

Confederate Engineers in the American Civil War

By First Lieutenant Shaun Martin

On 16 March 1802, the Congress of the United States authorized President Thomas Jefferson to organize a Corps of Engineers, which "shall be stationed at West Point, New York," and "shall constitute a military academy," with classes beginning in April 1802.[1] The academy progressed from a disorganized and largely unknown institute to one with a record of high academic excellence, producing officers who would make a name for themselves in military and civil affairs. While the graduates of West Point distinguished themselves in different branches within the Army, attesting to the quality of their military education, the curriculum was designed to provide an engineering education to supply the United States with trained engineers.

Jefferson Davis summarized a widely held opinion of the value of West Point graduates in a report made to Congress:

> *Nearly all great public works of the country, the river and harbor works, the lighthouses, and even the public buildings, have been directed by its graduates; they were the pioneers in the construction of railroad, and among the teachers of that art; and the great scientific works of the government have been chiefly conducted by them. The military services of its graduates have been ever more conspicuous than those in engineering and science. The fortifications, the improvements in ordnance and small arms, the conduct of the geographical and other scientific labors carried on in connection with the operation of troops, equally attest the character of the instruction imparted at West Point. Ever since the organization of the government, perpetual Indian warfare has kept the larger part of the Army in active operation on the frontier and in the barren plains and mountains of the interior. The duties are harassing and entail great privation and exposure; they call for the exercise of all the best qualities of the soldier which, tried by this severe test, the graduates have been found to possess in an eminent degree.*[2]

Choosing Sides

On 6 March 1861, after the South seceded from the United States, the Provisional Congress of the Confederate States of America passed "an act for the establishment and organization of the (Confederate) Army." Among other provisions, it called for the establishment of the Confederate Corps of Engineers.[3]

Since the primary source of men trained in the skills of artillery and engineering for the United States was West Point, those who attended classes together, as well as those who provided the instruction, chose sides when the Civil War began. (For example, in January 1861, the superintendent of West Point

was Captain P.G.T. Beauregard. Four months later—as a newly promoted general—his troops opened fire on South Carolina's Fort Sumter (see photo at left), a Union fort commanded by Major R. Anderson, who years earlier had been the artillery instructor for cadet Beauregard at West Point.[4])

The Union Army received the greater share of these officers and the experience they brought with them. Of the 65 cadets who had resigned from West Point and accepted commissions in the Confederate Army by May 1861, only seven were in the Corps of Engineers. An additional 13 officers were inherited from the academy faculty, but seven of them were soon detached outside the Corps of Engineers.

With its limited cadre and without a source of training for new engineers, the Confederate Army, like the Union Army, would suffer from a critical shortage of engineer officers. The Confederate Army, however, did a better job of overcoming this shortage. Its establishment of an Engineer Corps and an improvised organization of dedicated engineer troops gained the Confederacy numeric superiority with regard to its engineers.

In 1863, the Confederate Congress passed legislation assigning a company of engineer troops to every division in the field. The troops were to be drawn from each division and selected based on their experience in the mining or construction trades. Each company consisted of 100 men commanded by a captain and three lieutenants. The newly formed companies (4,000 soldiers, who were dedicated to engineer operations) were superior to the Union Army's ad hoc system, which relied on employing soldiers as engineers as needed.[5]

By 1865, the Confederate Army had many more engineer officers in the field than the Union Army. The Confederate Engineer Corps had 13 regular officers, 115 provisional officers drawn mostly from civilian engineers, and an additional 188 nonengineer officers assigned to engineer troops. This compared to the Union's 86 engineers.[6]

The engineer troops of the Confederacy were generally committed to constructing and improving field fortifications deployed to the coastal and interior defenses, and it was in this capacity that they were superior to their Union counterparts. At times, engineers were used to maintain and improve the Confederate rail system, but here the Union Army excelled, both in its utilization of the engineers and its logistical support of the rail system.[7] The creative use of the resources available was what set the Confederacy apart from the Union. Another lasting contribution of the Confederate engineers was the development of new weapons systems.

Field Fortifications

The innovations employed by the Confederate engineer units during the Civil War were remarkable. Field fortifications dominated the Confederate defensive operations and were extensively employed in their offensive operations. A zigzag system of trenches, which had never been used in field operations, protected the approach. Such entrenchment methods previously had been used exclusively for siege operations.[8]

Union Captain Orlando Poe, General William T. Sherman's chief engineer, admired one particular innovation he had observed—the "head log," which was invented to cope with the deadly accuracy of sharpshooters. The head log was described as "a stout log, of hardwood if possible, which is cut as long as possible and laid upon blocks placed on the superior slope for a foot or two outside the interior crest. The blocks supporting the head log raise it sufficiently from the parapet to allow the musket to pass through underneath it and steady aim to be taken, while the log covers the head from the enemy's fire. Frequently, the blocks are replaced by skids which rest on the ground in the rear of the trench so that if the head log is knocked off the parapet by artillery fire, it rolls along these skids to the rear without injuring anyone."[9]

The Confederate Army often demonstrated its skill at strategic defenses in the tactics used by General Joseph Johnston. His troops would construct as many as three lines of fieldworks, including one to their rear. Johnston attended, with meticulous detail, to the general organization and detail of the entrenchment, while the engineer officer of each unit was in charge of the entrenchment, selecting the lines and placing each unit in position.[10] The Union Army routinely left this function to the troops themselves. Poe reported, " The constant practice of our troops has made them tolerably good judges of what constitutes a good defensive line and lightened the labors of the engineer staff very materially." [11]



Interior view of Confederate works



Confederate fortifications at Petersburg

The Union was slow to appreciate the effectiveness of the Confederate defensive tactics. In June 1862, the defense of Vicksburg, Mississippi, under the command of General John Pemberton, was under way. The Confederates threw up two circular fieldworks that were connected by rifle trenches. The Union Army's General Ulysses S. Grant failed to entrench his offensive line or even to entrench his camps. The Union forces staged three assaults, the first on 29 December 1862 with forces commanded by General Sherman. The second and third assaults by Grant's forces were on 19 and 21 May 1863, this time after a six-hour artillery bombardment by land and from the river. Grant captured a few works but could not hold them. On 4 July1863, Pemberton, who was short of food and ammunition, surrendered after defending for 213 days. Grant had employed 220 artillery pieces, while the defenders hardly used any artillery. Pemberton had defended Vicksburg with a force of 18,500 men and lost about 800 during the siege. Grant had engaged about 30,000 men, and his force was almost decimated.[12]

In June 1864, near the end of Grant's Overland Campaign, the Confederate Army again demonstrated the power of its engineers at a crossroads in Virginia known as Cold Harbor. General Robert E. Lee had lost the crossroads while fighting General Grant's forces during the preceding days. Early on 2 June, Lee's soldiers began to erect a defensive works. Although Grant wanted to attack immediately and roll over Lee's forces before they could complete their efforts, his units were unable to complete necessary preparations in time for the sunrise assault. So Grant rescheduled the attack on Lee for dawn on 3 June.

Meanwhile, Lee's men dug frantically throughout the day on 2 June. Confederate engineers from Richmond used long cords marked with small strips of white cloth, expertly laying out the lines to maximize the fields of fire.[13] The earthworks were low-lying and did not look at all impressive. A Union officer recollected, "The country being generally level and only slightly undulating, the sharpest eye could perceive through the woods and fields nothing but faint lines of rifle trenches." [14]

A little before 0500 on 3 June, after a brief bombardment, Grant's forces began their assault on the Confederate positions. The mass charge of nearly 60,000 Union soldiers was shattered in less than an hour. Major General Andrew Humphreys, the Union Army's chief of staff, later tallied the Union losses for the day at 4,517 wounded and 1,100 dead.[15] After the war, Grant wrote, "I have always regretted that the last assault on Cold Harbor was ever made."[16] The Overland Campaign was finished and Grant now focused on taking Petersburg, Virginia, a siege that would last nine and a half months.

A new philosophy had emerged within the Union ranks. After Cold Harbor, General William F. Smith said, "It had become an axiom among both officers and men that a well-defended rifle trench could not be carried by a direct attack without the most careful preparation, nor even then without fearful loss."[17] On 18 June 1864, Union forces tried once more to storm an entrenched Confederate line at Petersburg. Within ten minutes, 241 Union soldiers were killed and 371 were wounded.[18] The message at last penetrated to the highest echelons of the Union command. Until 2 April 1865, when the war was almost over, the mere sight of Confederate field entrenchments ahead terminated many offensive operations at Petersburg.[19]

The Confederacy pursued a strategy of waging a defensive war[20] but, in the offense, its engineer forces were both innovative and highly effective. One especially successful technique involved creating a skirmish line that moved increasingly closer to the enemy's works. The line protected itself by digging individual rifle pits. Working parties then joined the chain of pits into an ordinary rifle trench, which they later strengthened. By this means, entire earthworks could end up within 200 feet of each other.[21]

A number of items for use in the offense were invented out of necessity. One such innovation was the sap roller, a large

cylindrical basket that was closed at both ends and filled with rocks and soil. "Sappers" would roll the basket until they were directly in front of the Union positions. The advantage to this was that troops could move onto enemy defensive works while under fire and prepare a rifle trench almost on top of the enemy and be relatively free of the murderous fire the enemy could deliver.[22]

Rail Systems

Besides field fortifications and trench warfare, engineers were responsible for the rail systems that provided transportation for supplies needed by the armies. Dominance of both the rail and waterway transportation systems would contribute greatly to the ultimate victory of the Union forces, but the Confederate forces often made good use of the rail resources available to them throughout the duration of the war.

Like Grant, Lee understood the importance of the rail system during the war and had employed his engineers in the system's maintenance and expansion. Although Lee did not have the use of the waterways that the Union enjoyed, he still needed to move troops and materials. At his disposal, Lee had the Orange, the Alexandria, and the Virginia Central Railroads. The combined system extended from Richmond to within 40 miles of Washington, D.C. However, compared to the Union's Baltimore & Ohio Railroad, the Confederate rail system was very limited in the number of miles of track and the general quality.

The Union dominance of rail transportation was actually strengthened by the decisions of the Confederates regarding their existing system. First, the tracks for the southern rail systems were laid in a north-south direction and were not interconnected—a problem that could have been overcome by laying new tracks. But Congress was slow to respond to Lee's requests, and he expressed his concern in a letter written on 27 April 1861 just after assuming field command.[23] In addition, southern railroads were not subordinated to military needs, in contrast to the organization and administration of railroads in the North.[24] This was a continuous logistical hindrance as Lee anxiously waited for subsistence, fodder, animals, and wagons to arrive via an undependable rail system.

Another shortcoming in the southern rail system was the gauge of the rails. They were not a standard gauge, which meant that troops had to unload materials at junctions and reload them. As the Union Army captured these sections, it upgraded the track to the standards of the existing northern rails. This involved replacing rails with the standard gauge used by the northern rail system and laying new track to connect previously unconnected sections.

In spite of not developing their own rail system adequately, Confederate engineers contributed to pioneering uses of the railroad. For example, they adopted an effective railroad mobilization strategy. In the spring of 1862, Grant threatened the town of Corinth, Mississippi. A significant feature of this battle was the Confederacy's ability to quickly move troops to contest Grant's presence. In an unprecedented rapid concentration of troops, the rail system brought several armies to Corinth, plus newly mobilized regiments from other states. The Confederates lost the battle for Corinth, but they had shown the importance of the rail system in delivering troops to battle.[25] Grant was quick to see this importance and would use it effectively against the Confederates in the future.

Weapons Systems

Confederate engineers were also employed in developing new weapons in hopes of gaining an advantage on the battlefield. Among these was the introduction of a railroad artillery battery. During the Peninsular Campaign of 1862, General Lee suggested that a railroad battery be built for the Confederates. It would be used on the York River Railroad to halt the advance of General George B. McClellan along this line.

On 5 June 1862, Lee wrote his chief engineer, Major W. Stevens, and suggested that the Confederate engineers "construct a railroad … plated and protected with a heavy gun."[26] He also suggested that mortars be used in a similar manner. Lee hoped the gun would be in action by 6 June; however, it was not available until 22 June. The 32-pound gun was rifled and banded and weighed 5,700 pounds. Mounted on a railroad flatcar, it was protected in front by a sloping iron-plated shield through which a porthole had been cut for the muzzle of the gun. The sides of the car were protected with timbered walls that were lined with iron. The basic ammunition load consisted of 200 rounds, including a number of 15-inch solid bolt shot. The gun was first used at Savage's Station, Virginia, on 29 June during the Seven Day's Battles. The gun, under command of Lieutenant James E. Barry, was pushed near a rail bridge near the depot. He was to clear an obstruction emplaced by the Union troops and rake the infantry in the valley below with fire. He accomplished his mission with a terrible effect. The Union infantry's attempted assault on the gun was repulsed, and the Union suffered heavy losses.[27]

Conclusion

The Confederacy was never able to gain dominance in rail transportation, and the new breed of weapons and tactics introduced by the ill-fated nation's engineers did not provide the edge they needed to win the Civil War. However, the Confederate engineers' battlefield tactics changed the face of warfare, forever allowing commanders to mass and redeploy troops and transport supplies with previously unimagined rapidity and effectiveness. On the battlefield, the engineers demonstrated with gory clarity the contributions they could make. The innovations they introduced were the foundation of warfare of the future.

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Endnotes:

[1] Stephen Ambrose, *Duty, Honor, Country: History of West Point*, Baltimore: The Johns Hopkins Press, 1966, p. 22.

[2] Report of the Commission, Senate Document No. 3, 36th Congress, 2d Session, Washington, 1860, pp. 56-57.

[3] Richard P. Weinert, " The Confederate Regular Army," *Military Analysis of the Civil War*, ed. Military Affairs, New York: KTO Press, 1977, p. 17.

[4]Ambrose, p. 22.

[5] John H. Westervelt, *Diary of a Yankee Engineer*, ed. Anita Palladino, New York: Fordham University Press, 1997, pp. 47-59.

[6] Edward Hagerman, *The American Civil War and the Origins of Modern Warfare*, Bloomington and Indianapolis: Indiana University Press, 1988, pp. 236-239.

[7] John Prados, "How Many Roads to Richmond?" *The Quarterly Journal of Military History*, Vol. 12, No. 2, 2000, p. 55.

[8] Ibid., pp. 54-55.

[9] W.T. Sherman, *Memoirs*, Bloomington: Indiana University Press, 1957, pp. 117-118.

[10] Fitzhugh Lee, *General Lee*, New York: Greenberg D. Appleton and Co., 1894, p. 138.

[11] Sherman, pp. 38-39.

[12] Noah Andre Trudeau, "The Walls of 1864," *The Quarterly Journal of Military History, Vol.* 6, No. 2, 1994, pp. 24-26.

[13] Ibid., pp. 29-30.

[14] Barron Deaderick, *Strategy in the Civil War*, Harrisburg: The Military Service Publishing Company, 1946, p. 103.

[15] Trudeau, p. 30.

[16] Ulysses S. Grant, *Personal Memoirs*, New York: World Publishing Co., 1952, p. 96.

[17] Deaderick, p. 122.

[18] Ibid., p. 147.

[19] Trudeau, p. 31.

[20]James M. McPherson, "Failed Southern Strategies," *The Quarterly Journal of Military History*, Vol. 11, No. 4, 1999, p. 62.

[21]Hagerman, p. 199.

[22] Ibid., p. 330.

[23] Moxley G. Sorrel, *Recollections of a Confederate Staff Officer*, New York: Neal Publishing Co., 1905, p. 784.

[24] Hagerman, pp. 146-147.

[25] Prados, p. 55.

[26] Lee, p. 288.

[27] Stansbury Haydon, "Confederate Railroad Battery," *Military Analysis of the Civil War*, ed. Military Affairs, New York: KTO Press, 1977, pp. 291-294.

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retrieving a wide range of information products on both the secure and nonsecure Internet protocol routing (SIPR/NIPR) networks.The need for this project was identified after realizing that years of hard work had been electronically filed and boxed with little or no cataloging system for future retrieval. As a result, planners have spent hours digging through old boxes and scanning various disks and hard drives trying to locate good historical products they knew existed. When products weren't found, planners were forced to work from scratch and duplicate the efforts expended by their predecessors. This predicament served as a powerful motivator to get this engineer management system and repository designed and in place as rapidly as possible.

To assist in the development of this repository, we turned to the Waterways Experiment Station's (WES's) Tele-Engineering services in Vicksburg, Mississippi, for technical assistance. In short, our engineer planners developed the objective system and functional requirements, and WES successfully turned these requirements into a user-friendly engineer-information application.

The repository is designed with drag-and-drop functionality and drop-down menus, which will provide users a means to find and download various engineer products quickly and easily. It is being developed as a Web browser using Microsoft® Access 2000 and is organized by each country in the USAREUR area of operation.

The opening menu portrays a map of the European geographical region. Each country on the map has a trigger symbol linked to the primary table for that country. The primary tables have information organized into a minimum of 18 areas, to include military capabilities, U.S. military operations, topography, routes and bridges, ports, airports and airfields, power and water, useful Web sites, and other engineer-related topics. Subordinate tables have various forms of informational products, internal links to products in the database, or external links to Web sites where products you are interested in exist. The repository is also designed with a search engine to guide users directly to all its available products. This repository will be open for outside use in October 2000. The secure and nonsecure Web sites are available from the USAREUR ODCSENGR's home page.

Working Together

The DeFleury Contingency Operations Center and the Engineer Information Repository reflect two initiatives that the ODCSENGR personnel took on to supercharge their engineering capabilities and help them provide better and faster support to future operations. These projects illustrate what we, as individual staffs or units, can accomplish when we take the time to identify what's truly vital to our mission and then work together to make it happen.

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