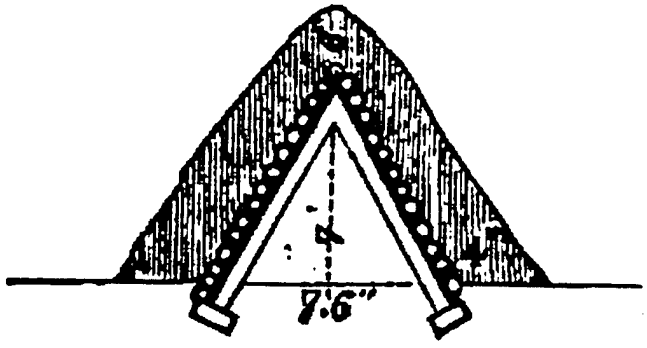


Figure 33. Field Magazine. Source: Henry L. Scott, Military Dictionary, (New York: D. Van Nostrand, 1864), 395.

## Endnotes

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# CHAPTER IV

## UNDER, OVER, AROUND

> We must destroy this army of Grant's before he gets to the James River. If he gets there it will become a siege, and it will be a mere question of time.

Robert E. Lee, Siege of Petersburg

Earthen field fortifications during the American Civil War changed very little from the designs that had been developed in earlier European conflicts. The only noticeable modification emerged in the amount of earth used to counter the increased penetration power of rifled weapons. This slight change should have been a hint that existing tactics also needed to change.

Both the Union and Confederate armies began construction of field fortifications early in the war. The use of field fortifications was widespread throughout the war. Field fortifications around cities and transportation hubs usually began with the building of redoubts on key terrain. These redoubts were interlocked with rifle pits, breastworks, and trenches. To give the defenders clear fields of fire, a 1,000-yard kill zone was chopped out of the surrounding forest. Obstacles were then placed in the dead spaces, areas not visible to the defenders, to channel the attackers so effective fire from the heavy weapons could be placed on them. The massive volunteer armies concerned themselves with field fortifications early in the war primarily because their senior officers (especially the military academy graduates) had all studied from the same textbook and under the same instructor Dennis

Hart Mahan. These men understood the need to train and recruit armies as well as the importance of field fortifications.

During the First Battle of Manassas, in July 1861, Union General Ervin McDowell sent engineers forward in his columns in order to destroy field obstacles, which the Confederates had placed in his path. In February of 1862, General Grant attacked at Fort Donelson and Fort Henry. He encountered not only field forts, but entrenchments and obstacles. Further west, Confederate forces under Brigadier General Gideon Johnson Pillow constructed two infantry regimental redoubts which included land and floating artillery batteries at New Madrid, Missouri. In Galveston, Texas, and Camden, Arkansas, field fortifications played an important role in the battles to control these areas of operation.[2]

By the end of 1861, Washington, D.C., "had 60 enclosed forts, supplemented by 37 miles of trenches, 20 miles of rifle pits, and 93 gun batteries containing 762 heavy guns and mortars."[3] Richmond also prepared by building field fortifications, including gun emplacements for 218 guns, which were anchored in a semicircle on the banks of the James River. The longest line included more than twelve miles of field fortifications and obstacles to protect Richmond. These earthworks were connected with the defenses of Petersburg located to the south. In the rivers, the Confederates constructed obstructions and placed torpedoes (mines) which were covered by fire from land batteries.[4] By 1864, Richmond was protected by five defensive lines. These lines were known as the "Northside Defensive Lines." These consisted of 120 miles of earthen forts and trenches anchored to the James River.[5]

By 1862, all of the key cities and many of the industrial and transportation centers had either been surveyed for field fortifications or already had fortifications in place. These included Yorktown, Virginia; Cincinnati, Ohio; Columbus, Georgia; and Fort Gibson,

Oklahoma.[6] Petersburg, Virginia, became the site of a ten-month siege during the last year of the war, although construction of the Confederate fortifications began in the summer of 1862. Constructed in a semicircle with the Appomattox River as a boundary, these fortifications included fifty-five redans connected with six-foot-high earthen breastworks and a six- to eight-foot-deep, fifteen-foot-wide ditch. Forward of the defensive line, the Confederates cut back the forest for 1 1/2 miles in order to create a clear field of fire. The trees were then used to build a ten-mile-long abatis. These defenses were named after their designer Confederate Captain Charles H. Dimmock.[7]

The primary instructor and textbook writer for field fortifications was Dennis Hart Mahan. His manual Field Fortifications originally appeared in print in 1836, and became the definitive work on the subject. West Point had a largely nonmilitary curriculum which did not completely cover all aspects of the art of war. Mahan's general tactics and strategy were squeezed into a single fourth-year course. Mahan also developed and directed the Napoleon Club, an organization where students could have more intensive discussions regarding military arts. Mahan's greatest continuing influence came in the form of his manuals. It was through Mahan's 1836 manual that civilian engineers, volunteers, and militia officers acquired information on the building of field fortifications.[8]

Mahan's A Treatise on Field Fortifications explained how and why fortifications were used. He developed charts concerning construction, weapons penetration, and the use and construction of obstacles. The difficulty was that Mahan's discussions, lectures, and written works continued to focus on the tactics of the smoothbore and the bayonet. Mahan did not address the topic of rifled weapons and was severely limited in his instruction concerning attacking field

fortifications. In his chapter on "How to Attack Entrenchments," he dedicated only eight pages to the subject.[9]

Mahan explained the role of intelligence and the important part it played in defeating field fortifications. He presented detailed lessons about using reconnaissance elements to find weak spots in the defense. He explained the importance of surprise and weather conditions for attacks on field fortifications. Mahan even broke down the assaulting force into special units, each with a dedicated mission. Mahan explained how to overcome and destroy obstacles. Unfortunately, Mahan taught that the most expeditious method of attack against field fortifications was "an open assault made either with the bayonet alone, or with the combined action of artillery and the bayonet."[10]

The bayonet became obsolete when the U.S. Army adopted the 1855 rifled musket. By the time of the American Civil War, the bayonet charge was useful only for its psychological effects on inexperienced troops. Veterans recognized a bayonet charge as suicidal. One Union soldier who recognized the reality of this ancient warfare wrote: "An officer who attempted to put the drill into actual practice would have been sent to the rear and clothed in a straight jacket."[11]

One year after the U.S. Army adopted the rifle as the standard weapon, Mahan suggested that the bayonet could overcome defenders armed with rifles behind field fortifications. This illustrates the point that Mahan did not realize rifled musket advancements. Mahan simply did not realize how rifled weapons affected combat.

Although Dennis Hart Mahan graduated first in the West Point class of 1824, he had no combat or command experience. After graduation, he remained at the Academy for two years as assistant professor. In 1826, he went to Europe to study military instruction and civil engineering with an emphasis on roads and waterways. During this

time, he completed a course at the School of Application for Engineers and Artillery at Metz, France. He returned to West Point as assistant professor of engineering in 1830 and was granted status as a full professor in 1832. Mahan remained at West Point until his suicide in 1871.[12]

Just as field fortifications appeared early in the American Civil War, so did attempts to design ways to counter those fortifications. Included the invention of larger caliber cannons to blast holes in earthworks. Others included special weapons, such as the Vandenburgh Volley Gun. The inventor of this weapon offered it to the British and Union armies, but they rejected it. The Confederacy adopted this weapon and used it as a suppression weapon because of its capability to fire 121 bullets concurrently at a range comparable to rifled muskets.[13] This was an improvement over the cannon's canister rounds which were effective only to three hundred yards.[14] Other plans were simple in nature and included digging under or around the opponent's fortifications. General Grant spent months trying to dig canals so that he could send his troop around the Vicksburg fortifications and later gave permission to dig under the Confederate earth works at Petersburg in order to explode a mine. General Butler's army spent the last part of the war digging a canal around Drewey's Bluff's Confederate field fort on the James River. The canal was not completed until the last days of the war.[15]

The plan developed by the Union Army and Navy to attack Confederate Fort Fisher was innovative, but did not take into consideration factors concerning tidal conditions. The scheme showed innovation, but lacked thorough planning. Fort Fisher was the largest earthwork in the South and had become one of the last ports for the blockade runners. Fort Fisher consisted of walls of sand twenty to

sixty feet high. It was over a mile long. Between the sand mounds, thirty-two heavy seacoast guns were placed. Troops were housed in bombproof, sand bunkers. Forward of the walls, Confederates had cleared fields of fire and seeded a minefield.[16]

General Benjamin Franklin Butler believed that he could blow a massive hole in the fort by using a ship filled with black powder. The plan was to run aground a ship filled with 215 tons of black powder close to the fort, then detonate the powder. The explosion was meant to stun the defenders and blast a hole in the walls, through which a combined force would pour into the fort. The plan was not well received by Lincoln or Grant, both of whom still held the memory of those lost at the Petersburg mine disaster.[17]

The plan failed not for the lack of effort or design, but because the ship was not positioned closely enough to the fort when the explosives were detonated. The defenders thought the ship was a blockade runner whose cargo had exploded and were not alarmed to an impeding attack. In the end, it took a combined force of the Army and the Navy consisting of 62 ships, 627 guns and an 8,000-man landing force to take the fort on January 15, 1865. There were 1,000 federal casualties. The idea was plausible and could have been used to break through field fortifications if the planners had invested a little more thought in the initial planning stage.

By the end of the war, the Union Army was three times as large as the Southern force. The final and most successful tactic employed by the Union Army was simple. By extending its flanks, the Union Army used its superior numbers to stretch the Confederate defender's lines. The Union Army was able to fill the trenches with new replacements while the defending Confederates could not. The result was that the defender's line was merely a skirmish line with minimal reserves available to fill

the gaps. Once the Confederate line was at its breaking point, there were too few defenders shooting behind the parapet to defeat the rush of an attacking force.

Many of these innovative ideas showed promise, while others were considered only a folly. It was in the field of tactics that individuals combined what they had learned at the military academies with practical combat experience. Emory Upton was considered the master tactician of the Union Army.

Upton was an 1861 graduate of the United States Military Academy at West Point, New York. He served with distinction as an officer in the cavalry, artillery, and infantry. By the end of the Civil War, he was a cavalry division commander with the temporary regular Army position as brevet rank of major general. His commanders bestowed upon him the honor of "best all-round soldier of his day."[18] Upton had a strong belief in the Regular Army Officer Corps. He always tried to improve on his tactics. He was a strong disciplinarian who believed in training. During the Battle of Salem Church in 1863, Upton was ordered to make his first and last frontal assault against dug-in troops. This assault resulted in his units sustaining a 50 percent casualty rate. It was a lesson that he never forgot.

Upton was a product of West Point and Dennis Hart Mahan. In his early combat experiences, Upton demonstrated that he believed in the power of the bayonet over the rifled musket. This was in keeping with what he had been taught at West Point. During his first engagements, his Connecticut soldiers were filled with horror when he pointed at charging Confederate soldiers and ordered his men to "catch them on your bayonets and pitch them over your heads!" It took several combat experiences before Upton decided to modify his thinking.[19] Upton's

early combat experiences brought him to the realization that he must modify his tactics.

Upton realized the need to diverge from textbook tactics, beginning with the eye-opening experience at Salem Church. From that day forward, Upton made suggestions to others on how to defeat defenders positioned in field fortifications. On November 7, 1863, at the Rappahanock Station bridgehead, Upton was ordered to take a Confederate redoubt near the Orange and Alexandria Railroad Bridge. Upton attacked under the cover of darkness, using a deception plan, and moving in on the defenders in a silent bayonet charge. He was successful, but his success was not exploited.[20] At Spotsylvania, Upton suggested to General Meade and General Grant that an attack in column formation instead of the common linear formation could have positive results in the stalemate against Rebel field fortifications. Upton felt that the column formation could be used like a battering ram while still using the principle of mass in fire power.

Colonel Upton took twelve regiments, placed them in "three lines, each four regiments deep,"[21] then issued specific units special missions. Units were divided into assault teams, flank protection units, and reserves. Upton was successful primarily because he had organized his men and placed them in a covered and concealed position 200 yards from the rebels parapets. After a coordinated ten-minute artillery preparatory fire, his men charged the earthworks just as the sun was setting. Although Upton's forces were not successful, essentially because he was not properly supported, his concepts were sound and innovative. General Grant promoted Upton to brigadier general the day after the attack. Two days later, General Grant tried the same tactic with a larger force at The Mule Shoe salient. Had it not been

for Confederate General Lee's personal involvement in placing reinforcements, the attack would have been a complete success.[22]

On June 1, 1864 at Cold Harbor, Virginia, Upton was ordered to make a frontal assault. In this unsuccessful attack, Upton lost 250 men in sixty seconds. In an attempt to prevent further losses, Upton gave an unorthodox command to his men to lie down, extended his line and had his men fire from the ground. Upton became openly critical of officers who were not innovative and who continued to sacrifice soldiers in frontal assaults. Upton called The Battle of Cold Harbor, "Murderous!" stating further, "I have seen but little generalship during this campaign. Some of our corps commanders are not fit to be corporals." He observed that the generals were "lazy and indolent, refused to go to the front, knew nothing of conditions, yet, without hesitancy, they will order U.S. to attack the enemy, no matter what their position or numbers."[23] Upton felt that a war of attrition was not the most tactically sound way to attain a victory.

General Upton learned from his experiences in the infantry and the artillery. He applied this knowledge when he took command of the Fourth Division of the Cavalry Corps. Upton outfitted his 12,000 horsemen with repeating Spencer carbines. At the Battle of Selma, Alabama, Upton used rapid firepower for suppression. He placed his soldiers in a single line instead of the typical infantry two ranks. To move over the obstacles already positioned by the enemy, he directed his men to overcome the 5 1/2 foot palisade by climbing over each other's backs in a "leap-frog" maneuver. While one unit continued suppressive fire, the reserve cavalry brigade rode over the parapets to exploit the success already gained by the dismounted troops.[24]

Upton's experiences in the infantry, the artillery, and the cavalry of the Federal Army helped him to formulate ideas for new

tactical formations which could be used against fortified positions. Upton began to record his ideas during the last months of the war. In January 1867, Upton asked that his manual be considered by either a board of officers or by the Secretary of War. Later that year, a board voted unanimously to adopt Upton's tactical methods for the U.S. Army.[25]

Upton evaluated each mission, the enemy, and the terrain before he applied the tactical plan. He developed examples of tactical insight that not all commanders understood because they were continually thinking linear minded. Hardee's and Casey's manuals directed linear-type formations, but combat experience proved these formations were futile against veteran defenders with rifled weapons. Continued attacks with devastating results caused men to ponder an alternative tactic to employ in the hopes of becoming victorious and preventing further needless loss of life.

Dennis Hart Mahan's West Point textbook Out Post stressed that the officer must be flexible in his plans. Officers were told to consider alternative maneuvers as options to direct attacks. In the formation of his tactical theories, Upton took these sections of text to heart. But Upton was not the only tactician during the Civil War. Many officers devised ways to use field fortifications in offensive and defensive operations. Senior commanders, such as Generals Lee and Grant, were less influenced by Mahan. They were influenced by Jomini. Both generals understood that offensive operations could bring victory and that there were direct and indirect means to attain victory. They understood turning movements and flanking movements and used them successfully. Grant spent months digging canals and trying to find a way around the Confederate defenses on the bluffs at Vicksburg. Lee successfully used turning movements at Chancellorsville and, to some extent, at the second day of Gettysburg. Although younger, General

Sherman showed that he too had been influenced by Jomini. Instead of utilizing direct assaults, his Atlanta campaign was a classic turning and flanking maneuver. Although neither a West Point graduate nor a student of military history, General Nathan Bedford Forrest was the master of deception and had an uncanny ability to read the terrain, weather, and his enemy to the point that he was defeated rarely. Many of Forrest's victories were over Union forces who were stationed behind earthworks and stockaded outposts along transportation lines for the Union Army.

One of the first instances of innovative tactics to defeat field fortifications came not from the regular Army military tactics manuals or textbooks, but was devised by volunteer forces serving in the West under Colonel, later General, Morgan L. Smith. During the attack on Confederate forces at Fort Donelson on February 15, 1862, Smith's Brigade was advancing into the open killing field in front of the fort. The brigade sent five companies of skirmishers forward. When the brigade saw that they were going to receive a volley from the defenders, the entire brigade laid down. While the Confederate defenders were reloading, the brigade rushed forward, absorbed the skirmish line and laid down again and opened fire. The events were recorded by General Lew Wallace, the division commander. He stated; "Soon as the fury of the fire abated, both regiments rose up and rushed on, in that way they at length closed upon the enemy, falling when the volleys grew hottest, dashing on when they slackened and ceased. Meanwhile, our own fire was constant and deadly."[26]

Smith's brigade's tactic of short rushes and bounds was the beginning of the three-second individual rushes used by the infantry today. This technique may not have been an innovation adapted directly

from the western armies of the Civil War. Smith and his men may have adapted this tactic from veteran Indian fighters on the frontier.

General William T. Sherman saw the U.S. Army and the Confederate Army move away from prescribed textbook tactics. Sherman said:

> Very few battles in which I participated were fought as described in European textbooks viz. (sic) in great masses, in perfect order, maneuvering by corps, division and brigades. We were generally in wooded country and though our lives were deployed according to tactics, the men were generally found in strong skirmish lines taking advantage of the ground and every cover.[27]

It was not until after the war that General Upton reflected on his experiences and recommended that the U.S. Army should free its infantry formations from the elbow-to-elbow tactics of the past and instead utilize strong skirmish lines.

Training, planning, and combat experience were the keys to attacking field fortifications successfully. Failings in any of these areas could spell disaster. At both Fort Sanders in Knoxville, Tennessee, and Fort Gilmer in Virginia, commanders forgot to issue the attacking forces scaling ladders to cross the obstacles and climb the parapets. At Fort Gilmer, the 7th U.S. Colored Troops became stuck in the fort's ditch. The soldiers lost their momentum. They could not go over the parapet and had no fire support to assist them in breaking contact. This is an example of how poor planning brought about disastrous results. Confederates, as did the Union defenders at Knoxville, then massacred the attackers by firing their rifles, lobbing hand grenades and tossing lit artillery shells into the midst of soldiers stuck in the ditch.[28] Another tactic employed to defeat fortifications was the practice of using tunnels. This was a tactic that was as old as defenses themselves. Tunneling was a form of siege operation that was very time consuming, but saved many lives. During the ten-month siege at Petersburg, Virginia, from 1864-1865, Lieutenant

Colonel Henry Pleasants of the 48th Pennsylvania Volunteer Infantry, designed a special ventilation system for tunnels which could not be seen above the ground. Pleasant, who was an engineer, developed the system to prevent the enemy from finding and countering the tunnel with small explosions and cave-ins. Pleasant requested approval to dig under the Confederate earthworks and detonate 8,000 pounds of black powder. General Ambrose Burnside granted permission. What happened after that blast was known as the Battle of the Crater. It became a tactical nightmare for the Union soldiers. The failure came when General Grant and General Meade became worried about the repercussions of sending U.S. Colored Troops as the initial assault force. These troops had already completed rehearsals and training for this type mission. Grant ordered an unrehearsed white unit into the breach after the explosion. The result was a Union failure with over 3,798 casualties, but no earthworks taken. There were 1,500 Confederates lost. The Battle of the Crater showed that tunneling was a sound tactic, but the Union officer's meddling in the execution of the plan was disastrous.[29]

Experienced combat field commanders found that, if they were to overcome field fortifications, they must break away from the textbook and parade ground drills and formations. This breaking away from traditional infantry tactics was rarely directed by officers who relied on Casey's and Hardee's manuals, but more often by the soldiers themselves. The officers of the regular army always seemed slow to abandon old ideas and tactics from past wars. U.S. volunteer soldiers have never been very responsive to textbook solutions and rigid discipline. This was true in the Civil War. Regular Army officers were stretched to the limit of their command and control space. Tactics requiring bounding, suppressive fire, or cover-to-cover movements only

compounded the control and communication problems these officers already faced.

The tactics under which soldiers preferred to fight were not what the officers had been taught. The tactics were contradictory to the principle of mass that the officers were trying to instill through the use of drills and volley fire. Neither army devised a battlefield reports mechanism by which effective tactics were passed on to commanders in other theaters. The result was that officers who refused to deviate from the teachings of Casey, Hardee,and Mahan were proven ineffective. It was long after the war was over that the U.S. Army developed a tactical doctrine, abolished linear tactics,and emphasized the initiative of the individual soldier.

## Endnotes

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[16]Stephen T. Foster, "Fortifications: Earth Forts" The Civil War Cards (Durham, CT: Atlas Editions, 1994), D3 602 80-16.

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[20]Ambrose, Upton, 25.

[21]Ibid., 31.

[22]Ibid., 33-34.

[23]Ibid., 36-37.

[24]Ibid., 46-47.

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[26]Lew Wallace "Report on the Capture of Fort Donelson, 20 February 1862" Official Reports Ser. 1, vol. 7. 238-239.

[27]William T. Sherman, Memoirs of General William T. Sherman By Himself (Westport, CT: Greenwood Press, Publishers, 1957), 384.

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# CHAPTER V

## DRILLS VERSUS TACTICS

> Wherever the Federal troops moved forward, the Rebels appeared to have the advantage. Whenever they advanced, the advantage was transferred to us.[1]
>
> Perry D. Jamieson, Crossing the Deadly Ground United States Army Tactics, 1865-1899

The bloody campaigns of the war engraved into the minds of the leaders of both armies that there was a great need for a true tactical doctrine. The four deadly years of the American Civil War forced volunteer and regular Army officers to look for answers in the current drill manuals; but, to no avail. The few innovative leaders who took their ideas through the chain of command only found out later that they were not fully supported, on or off the field of battle. This half-hearted support led to failure when the time for tactical exploitation arrived during the course of a battle. This was especially true in the "zero defect" Army of the Potomac. This was less of a problem in the Army of Northern Virginia where any innovative ideas were welcomed in the hope that they might offset the advantage of the larger Union army. The Union's long line of leadership failures produced a zero mistake mentality in Washington. This stifled any further advancement of innovative theories on the development of tactics to deal with the problems associated with field fortifications.

The horrific losses suffered during the campaigns were the beginning of the end for tactical manuals that were no better than parade drill command booklets. The new tacticians of the day could not

stop the war to discuss new theories, nor were the new theories passed to others as "lessons learned." Although companies and regiments were developing their own tactics and ideas, changes in the army were, and still are today, always slower. In the case of the common infantry soldier, this delay was deadly.

The contemporary perception that many of the leaders of the American Civil War did not understand the tactical use of field fortifications may have applied during the first part of the war, particularly as related to the inexperienced volunteer officer. Officers trained at West Point and those with experience in the Mexican War or who had observed the European conflicts possessed an understanding of field fortifications as it related to smoothbore tactics. The later battles of the war were not the toe-to-toe fights in open fields that were waged in the early part of the war. It seems, that, later in the war, military leaders had developed an understanding of the danger of advances in arms technology and their effects when combined with proper field fortifications. Of this group of officers, there were even fewer who understood how to form and deploy tactical units to defeat an enemy that was behind field fortifications. The veteran soldiers knew first-hand that defenders protected by fieldworks could deliver deadly fire, even with obsolete weapons, against any force, while suffering few losses to themselves. This was especially true if offensive forces advanced in close-ordered lines using William J. Hardee's and Silas Casey's so-called tactical manuals.

The professional officer and soldier understood the advantages and disadvantages of digging protective fortifications. These same soldiers, in their nineteenth century mind, also believed that offensive operations, either in flanking maneuvers or siege operations, would prevail. There were some tactical thinkers during the war who convinced

Army commanders to employ new tactics instead of waiting for advances in arms technology to counter field fortifications. One such man was Union Colonel Emory Upton. Upton was a 1861 graduate of West Point. He commanded in combat with the infantry, artillery, and the cavalry. He was an intelligent man who always looked for alternative ways to move troops in offensive operations. He saw the tactical manuals of the day as drill manuals for a parade field. He first experimented with light infantry column attack formations in 1864 at Rappahannock Station and Spotsylvania Court House.[2]

During Grant's Spring Campaign of 1864, the Union Army fought its way through the Battle of Wilderness with great losses. In the flanking maneuvers that followed, Lee dug three miles of entrenchments along the high ground which resulted in a salient. It was here, at the Battle of the Mule Shoe, that Upton devised a plan to attack on a narrow front with twelve infantry regiments to break through the Confederate entrenchments.[3] Grant approved the plan, and the Union attack broke through the entrenchment's.

This sharp tactical punch might have succeeded if Upton had been supported by other units; but, rarely is innovative thought supported by all for the fear of failure or envy that one did not think of it first. In either case, some 1,000 Union dead were added to the 7,000 Union soldiers left in and around the trenches at Spotsylvania. Upton's men would say that General Gershom Mott, whose division was given the task of supporting Upton, was drunk during the battle.[4] However, Upton's attack was not considered a failure by Grant who gave Upton a battlefield promotion and reported to General Meade, "a brigade today, we'll try a corps tomorrow!"[5]

On May 12th, in the second day of fighting at Spotsylvania, Grant and Upton again tried with 20,000 men. This time the attack was

supported, but the punch into the Confederate entrenchment's was hampered by the narrow front because the large number of Union troops in the gap gave only the first Union units clear frontal fields of fire against the defending Confederate troops. The Union commands became intermingled and disorganized, and, consequently, there was a loss of command and control down to the lowest level.[6]

To make matters worse for the Union troops, the Confederates also had developed their own counter to Upton's formations. The Rebels placed two regiments of sharpshooters forward of their main line. When the attack hit, the Union troops were broadsided by Confederate small arms and later with Confederate artillery. These countermeasures and ferocious counterattacks were personally positioned by General Lee. These countermeasures stalled the initial Union column success.[7]

Upton had developed a tactical formation that could be used against fortified positions, but it had to be refined. In April of 1865, he helped plan and lead the dismounted cavalry assault on Selma, Alabama. Using the rapid firepower from the Spencer repeaters in a single line instead of the normal two ranks, he took the entrenched positions. Using his wartime experience, he started to write his own tactical manual in the last months of the war. Upton asked that his manual be considered by the Secretary of War or a board of officers in January 1866.[8]

In the last year of the war, there were few Confederate Armies on the offensive. As a result, field fortifications were used to reinforce their smaller numbers. The Union commanders were again looking for ways to prevent future frontal assaults, such as the attacks on Cold Harbor. During the battles around Petersburg, the Union Army defeated the enemy by simply stretching the Confederate lines on the flanks by extending their own lines. This tactic worked mainly because

the Union had a larger army and it forced the Confederate to put fewer soldiers behind the parapets.

Two Union general officers Horatio Gouverneur Wright, Commander of the Sixth Corps, and Andrew Atkinson Humphreys, Commander of the Second Corps, became aware of the weak spots in the Confederate lines during their shifting of troops to support their offensive and defensive operations. Using this intelligence to their advantage, they formulated an attack plan that used the element of surprise, the weather, and light conditions, and special pioneer troops to cut through the obstacles and take Confederate trenches.[9] Both men realized that attacks on even the outermost positions of the enemy works, an entrenched picket line, would cost them several hundred men.

General Wright wrote:

> This was an example of an attack in broad day against a simple infantry cover, which cost us, in killed and wounded, a number equal perhaps to that of the entire force of the enemy actually opposed to us. It was an attack of nearly two divisions against a picket line covered by a simple trench and parapet; but had it been held by two ranks of good troops it is doubtful if it could have been carried even by an entire corps.[10]

General Wright observed the result of the Union Army's flanking maneuvers, which stretched the Confederate defensive line. If the number of troops behind the main line could be reduced so that only one file was firing from behind the parapet, that section could be captured. Wright and Humphreys may not have known that the thinning of the Confederate line was caused by the larger Union force's extension of its lines, but they were aware that the smaller Confederate Army had to shift troops to make any counterattack which would weaken their defensive force along some part of their line.

At the Battle of Hatcher's Run, Wright wrote:

> The plan of attack assumed the possibility of this secrecy of assembling, and of getting over at least a part of the intervening space before the enemy should be ready to offer any serious

> resistance. In other words, the success of the plan depended largely on its being at least a partial surprise. . . the attacking force was assembled without being discovered, in a position within about six hundred yards of the enemy main line, and that most of intervening distance was passed over before the enemy was ready to offer serious resistance. It should be further remarked that the time of attack, which was in the early gray of a foggy morning, when there was just light enough to enable the men to see where to step, was favorable to success, as the enemy could not discover the attacking forces till it was close upon him. On this account the considerable artillery of the enemy occasioned scarcely a casualty.[11]

And Wright closed by saying:

> The conclusion drawn from this attack clearly seems to be that a well entrenched line, defended by two ranks of infantry, cannot be carried by a direct attack, unless it be in the nature of a surprise, provided that the attacking force has to approach over ground seen from the lines through the whole extent of the efficient range of modern small arms; this conclusion is supported by my previous experiences in the war, and I believed most of our officers will fully agree with me. The attack in question would, I am fully convinced, have been a failure but for our being able to surprise the enemy, and the attenuation of his force by one-half at least of what is generally deemed necessary for an efficient defense of an entrenched line.[12]

As the war lingered on, most commanders had seen too many soldiers die and were looking for answers to end the tactical stalemate caused by effective use of field fortifications. The feeling was that the William J. Hardee's and Silas Casey's manuals were just translations from French Army manuals and did not really apply to the American conflict. In November 1865, the Army and Navy Journal stated, "We are beginning to overhaul our Scott, our Hardee, our Casey and to question whether, after all, the officers who edited these tactics did not follow the original too closely."[13] Union Corps commander G. K. Warren was critical of Casey's manual saying it left, "the Army in some situations virtually without any tactics at all."[14]

The manuals of Hardee and Casey were not tactical doctrine, but drill manuals for a parade field explaining little more than formations. Upton was the first to recognize the need for a new tactical book. With the notes he took during the last months of the war, and the sanction of

postwar review panels of Colonel Henry B. Clitz's and Ulysses S. Grant's, in January of 1866, Upton finished his work on a new manual that was published by the army in August 1867. It was titled, A New System of Infantry Tactics, Double and Single Rank: Adapted to American Topography and Improved Fire-Arms.[15] Two years later, Upton further developed a system of commands and formations that were compatible to formations in cavalry, artillery, and infantry. It was not a combined document, but it became the basis for formations and commands common in all three of the major combat branches. These formations and commands were collectively known as "assimilated" tactics.[16]

In 1866, Franicus J. Lippitt published his manual called, A Treatise on Entrenchment's. Here, Lippitt placed artillery in a significant role in attacking field fortifications. The Army and Navy Journal followed up on the manual in 1867 when it identified the rifled cannon as the primary factor for forcing the infantry to change formations.[17] The Confederacy did not publish any tactical manuals after the war, but their experiences were nonetheless important. On August 25, 1864, at the Battle of Reams's Station, Confederate General Ambrose P. Hill's III Corps was ordered to take back the vital rail line from Union division commanders, Generals John Gibbon and Nelson A. Miles. In his first attack on the Union's hastily built earthworks, he was repulsed. But when he used his batteries in a 15-minute preparatory fire, then sent two divisions of yelling infantrymen toward the Union lines, the regiments of General Miles divisions broke and ran.[18]

Discussion and doctrine debate was good for the Army. Many of the leaders and soldiers had varied opinions about formations, equipment, and their employment. The U.S. Army realized through its many postwar review boards and panels that Army officers needed to develop an advanced school system for its leaders if it was to keep them

updated on the new tactics and equipment. Many of the veterans voiced their resistance to change, while the active duty Army had little time to spend studying tactics. This was because, after the war, Congress reduced the Army in numbers and spread it so thinly on the frontier that there was little time for a field soldier to reflect on tactics or practical exercise.[19]

The few senior veteran officers left in charge of the army saw the need to change. The combat veteran, retired General William H. Morris stated in 1866, that there were officers still in the army who preferred Scott's 1832 smoothbore musket manual to Hardee's rifle tactics. General Grant stated in his memoirs that he drilled his troops in a Scott and Hardee combination.[20] William T. Sherman stated in 1880 that an infantry soldier of that date and time could place effective fire, accurately, twelve times that of a soldier in 1779. Sherman went on to remark:

> If Baron Steuben were to arise, he would doubtless attack one of Upton's thin lines with his old column of attack doubled on the center and would learn in a single lesson that the world has advanced in science, if not in patriotism, courage, and devotion to duty.[21]

Commanding officers like Sherman and Upton had realized the danger of attacking a fortified, entrenched line against smaller, dug-in Confederate armies with commanders, such as Lee and Johnston. Keeping with the principle of offensive maneuver, Sherman and Upton looked for alternative ways to defeat entrenched defenders. In many cases, this was through flanking maneuvers or through devices, such as an explosive mine placed under the defensive fieldworks or tactical formations, that would give the troops on the offense the tactical advantage that they could exploit. But, the volunteer Confederate and Union officer corps, only had a slight knowledge, at best, on how to correctly use field fortifications in either offensive or defensive operations. The few

exceptions were those officers from military academies who had studied Professor Mahan's manuals survived, and learned through combat experience. These men had some insight on the use of field fortifications, but this experience was based on smoothbore tactics. Still fewer of these officers tried any innovative tactics with their knowledge of the rifle musket. They could protect their forces from high casualty rates initially on the defense, but they had minimal knowledge of how to break through a defensive line without laying siege to the whole area.

The experiences of the different commanders should have been recorded and passed on to the junior leaders. The problem was that no central agency published and distributed the experiences of the field commanders, like General Wright and General Humphrys. The lessons had to be learned over and over again through the blood of the soldiers. The Union Army did try to prevent incompetent volunteer officers from leading troops into combat through a system called Officer Examining Boards. These boards were needed in such a large volunteer army, although their tactical review was very elementary and they never informed the officer corps of new strategies or tactics required for the battlefield. The board's charter was to review the new officer to see if he had, "acquaintance with military tactics, their appreciation of the responsibilities of their position and their general fitness to be entrusted with the care and supervision of a body of men."[22]

Perry D. Jamieson's Crossing the Deadly Ground asserted that the radio communications of the twentieth-century would have corrected many of the mistakes in battle.[23] This may have been true if twentieth-century communications were available in the nineteenth. Using a nineteenth-century problem analysis, the radio is not a viable solution. A collection of "field notes or lessons learned" from the Army

commander's adjutants could have been collected and the notes centralized at the Armies' respective capitals. Then, a military examining board could have consolidated them, and then redistributed to the field as tactical field notes. This would have helped the nineteenth-century commanders develop an officer corps and train them how best to use field fortifications in combat operations. But it was not to be, and it was not until the tactical reviews of Washington, D.C., in 1890 and the 1891 Fort Leavenworth, Kansas, board, that the United States Army published its first American tactical manual.[24]

## Endnotes

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[5]Whatley, "Rifles," 23.

[6]Ambrose, Upton, 34.

[7]Ibid., 34.

[8]Whatley, "Rifles," 24.

[9]Jamieson, Crossing Deadly Ground, 6.

[10]J. G. Barnard, A Report on the Defenses of Washington to the Chief of Engineers, U.S. Army, (Washington: Government Printing Office, 1871), 151.

[11]Ibid., 150.

[12]Ibid., 152.

[13]Ibid. 153.

[14]Jamieson, Crossing Deadly Ground, 6.

[15]Ibid., 4.

[16]Ibid., 6.

[17]Ibid., 9.

[18]Stephen T. Foster, "Battle of Ream's Station: Rebels Take Back the Railroad" The Civil War Cards (Durham, CT: Atlas Editions, 1993), D3 602 67-10.

[19]Jamieson, Crossing Deadly Ground, 15.

[20]Ibid., 20.

[21]Ibid., 17.

[22]Stephen T. Foster, "Officer Examining Boards: Weeding Out Incompetence" The Civil War Cards (Durham, CT: Atlas Editions, 1994), D3 602 73-10A.

[23]Jamieson, Crossing Deadly Ground, 18.

[24]Ibid., 1.

# CHAPTER VI

## GROUND ANALYSIS

> Fieldworks: "Their object is to provide a body of troops, or a town, with a secure protection against a sudden assault of superior numbers by the interposition of a parapet or some material capable of resisting the effects of projectiles."[1]
>
> Henry L. Scott, Military Dictionary

The failure of Civil War Union and Confederate officers to understand the tactics required to use field fortifications in defensive and offensive operations rested on the shoulders of the prewar U.S. Army and the curriculum at military academies. The curriculum of West Point and the Virginia Military Institute (Camp Mahan) emphasized engineering. The study of tactics and strategy was secondary. These upper level courses were based in military history with emphasis on the great campaigns of Europe. The flaws were the instructors' failure to keep abreast of technological advancements and their failure to assist in the development of any doctrine concerning army tactics. These failures were especially evident in the case of Dennis Hart Mahan, the most influential instructor of the pre-Civil War era.

Mahan was an influential professor at West Point and the man for whom Camp Mahan, later known as Virginia Military Institute, was named. His instruction and writing were indoctrinated into all but the most senior Civil War officers, given that Mahan taught at West Point from 1826 until 1871.[2] Mahan's instruction was appropriate for armies using smoothbore weapons, but not for armies using rifled muskets and cannons.[3] Although Mahan's instruction and writings concerning field fortifications made students aware of the engineer designs of the

fortifications, they did not take into account Mahan's lack of understanding of those field fortifications, which combined with rifled weapons would revolutionize warfare.

Mahan did not understand and, therefore, did not make his students aware of the fact that field fortifications, when coupled with the rifled weapons, became a combat multiplier. This combination of field fortifications and rifled weaponry could make up the difference for a lack of troops in a smaller force and could be considered an addition to forces already on hand. This combination of rifled weapons and field fortifications had a drastic effect on all branches of the army in both offensive and defensive operations during the American Civil War. The additional range of the rifled musket alone changed cavalry and artillery tactics. Officers who understood neither the power of rifles nor how to combine that power with field fortifications led their troops to needless slaughter.

The curricula of the academies paid little attention to strategy. According to Colonel Henry L. Scott, Inspector General of the United States Army, strategy is the "art of concerting a plan of campaign, combining a system of military operations."[4] West Point dedicated only a few classroom hours to strategy. Students who were motivated enough to pursue a more detailed study of strategy joined an advanced study group called the Napoleon Club. This group was founded and directed by the very influential Professor Mahan. Once again, Mahan had direct influence over future leaders of both the Confederate and Union armies.[5] When the textbook's author and the instructor are one in the same, little room is left for open discussion. Consequently, Mahan's opinions and theories were likely one-sided and discussion was presumably limited. However, Mahan's beliefs were not without a basis in fact. The foundation for Mahan's work is evident in the writings and experiences of Baron Antoine Henri Jomini, the French military theorist. Jomini's principles of strategy were known and accepted by officers of

the Civil War. Jomini's theories are based on his belief that mass forces directed at a decisive point in the enemy position could break through and destroy that enemy force. What Jomini and his disciples did not take into consideration was the effect of new weapons and technology.[6]

Jomini placed emphasis on offensive operations to gain victories. He did not consider field fortifications and the rifled weapons as combat multipliers. The senior leaders of the American Civil War, who had not been instructed by Mahan, had been influenced by Jomini. This was the case with General Robert E. Lee. The influence of Jomini on this generation of leaders was just as great as that of Mahan on the younger leaders of the American Civil War. Jomini also failed to address technology. He undervalued psychological and morale factors. Jomini assumed that enemy actions were predictable. He required that masses of forces be placed on a decisive point without the development of branches and sequels. Jomini also failed to understand the importance of the elements of surprise, fog of war, and strategic mobility. Jomini tried to make the battlefield a cut and dry science.[7]

There is a direct relationship between the fundamental teachings leaders received at the academies, U.S. Army doctrine, and the high casualty rates in the Civil War battles. The influence of Jomini and Mahan was great. The failure came from Mahan's lack of familiarity with the new rifle technology and his lack of combat experience. The U.S. Army was a failure because it did not develop a doctrine to incorporate new tactics for new weapons. Those failures resulted in high casualties in battles like Cold Harbor, Franklin, Gettysburg, Fredericksburg and Stone River where the offensive commanders attacked rifled defenders who were behind fortifications.

Union General in Chief Henry Wager Halleck's military operations were strongly influenced by his studies at West Point. He was a student of both Jomini and Mahan. This was evident in his review of the book

Napoleon Memories. Halleck said it contained "all the general principles of military art and science." In his book Elements of Military Art and Science, Halleck reviewed the principles of Jomini and Mahan. He later applied these same principles to operations he directed during the American Civil War. General Halleck used field fortifications in both offensive and defensive operations in his movement to Corinth, Mississippi. His West Point studies were evident when he replied to questions about his plans by saying, "I have kept Napoleon's maxims in view in coming to my conclusions."[8] This meant that he had followed Jomini's principles, which were founded in Jomini's observations of Napoleon's experience. General William T. Sherman, also a West Point graduate and a student of Mahan, recommended the works of Jomini and Mahan to his junior officers. Confederate General Ambrose P. Hill, another graduate of West Point, expressed the views of the Napoleon Club when he compared Confederate mistakes to historical accounts of the Austrians in Napoleon's Italian campaign.[9]

The fact that American Civil War officers had studied past campaigns and wars under the tutelage of instructors who wrote textbooks in theory and tactics without any consideration to advancement of technology was a serious problem. The U.S. Government had neither developed nor directed the army branches to develop doctrine which took new technology into consideration. The US Army still relied on Hardee's 1855 drill manuals.[10] Without effective doctrine, the Army was doomed to fight the next war using past experiences--to essentially refight the last war. This proved to be deadly on the battlefields of the American Civil War, where rifled weaponry was prevalent.

The problem of the curricula at the military academies was minor in comparison to the gross neglect of the U.S. Army to provide advanced military education after a cadet graduated. There were no basic or advanced branch courses. There were no staff schools at company or field-grade levels. There were no commanders' courses at the

company or field-grade level. There was no war college for senior officers. There was no large-scale training or joint training exercise. In fact, there was no large-scale training of commanders or staff above regimental level. There was no consolidation of experiences and no concept of military lessons learned. No doctrine was being formulated. The only way for an officer to gain knowledge of any insights in other officers' experiences was to have served as an observer in a foreign conflict, such as the Crimean War. In fact, Delafield, Barnard, and McClelland all acted as observers during the Crimean War. They all concluded that the combination of field fortifications and rifled weapons would create a substantial change in warfare. Unfortunately, their reports were neither distributed widely nor in a timely fashion. This meant that the wealth of experience-based information they could have provided was lost to the vast majority of officers.[11] This lack of battle analysis left most officers, especially the militia officers, without any means to gain experience. Having no doctrine, both the militia and the regular army officers relied on history and the drill manuals of Hardee and Casey to take their troops into combat. This combination of textbook guidance only showed the new officer how to apply antique tactics in paradelike formations on a battlefield where the weapons could kill at a range ten times that of anything they had studied.[12] (See table 4.)

The failure of the U.S. Army and the academies to provide contemporary and legitimate education could have been corrected had the armies produced a collection of field notes or lessons learned from their experiences, beginning with their first battles. Brigade and corps adjutants kept very detailed notes of battles and day-to-day administrative matters. Adjutants could have collected lessons learned notes from the units and forwarded them to a centralized location to be consolidated. Then, a Military Examining Board, which both sides had already established, could have consolidated and then redistributed

these lessons to the field in the form of tactical field notes. Such notes would have, in effect, become the foundation of field doctrine. These notes would have been of great assistance to the militia and to regular Army officers in both Armies. Field notes would have consolidated experiences--of past victories and failures--and led to standard operating procedures and battle drills throughout the command structure. Ultimately, this shared knowledge would have saved soldiers' lives.

Table 4. Maximum and Effective Weapon Range

| Weapon | Theoretical Maximum Range (in yards) | Effective Battle Range (in yards) |
|---|---|---|
| Rifled Cannon Heavy | 3,000 | 2,000 |
| Rifled Cannon Light | 1,800 | 1,800 |
| Smoothbore Cannon | 1,600 | 800 |
| Sniper Rifle | 1,700 | 600 |
| Enfield/Springfield | 1,000 | 200 |
| Older Rifles | 400 | 100 |
| Smoothbore Musket | 200 | 50 |
| Carbines | 800 | 125 |
| Pistols | 100 | 10 |

Source: Paddy Griffith, Battle in the Civil War, Mansfield: Field Books, 1986, 12.

Civilians and regular Army officers all thought that the American Civil War was going to last only a few months. One decisive blow was supposed to have ended the rebellion. Had the experiences of Upton, Lee, Grant, Hill, Beauregard, Burnsides, Hood, and McCellan been collected and shared, this consolidated knowledge may have prevented the costly mistakes that were made in the Battles of Cold Harbor, Franklin, Spotsylvania, and Knoxville.

It has been said that "knowledge is power." In the American Civil War, the nineteenth-century officers' knowledge was encumbered by

the lack of experience, a dependence on history, and a weak tactical educational background. When defensive forces applied field fortifications, the officers in the offensive had only two options, deadly mass attacks or time-consuming siege operations. When the offense applied field fortifications in their movements, they found they were secured behind their parapets, but their advance movement was slowed severely, although their work load and planning were significantly increased. The options were few in an Army that had no doctrine and whose officers were the ill-prepared products of a military education system which had a curriculum devoid of discussions of current military technology and its foreseeable effect on future battles. One half a century later, these lessons would have to be learned again in the trenches of Europe.

## Endnotes

[1]Henry L. Scott, Military Dictionary: Comprising Technical Definitions; Information on Raisin and Keeping Troops; Actual Service, Including Makeshifts and Improved Materiel; and Law, Government, Regulation and Administration Relating to Land Forces (New York: D. Van Nostrand, 1862), 283. (Hereafter cited as Scott, Dictionary).

[2]Robert Seager, "Mahan, Dennis Hart" in Dictionary of American Military Biography, vol. II, H-P, (Westport, CT: Greenwood Press,1984), 714-715.

[3]Herman Hattaway and Archer Jones, How the North Won: A Military History of the Civil War (Chicago, IL: University of Chicago Press, 1983), 12.

[4]Scott, Dictionary, 574.

[5]Hattaway, How the North Won, 12.

[6]Max Ray Williams, "Jomini, Antoine Henri" in International Military and Defense Encyclopedia, vol. 3, G-L, (Washington, DC: Brassey's (US), Inc., 1983),1388.

[7]Ibid., 1889.

[8]Hattaway, How the North Won, 13.

[9]Ibid., 13.

[10]Perry Jamieson, "Hardee, William Joseph" in Dictionary of American Military Biography, Volume II, H-P, (Westport: Greenwood Press, 1984), 441.

[11]Hattaway, How the North Won, 13.

[12]Paddy Griffith, Battle in the Civil War (Mansfield, England: Field Books, 1986), 24.

# GLOSSARY

The following glossary has a collection of Civil War photographs. It is housed in the Prints and Photographs Division of the Library of Congress. Most of that collection is the negatives taken during the war by Mathew B. Brady and the Alexander Gardner Companies. Gardner was a protege of Brady. The photographers made their money by selling individual soldier portraits. The average cost was $1.00. There are very few combat photographs because of the equipment, time, and conditions required to take a photograph. Photographers did venture out onto the battlefields after the shooting had ceased. They were fascinated by the carnage of war. When the studios presented their photographs, patrons complained that the photographers had "dropped the bodies of the dead at their doorsteps." The Library of Congress collection of Civil War photographs includes 7,500 ambrotype glass plates along with 2,500 copies of other ferrotype portraits. There are no known restrictions on prints and photographs from the Library of Congress. Library of Congress, Prints and Photographs Division (reproduction number, e.g., LC-B8184-3287.)

Abatis. Trees cut down to form an obstacle line or used as an obstruction. Tips of the branches were sharpened to channel or slow the enemy attack. Field abatis were subject to heavy destruction from friendly and enemy cannon or rifle fire if they were in the direct line of fire. Soldiers learned to fill in the ditch and the low areas of the terrain to prevent early destruction. (See figure 42 Photo.)

Barbette. Firing step used to elevate an artillery piece so it would not have to be fired through embrasures. Firing over the parapet gave the gun a greater field of fire. The limitation was that the gun crew was more exposed. It was also the firing step for infantry to fire over the parapet.

Barricades. Temporary parapet that closed openings in fortified areas. They were constructed using items that could give protection from small arms fire, i.e., boxes, barrels, sandbags or wagons, variations of palisades; stockades; and abatis could be integrated. They could be built in a short period of time if necessary.

Barrier. Carpentry designed obstructions made into temporary fortifications. It provided a temporary protection from small arms fire. If it became a permanent structure, it was called a stockade.

Bastion. Field or permanent fortification with four fortified walls. This fort was manned by infantry and artillery soldiers. A platform encircled the fort and provided firing positions. Mines and obstacles were laid out to protect the fortification. Scott said that this position should hold five to six hundred infantry men plus artillery and crews.

Battery and Battery Positions. Two or more cannons. Field guns were given the highest attention when incorporated into defensive works because of their fire power. They were fired through the parapet by the means of an embrasure or fired over it on a stand called a barbette. Guns could be dug into sunken positions or elevated batteries. The sunken battery was the most field expedient. (See Figure 41 Photo)

Block House. Two-story permanent defense built to guard key transportation links, such as bridges, road links. Provided supporting fires for stockades or picket works. Made of vertical logs that were placed in the ground closed together. Loop holes were cut in both the top and bottom floors. Block house were maned by infantry.

Bombproof Shelters. Heavily reinforced areas that protected the soldiers from heavy bombardments. They were sometimes separate buildings. Many were constructed with large timbers which were reinforced with sandbags and sod. (See figures 48, 49 50 and 51 Photos.)

Chevaux-de-Frise. Logs or large timbers that had sharpened stakes driven through in a crisscross manner. They were then placed in an obstacle line in front of the ditch with or in conjunction to the palisades. They were very movable and could be used as a channelizing obstacle. If required, they could be chained together to prevent the enemy from rolling them out of the way. (See figures 46 and 47 Photos.)

Counterscarp. Outer slope of the ditch, opposite the parapet.

Crows'-feet. Iron spikes arranged so that when dropped on the ground it always landed with one spike up. This was very effective against cavalry.

Ditch. An obstacle in front of the parapet used to trap or slow the enemy in his final push to overtake the parapet. Rain water would collect in the ditch so that it acted as a moat. Torpedoes were placed in the ditch. The troops behind the parapet could throw hand grenades at attacking troops in the ditch. (See figure 43 Photo.)

Embrasure. The opening in the parapet through which guns or cannons were fired. They were spaced no less than 15 feet apart. Embrasures weakened the parapet and had to be reinforced and covered by fire from other weapons. Some had heavy wooden doors that opened only when the cannons fired. The opening of the embrasure was reinforced by gabions to prevent the cannon fire from destroying the revetment. Sandbags or boards could be used at the exterior slope of the embrasure, and after the last gabion, if the parapet was thick.

Exterior slope. Front side of the parapet, facing the enemy. It was at a 45 degree angle so that direct fire rounds were deflected upward.

Filling Room. A smaller powder magazine where prepared ammunition was stored close to the soldiers. It was also the area where bullets were made and rolled into cartridges.

Fougass. Explosive charge that was detonated when the enemy passed over it. It was recommended that the charge be placed under an obstacle so it would explode while the enemy was forcing his way through the obstacle. Fougass were made by using artillery shells packed in a water-tight box with an explosive charge. A stone fougass was made by placing 55 pounds (a cubic foot) of powder behind a wooden shield, then placing four cubic yards of half pound stones on top. Fougass was fired by means of a tube (augot) fill with powder which worked as the fuse.

Gabions. Large cylindrical wicker baskets filled with dirt. They were used in revetments of parapets, interior slopes of batteries and the side walls (cheeks) of embrasures. Gabions were open at both top and bottom. They were 22 inches in diameter and 3 1/2 feet in length. Green saplings were interwoven around strong, upright posts. (See figure 40 Photo.)

Glacis. Ground in front of the ditch, raised in such a way as to profile the enemy to the defenders' fire. Pronounced GLAY-sis.

Hand Grenade. Hand-thrown contact or fused explosive. Many had cardboard fins or cloth kite tails to stabilize its flight when thrown. Most exploded by means of a percussion device. Rampart-grenades were very large shells that had a burning fuse device like that of an artillery projectile.

Head Log. Large wooden log used to protect the soldiers from head wounds as they fired their weapons from underneath it while standing behind an earthen mound or parapet.

Head Log Supporting Struts. Used to prevent the head-log from rolling back into the trench and hurting the soldiers during heavy fire. They were also used to string up shelter halves for shade and protection from the weather. They were the basic supports for bombproof shelters within the trench line.

Hurdles. Revetment that was like a wicker fence. Hurdles were used to hold the dirt back on the parapet. They were made in 6 to 9 foot sections with a height of from 3 to 4 feet. Soldiers used green branches to weave the hurdles. Hurdles were also placed in the trenches as a walk-way cover over wet areas.

Lunette. A temporary fortification consisting of two faces forming a salient angle and two parallel flanks. It was shaped liked the capital letter "C" or a crescent moon.

Natural and Man-made Fortifications. Sunken roads, stone walls, fences, rocks and raised terrain were used initially for protection. If not properly incorporated with additional fortifications, i.e., head logs or parapets, unwarranted casualties would occur.

Palisades. An obstacle line of sharpened sticks used to stop cavalry and slow infantry. They were made to be either movable or permanent. If placed in front of a parapet, they were dug into a small 2 1/2 foot deep ditch. Then the stakes were secured to a buried log at the bottom of the small ditch and tamped down. Palisades were 9 to 10 feet long with a diameter of 6 or 8 inches. Once positioned in the ditch, over 7 feet of the palisade exposed. Split boards and other materials that could be sharpened were sometimes used to create the palisade. (See figures 44 and 45 Photos.)

Parapet. Earthen or man-made embankment used to protect soldiers from incoming fire. Soldiers could stand or kneel while firing their weapons over the top of the parapet. Most of the soldier was protected from direct fire. The parapet could be designed to protect soldiers from the fire of small arms to heavy cannon. (See figure 35 Photo.)

Powder Magazine. Dry buried reinforced structures where daily powder for the ordnance of the fort or defensive line were kept. Field magazines were made at the flanks of artillery positions or were dug into the parapet. Three to four feet of earth was placed over a 8 to 9 feet of splinter-proof timbers that had been covered by fascines. Others used tarpaulins and sandbags but the sandbags were knocked off by large shells during a bombardment. (See figures 52 and 53 Photos.)

Redan. Small, two-walled field fortification that formed a salient angle facing the suspected enemy location. They were used to cover advance positions, camps, river crossings and bridges and entrances to a bastion. They were supported by other works such as redoubts.

Redoubts. A geometric field work enclosed on all sides. They were circular, polygonal or square but could follow the contour of the ground. They were deployed with other forts for mutual support. A redoubt could support a redan by fire. (See figure 42 photo.)

Revetment. Support materials for the parapet necessary to prevent the walls from falling in from the effects of erosion and heavy enemy fire. They were constructed of sandbags, sod, wooden posts, saplings, gabions, or timbers. Sod was the most preferred material because it would not throw deadly splinters when hit by direct fire. (See figures 36, 37, 38, 39 Photos.)

Rifle Pits. Dug two-man infantry positions forward of the main defensive area. They were used by the skirmishers for protection. The position was dug 3 feet deep and 4 feet long with the earth thrown to the front and sides of the position. Loopholes were cut in the parapet and reinforced with sandbags and headlogs.

Sandbags. Cloth bags that held one bushel of earth. They were 12 to 14 inches wide and about 30 inches long. One man could carry about 100 empty bags. These were used in revetments, embrasures and in the repair of breaches. They were considered temporary. Sandbags were found unacceptable in the cheeks of gun embrasures because the burning flash destroyed them. Sand bags were covered with tar to slow down erosion.

Sap Roller. Two, large wicker gabions, six feet in length. The smaller gabion was slid inside of the larger. It had the diameter of two feet, eight inches, while the larger was four feet in diameter. Hardwood logs were stuffed between the two to protect the men behind it from direct fire from small arms. They were pushed ahead of workers at night while they expanded the fortification or trench line. (See Figure 56 Photo.)

Sod Revetment. Sod bricks made from cuts of grass sod. These cut sections were 4 to 6 inches thick with a width of 12 inches, and were 12 to 18 inches long. The sod bricks were placed into the revetted area like a wall and pinned together with wooden stakes. When watered, the grass roots strengthened the wall. The

computation for the required bricks for a given area was: "divide the height of the slope by the thickness of sod to get the number of rows required. Then divide twice the length of the slope by the sum of the length and breadth of a sod for the number in one row. Multiply these two quotients together, for the whole."

Stockade or Picket Works. Barriers made into a permanent defense. They were designed to give protection from direct small arms fire. They were made of rough trunks of young trees which were cut in lengths of 12 to 14 feet, with a diameter of 10 to 12 inches. They were placed into the ground close together. Firing steps (called banquettes) and firing holes (called loopholes) were cut so that each soldier's firing position was interlocked with the next shooter. The works were supported by obstacle lines in front, using a ditch, abatis, and palisades. Block-houses were built to provide flanking fire and observation. (See figure 54 Photo.)

Superior Slope. Top of the parapet. This was a flattened area where defenders could steady their small arms and fire.

Terreplein. Flat ground inside the parapet, at least 6'6" below the top of the parapet. From this position the defenders could stand and still be protected from direct fire in order to fire over the parapet. Pronounced TEAR a-plane.

Torpedo. Anti-personnel black powder mine with a contact fuse which would explode a small charge under the pressure of a soldier. Some were made with artillery shells and percussion caps (fulminate of mercury and saltpeter). The so-called Russian powder boxes consisted of a water-tight box holding a 35 pound powder charge. The firing device was a glass tube filled with sulfuric acid. When a soldier stepped on the mine and broke the tube, the acid would come into contact with a mixture of sugar, sulphur, gum water, and chlorate of potash and explode the torpedo.

Trap Holes. Pits dug in the ground to a depth of 2 1/2 to 8 feet. In the center of each pit, a strong, sharp stake was placed. The deeper holes were to prevent a soldier from crawling out. The smaller holes were effective against cavalry. If an infantryman was not killed, the smaller hole offered little protection from defenders' fire. Trap-holes were placed in front of field fortifications in a checkerboard pattern to prevent easy passage, much like a mine field of today. They were effective against infantry and cavalry if properly positioned.

Traverses. Portions of parapets that were built to protect troops or artillery from enfiladed fire or bursting shells. They could be covered for additional protection. They were placed between every two guns in an artillery battery to prevent all the guns in a battery from being destroyed with one well-placed shot from enemy artillery. (See figure 57 Photo.)

Trench. Term used in different ways during the nineteenth century. The trench was the area where a soldier reloaded his weapon behind a parapet. It could be a line of communications or in the offense, a zigzag or boyaus. These were enfiladed trenches running parallel to the defender to give protection to troops in the ready position for attacks on the fortification. They were 6 to 10 feet wide and no less than 3 feet deep. In offensive terms, to open the trench, meant to start digging toward the defenders' positions. (See figure 55 Photo.)

Trip Wire. Used to trip soldiers who were attacking the field fortification. Most were wire obstacles which had been tied to stakes in a criss-cross pattern. They were placed in conjunction with palisades, chevauz de frize or abatis.

Figure 34. Photo Parapet. Source: Timothy H. O'Sullivan, Civil War Photographs 1861-1865, Library of Congress. #39531

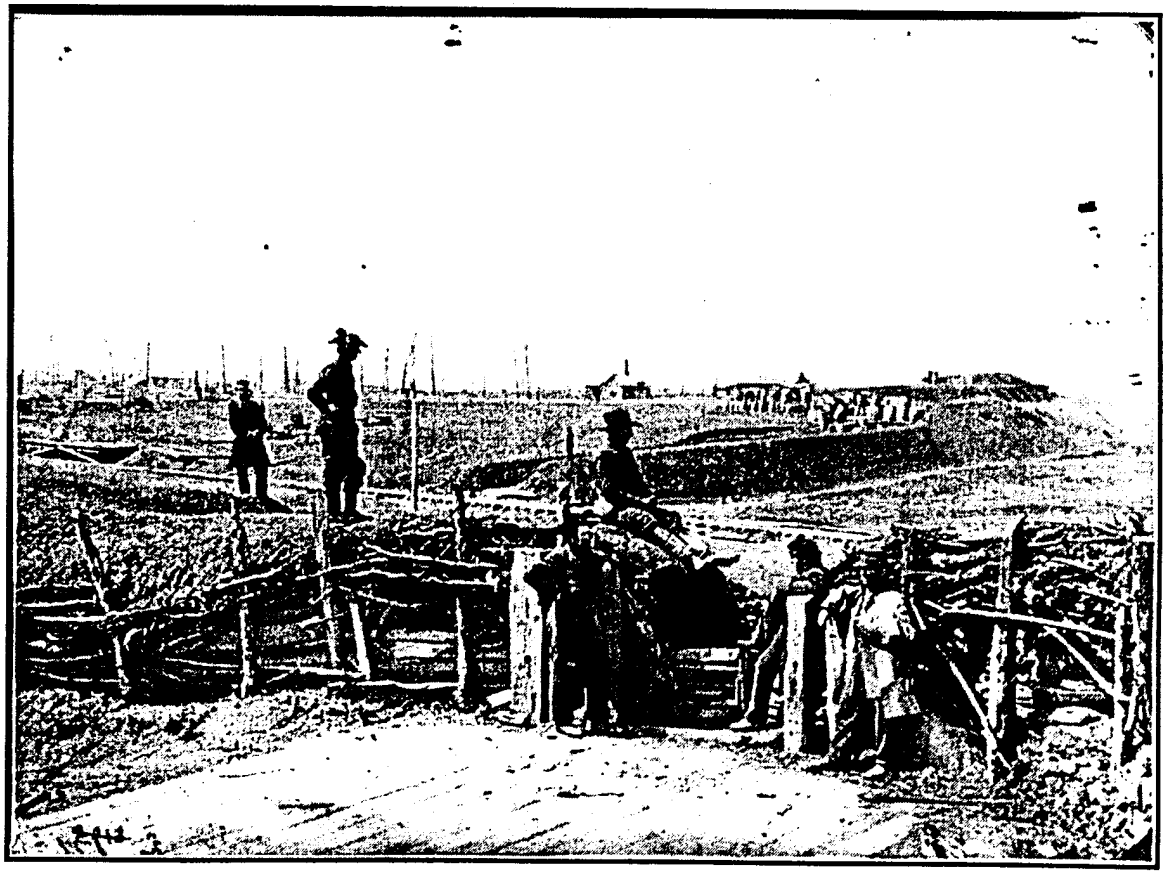

Figure 35. Photo Parapet/Revetment. Source: George N. Barnard, Civil War Photographs 1861-1865, Library of Congress. #40024

Figure 36. Photo Cotton Bale Revetment. Source: Timothy H. O'Sullivan, Civil War Photographs 1861-1865, Library of Congress. #39685

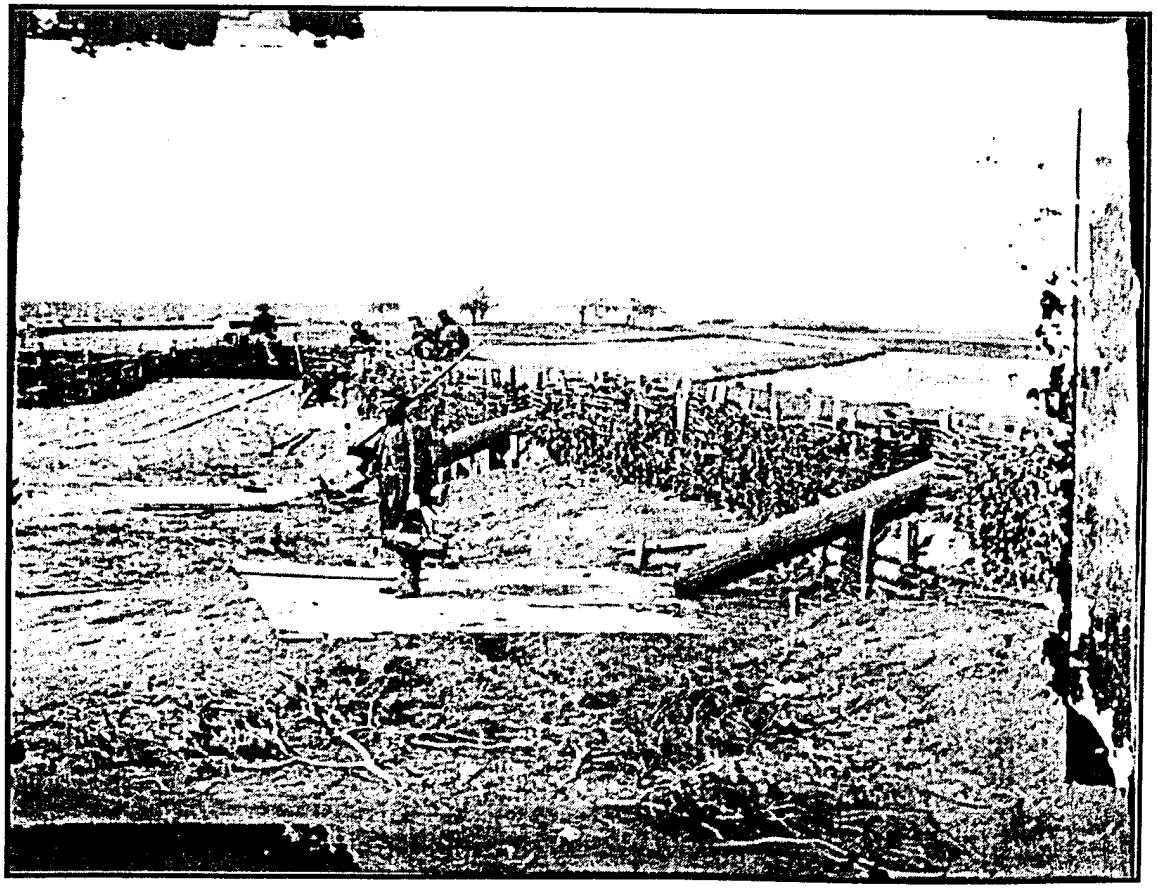

Figure 37. Photo Quaker Gun Position/Field Revetment. Source: George N. Barnard, Civil War Photographs 1861-1865, Library of Congress. #39456

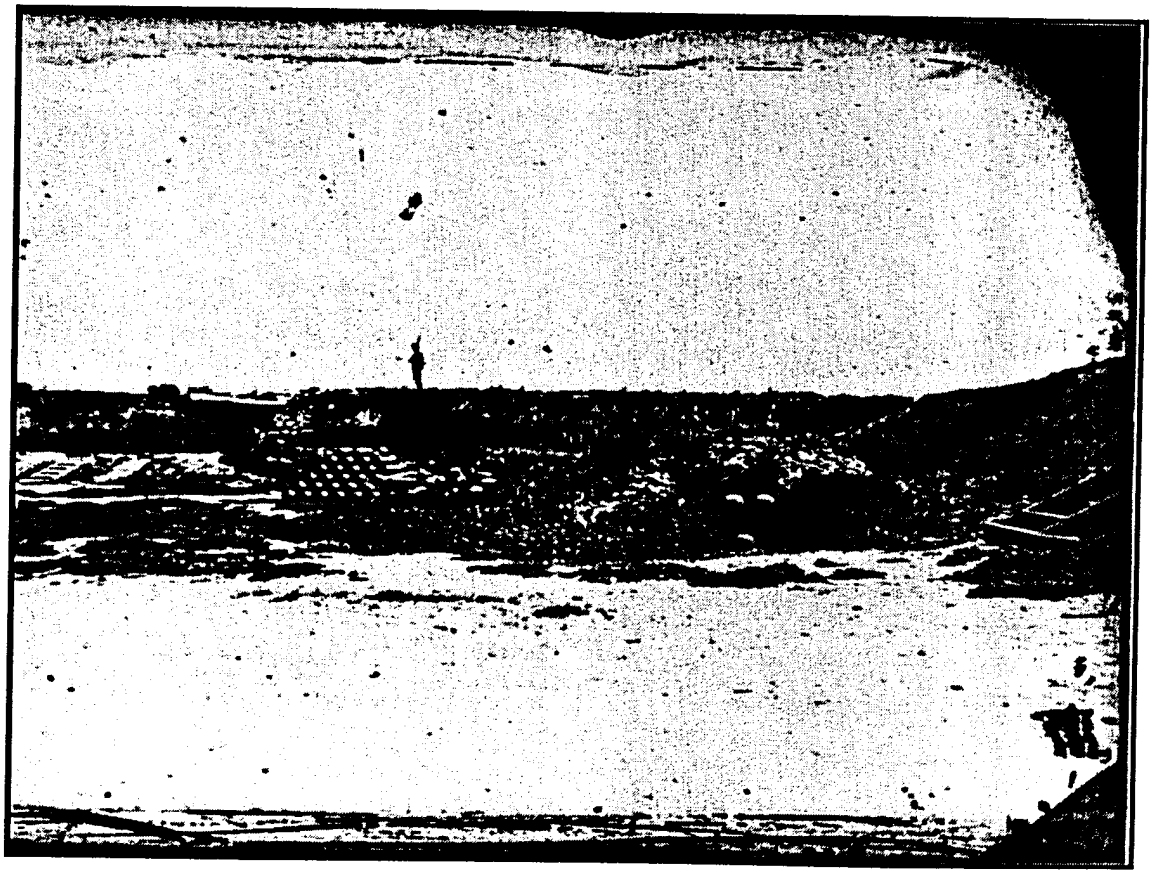

Figure 38. Photo Sod/Grass Revetment Fort Fisher, North Carolina. Source: Timothy H. O'Sullivan, Civil War Photographs 1861-1865, Library of Congress. #39648

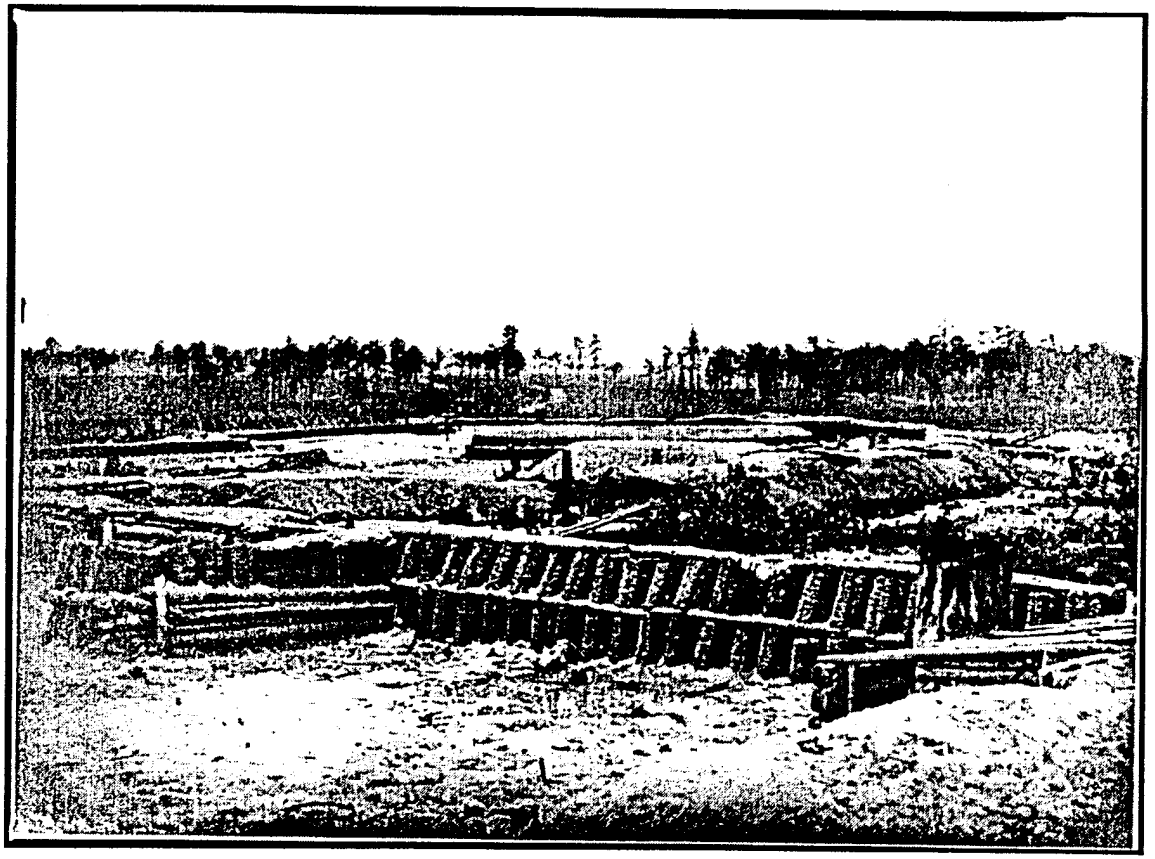

Figure 39. Photo Gabions in Fort Sedgwick. Source: Timothy H. O'Sullivan, Civil War Photographs 1861-1865, Library of Congress. #39531

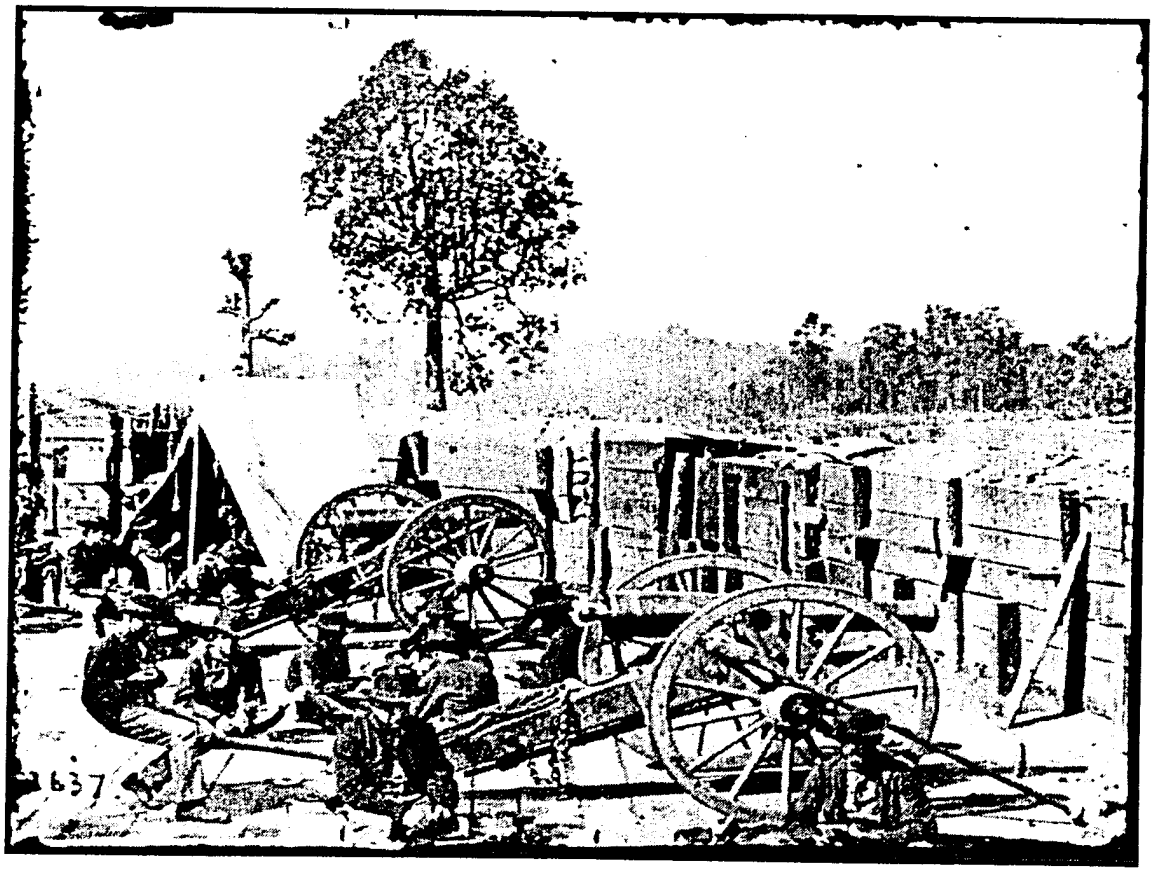

Figure 40. Photo Plank Revetment in Sunken Gun Platform. Source: George N. Barnard, Civil War Photographs 1861-1865, Library of Congress. #39958

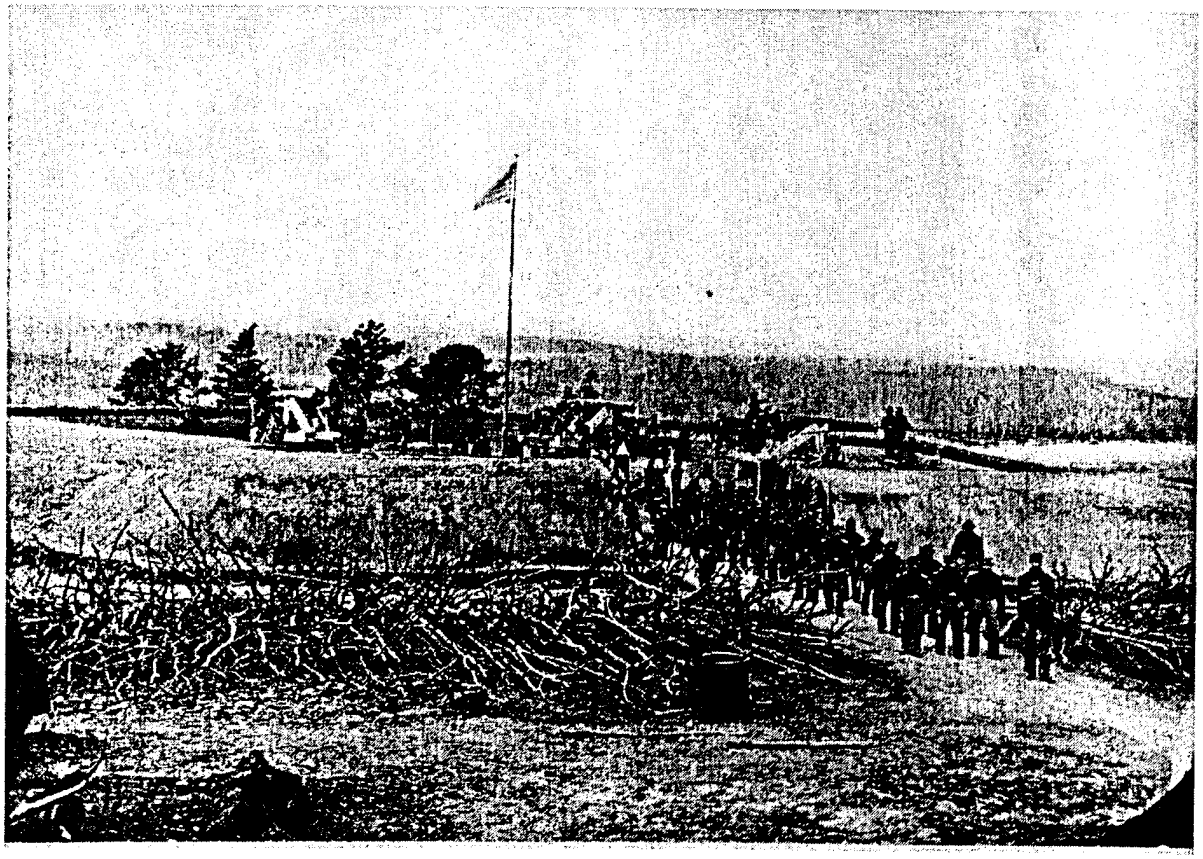

Figure 41. Photo Redoubt, Ditch, Abatis. Source: Civil War Photographs 1861-1865, Library of Congress. #121

Figure 42. Photo Fort, Ditch, and Palisades. Source: Civil War Photographs 1861-1865, Library of Congress. #3215

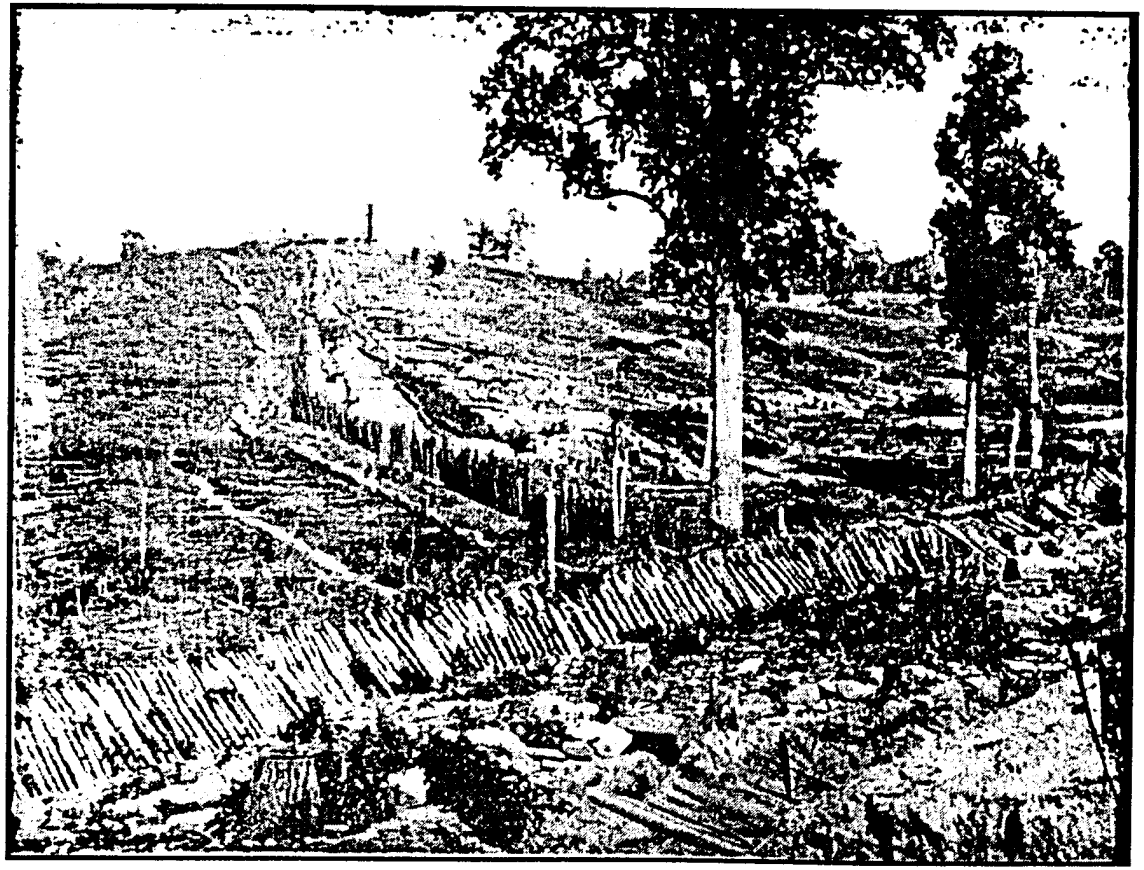

Figure 43. Photo Palisades. Source: George N. Barnard, Civil War Photographs 1861-1865, Library of Congress. #39774

Figure 44. Photo Fort Sedgwick Palisades. Source: Civil War Photographs 1861-1865, Library of Congress. #3209

Figure 45. Photo Chevaux de Frize. Source: George N. Barnard, Civil War Photographs 1861-1865, Library of Congress. #39775

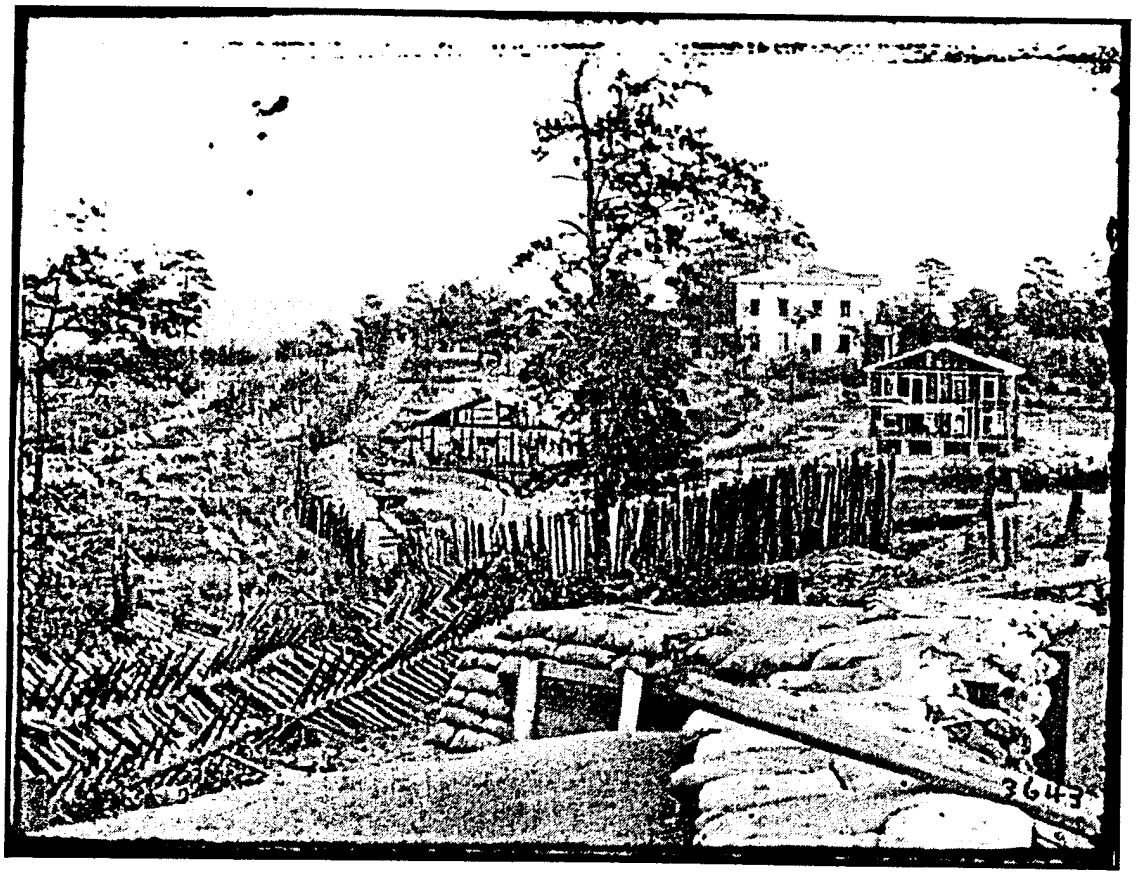


Figure 46. Photo Palisades and Chevaux de Frize. Source: George N. Barnard, Civil War Photographs 1861-1865, Library of Congress. #39959

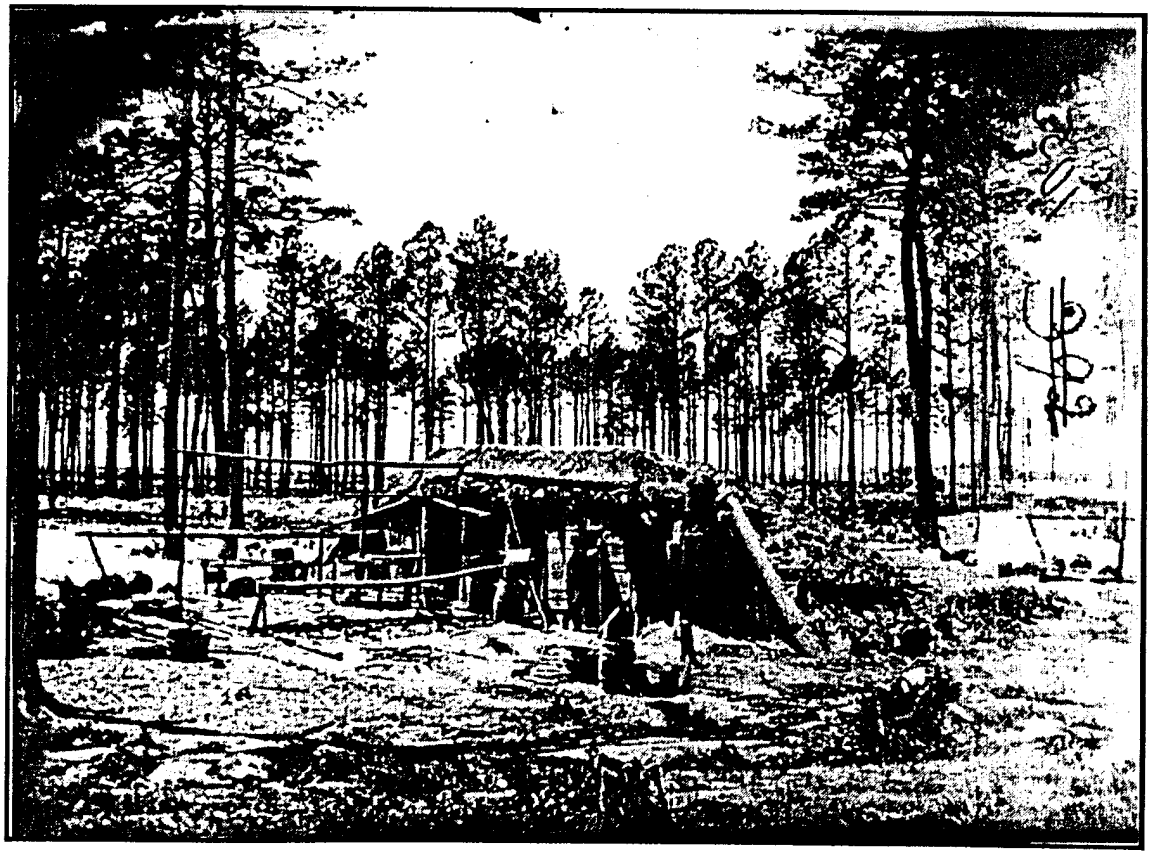

Figure 47. Photo Bombproof Shelter. Source: Civil War Photographs 1861-1865, Library of Congress. #1053

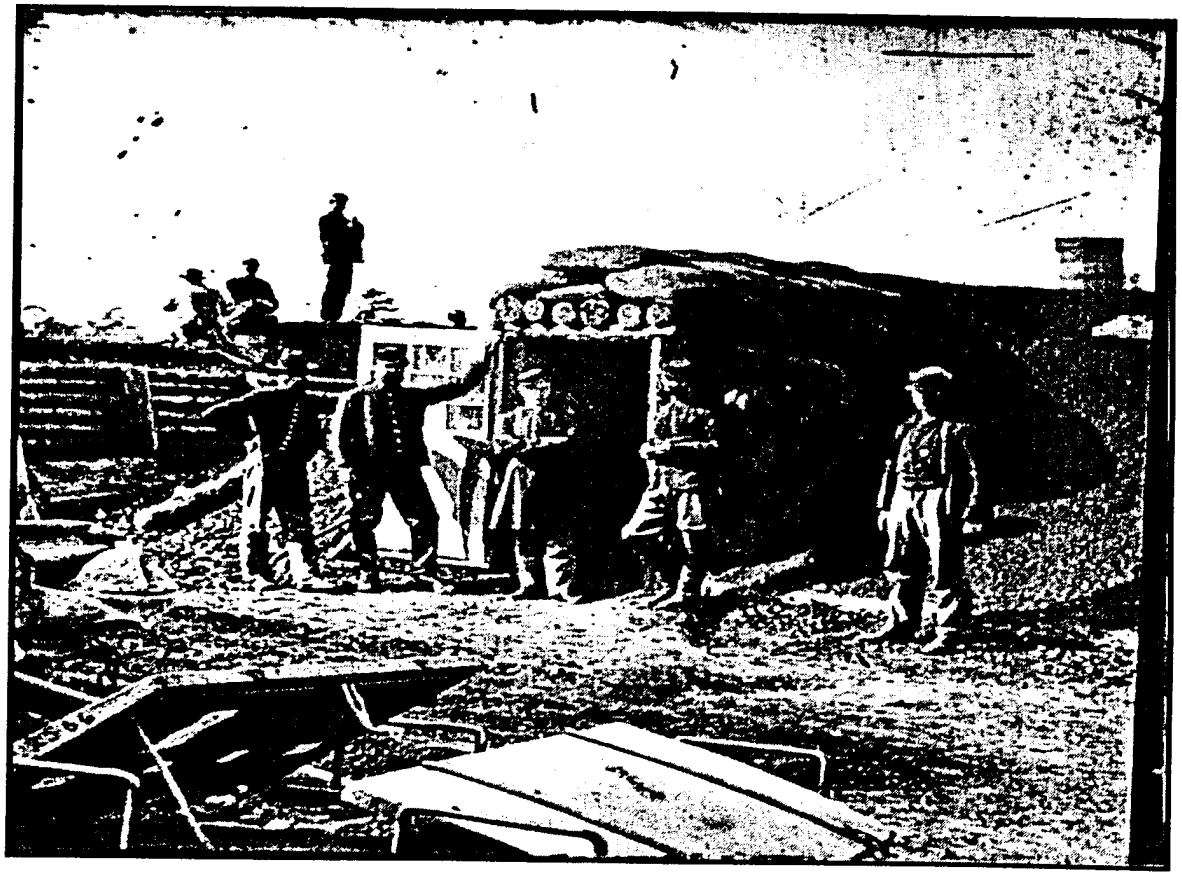

Figure 48. Photo Bombproof Shelter. Source: Civil War Photographs 1861-1865, Library of Congress. #39728

Figure 49 Photo Bombproof Shelter at Fort Sedgwick. Source: Civil War Photographs 1861-1865, Library of Congress. #3199

Figure 50 Photo Garrison Bombproofs. Source: Timothy H. O'Sullivan, Civil War Photographs 1861-1865, Library of Congress. #1084

Figure 51 Photo Magazine and Bombproofs. Source: Civil War Photographs 1861-1865, Library of Congress. #39637

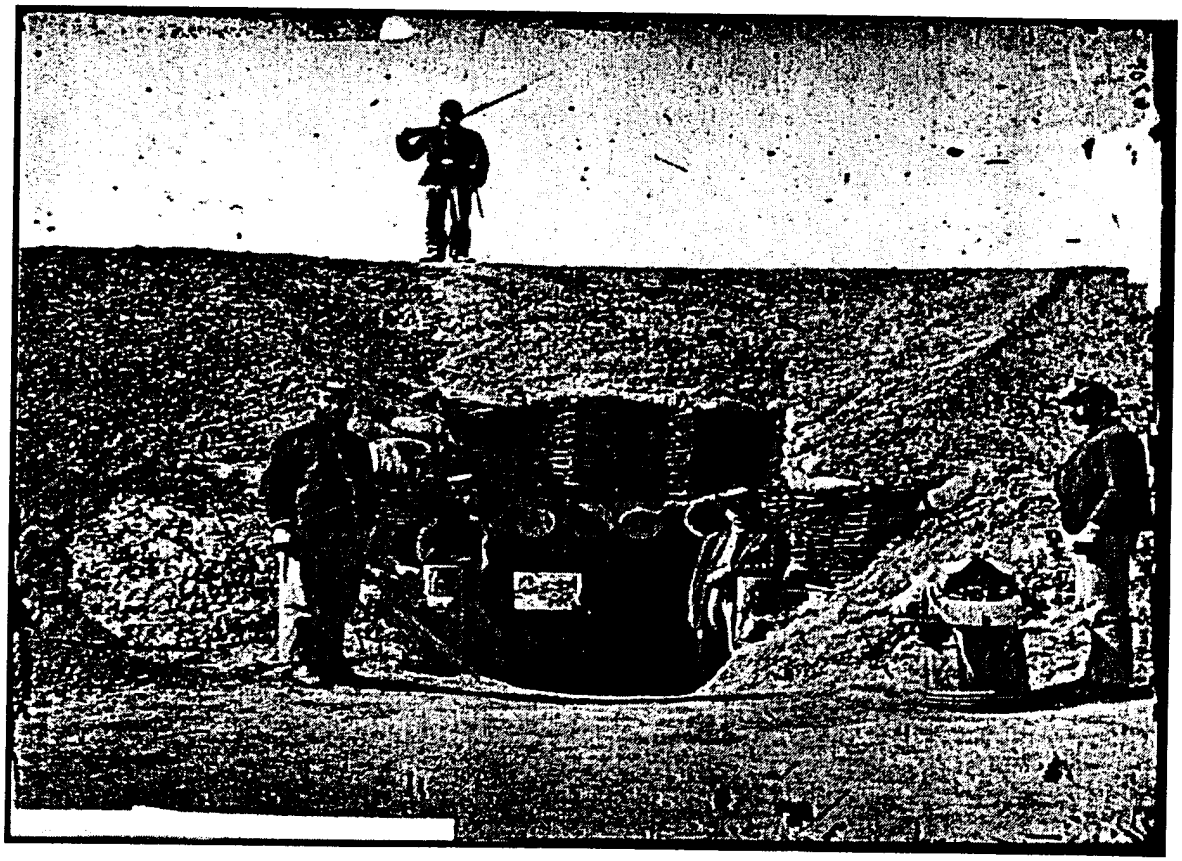

Figure 52 Photo Magazine. Source: Civil War Photographs 1861-1865, Library of Congress. #39768

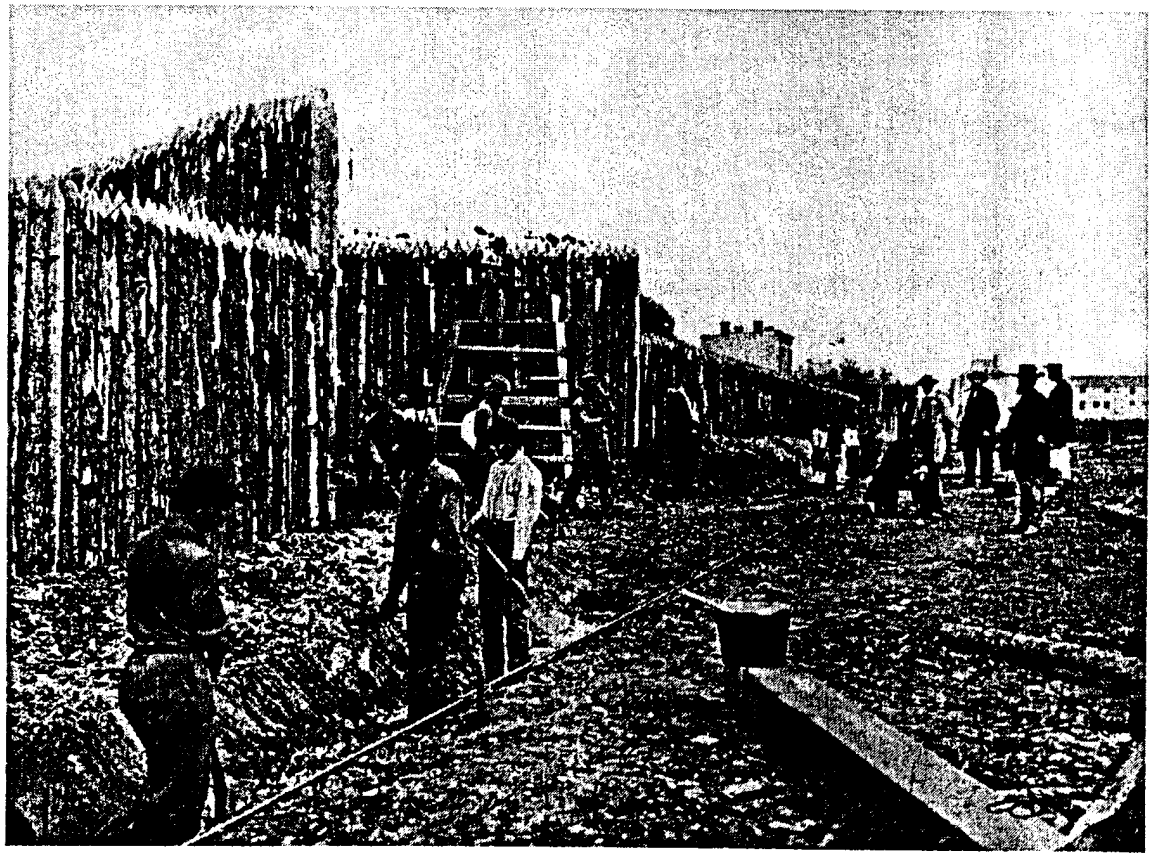

Figure 53 Photo Stockade with Loopholes. Source: Civil War Photographs 1861-1865, Library of Congress. #292K

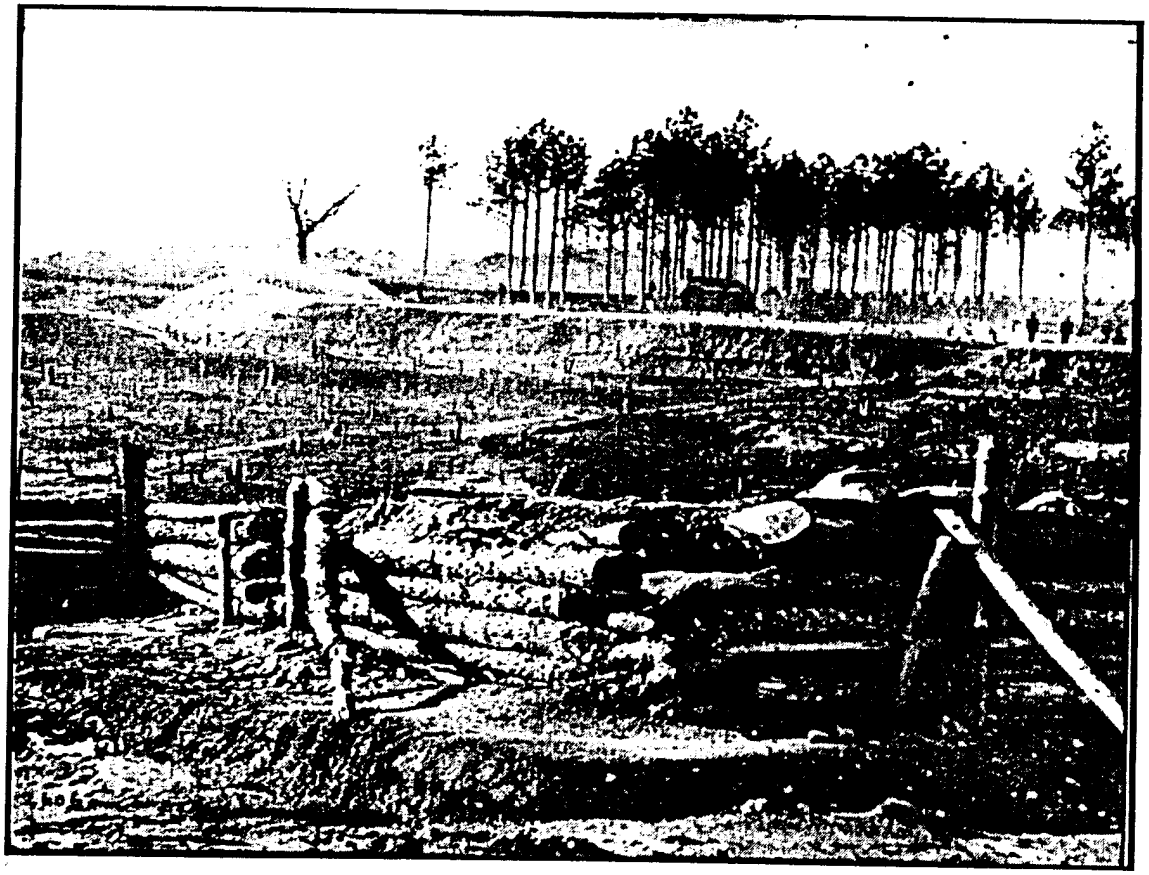

Figure 54 Photo Parapet with Log Revetment Along a Trench Line.
Source: Civil War Photographs 1861-1865, Library of Congress. #39737

Figure 55 Photo Sap Roller. Source: Civil War Photographs 1861-1865, Library of Congress. #39873

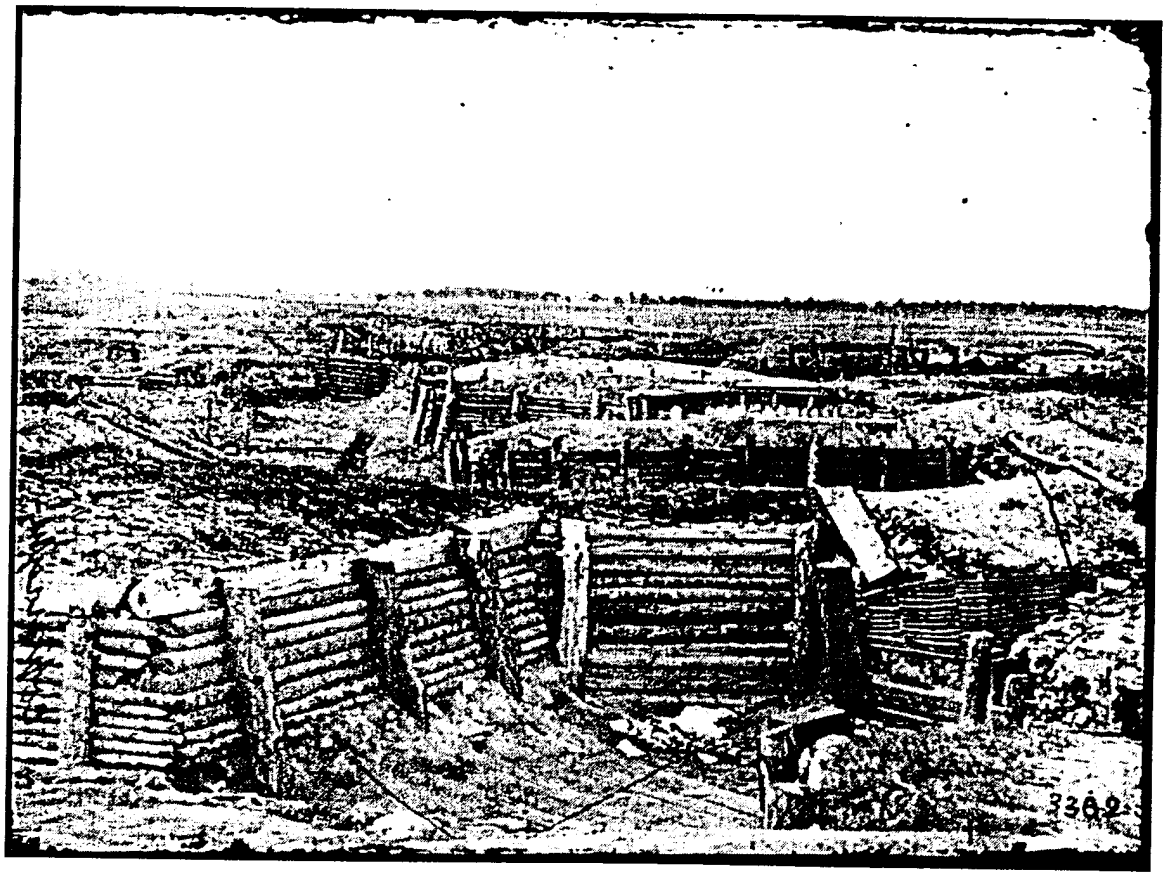

Figure 56 Photo Traverses. Source: Civil War Photographs 1861-1865, Library of Congress. #39867

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