

Modernizing Warfare: US Grant and Military Engineering in the Middle Mississippi Valley during the Civil War

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Among the myriad reasons the United States Civil War has attracted and sustained a high level of interest both outside the United States and within is that it is arguably the first modern war. For the first time, armies moved by steamboat and railroad as well as by foot. Weapons and other material were mass produced by factories. Large numbers of citizens responded to patriotic appeals to enlist and when that faltered a new, moral object – the end of slavery – was added as an inducement and when that proved insufficient a draft was implemented. Further, civilian populations were not entirely out-of-bounds – at least their morale and willingness to support the war was something to be undermined as the war dragged on. Among the principal architects of this new, modern war was Ulysses Simpson Grant working with William Tecumseh Sherman. Grant and Sherman rose from obscurity to prominence and Grant to the White House because of their redefinition of war and the resulting Union victory. To carry the architect metaphor forward one last bit, the studio where they began their design of modern warfare and tested it was the middle Mississippi Valley, especially western Kentucky, and West Tennessee. One aspect of this, although not the only one, was rethinking military engineering from a defensive, almost passive, activity to an offensive operation. Grant and Sherman succeeded because, more than other commanders at their level, they were able to recognize the fundamental ways in which the environment within which they fought had changed from the environment that underlay the doctrines of war they had been taught at West Point.

Military engineering often gets lost when military historians focus on the strategy of campaigns or the tactics of particular battles. It seems like part of the landscape – another aspect that sometimes gets neglected. Military engineering is, however, critical to success in defense, offensive battle, and, perhaps most of all, larger campaigns. If there are obstacles the engineer will have to remove them or develop a way around or through them. Grant and Sherman developed a dynamic approach that transformed warfare. Fortification, especially harbor fortification, was central to our nation's defense doctrine for our first century and a half of our existence as an independent nation. It is not a coincidence that engineering was one of the two principal subjects taught at West Point from its founding in 1803. The initial defense posture of the United States was to build coastal fortifications to slow down an invader until

the militia could be rallied to repel the attack. This kept the size of the standing army in the new nation small. Hence the curriculum West Point developed – engineering for building forts and advanced mathematics for effectively using coastal artillery—trigonometry was used for aiming the large guns over long distances. Little attention was given to tactics, strategy, or military history until after the War of 1812.

The importance of engineering during the Civil War emerges clearly from an examination of U.S. Grant's activities from his arrival in Cairo, Illinois through the Vicksburg campaign. In his various activities we can see engineering as it affected both defensive and offensive actions and individual battles as well as his larger campaigns. Grant graduated from West Point with the class of 1843 having studied the common curriculum, which by that time included Napoleon's campaigns. He did quite well in mathematics and horsemanship, another essential skill for an officer. He also showed a talent for drawing and painting. These last are not as peripheral as it might seem since drawing maps and sketches of military positions and landscape features were used frequently before photography to provide points of reference and information. Grant graduated in the middle of his class, but a number had dropped out.

In this essay I want to take up four aspects of military engineering in the Mississippi Valley during the Civil War. First, the construction of forts and their significance in how the war unfolded in the Western Theatre; second, Grant's use of engineering solutions to a number of military challenges, especially during the Vicksburg campaign; third, the actual siege of Vicksburg; and finally, a lesser known aspect of the war – a unit of former railroad workers organized and based at Columbus, Kentucky to quickly repair railroad tracks and bridges when Confederate raiders, particularly Nathan Bedford Forrest, who was quite active in west Kentucky and Tennessee, wrecked them.

Basic military engineering remained a central part of the curriculum at West Point after the reforms initiated by Sylvanus Thayer in the years following the War of 1812 that added the study of tactics, strategy, and military history to the curriculum. The reasons for that change are rooted in the failure of the pre-War defense strategy to prevent the burning of Washington. Thayer sent Denis Hart Mahan (WP 1824) to Europe in 1826 to study the latest in European military theories and practices. Mahan was a brilliant student and in his third year at West Point Thayer appointed him acting assistant professor of mathematics. Mahan returned from Europe and taught at West Point until 1871. He resigned his commission in 1832 so he could remain at West Point as a faculty member. [He committed suicide after the West Point Board of Visitors recommended he be forced to retire at age 69.] In addition to his courses on strategy and tactics, he wrote some of the earliest American manuals on fortification and other military subjects, nine books in all.¹ Mahan's works remained standard until after World War I not only

¹ *Treatise on Field Fortifications* (1836) *Elementary Course of Civil Engineering* (1837; revised 1868) *Elementary Treatise on Advanced Guard, Outposts, and Detachment Service of Troops* (1847; revised, 1862) *Summary on the Cause of*

in the US Army, but worldwide.² Mahan saw Napoleon as the culmination of military thinking and underplayed developments after Napoleon's career. Mahan's star pupil was Henry Wager Halleck (WP 1839) who was sent to Europe in 1844 to study military training and organization developments since Mahon's visit. He returned and wrote a number of important texts that became US Army manuals and textbooks at West Point.³

Fortification was a central concept for the control of strategic points – a key doctrine in Mahan's writings – and through them US Army doctrine. The formation of this doctrine was heavily influenced by Napoleon's operations. It was derived from the writings of one of his generals Baron Jomini. Mahan had studied Napoleon's campaigns and Jomini's writings thoroughly while in Europe after graduation.⁴ An important example of Mahan's influence was when Leonidas Polk, CSA (West Point 1827) moved from Union City, Tennessee to occupy Columbus, Kentucky very early in September 1861 he proceeded to build a fort to control the Mississippi there – a classic strategic point as defined by US Army doctrine. [Both sides in the Civil War had the same basic military doctrine and ideas because both armies were led by West

Permanent Fortifications and of the Attack and Defense of Permanent Works (1850) *Elementary Treatise on Industrial Drawing* (1853) Editor, with additions, the American edition of Mosely's *Mechanical Principles of Engineering and Architecture* (1856) *Descriptive Geometry, as applied to the Drawing of Fortifications and Stereometry* (1864) *An Elementary Course on Military Engineering [covering] Field Fortifications, Military Mining, and Siege Operations* (1865) *Permanent Fortifications* (1867).

² If his last name seems familiar his son, Admiral Alfred Thayer Mahan, who went to Annapolis, is famous for developing the theory of the significance of naval power in the late nineteenth century and greatly influencing global military planning from the 1890s through World War II. They are an interesting father –son duo. The elder Mahan was among the first Irish Catholics to be commissioned as an officer in the regular US Army. His son's middle name is clearly a tribute to Sylvanus Thayer his mentor who reformed the curriculum at West Point. The son of the author of much of the US Army's official doctrine chose to go to the Naval Academy and pursued a career in the navy despite not liking to be at sea. I am not aware of one, but this would seem a great topic for an article or a book.

³ *Report on the Means of National Defence* (1843); *Elements of Military Art and Science* (1846); (translator) *Life of Napoleon* by Baron Antoine-Henri Jomini (1864).

⁴ *Traité de grande tactique, ou, Relation de la guerre de sept ans, extraite de Tempelhof, commentée et comparée aux principales opérations de la dernière guerre; avec un recueil des maximes les plus importantes de l'art militaire, justifiées par ces différents événements* (1805) English translation Col. S.B. Holabird, U.S.A., trans., *Treatise on Grand Military Operations: or A Critical and Military History of the Wars of Frederick the Great as Contrasted with the Modern System*, 2 vols. (1865); *Précis de l'Art de la Guerre: Des Principales Combinaisons de la Stratégie, de la Grande Tactique et de la Politique Militaire*. (1838) English translation Major O.F. Winship and Lieut. E.E. McLean [USA]. trans., *The Art of War*. (1854); English translation Capt. G.H. Mendell and Lieut. W.P. Craighill [USA] trans., *The Art of War*. Philadelphia: (1862); *Histoire critique et militaire des campagnes de la Revolution* (1806; new ed. 1819–1824); *Vie Politique et Militaire de Napoleon racontée par lui-même au Tribunal de César d'Alexandre et de Frédéric*, 4 vol (1827).

Pointers and in addition Jefferson Davis, President of the Confederate States, was also a West Pointer, Class of 1828.⁵

Polk built the fort at Columbus according to Mahan's manuals. The site was chosen according to the principles Mahan had outlined. It was the first significant high ground going South (Wickliffe was too close to Grant's position at Cairo), also a strategic point per US Army doctrine. When, in response to Polk's advance, Grant occupied Paducah and Smithland, he too was seizing strategic points as defined in standard US Army doctrine – the confluence of rivers~ and had C.F. Smith (WP 1825) design forts for both sites.⁶ Columbus – known as the Gibraltar of the West – was a formidable obstacle ~ looming 150 feet above the river with 140 plus pieces of heavy artillery and some 13,000 troops when the fort was completed. It was a major obstacle in the way of Grant carrying out his mission – gaining control of the Mississippi and the other “western” rivers. Grant regularly and systematically probed its defenses, but did not attack it directly. His probing did not reveal a good plan of attack. The fort's batteries commanded the river and there was a large swampy area directly north of it. Direct assault would involve heavy casualties, which were to be avoided. The site was well chosen. Despite his later reputation as “Butcher Grant,” he was casualty averse and was physically sickened by the sight of blood. He had criticized Winfield Scott's classic campaign to take Mexico City because it involved **too many** battles, for example. He did, however, act decisively when the Polk began to build a camp across the river from Columbus at Belmont, Missouri – fighting a battle there on November 25, 1861, which first brought him to national attention. Whether it was a victory is debated. He was forced to withdraw in haste when the Confederates turned the fort's artillery on his position but argued in his reports and his memoirs that he had achieved all his objectives.⁷

Grant knew the value of fortification both from his education at West Point and reinforced that understanding experientially through his experience at Columbus-Belmont. The difficulties inherent in attacking well designed and properly sited fortifications – and Polk had done that ~ were too much to attempt with his green troops. When reports reached him at his Headquarters at Cairo, Illinois that the new Confederate commander at Fort Henry, Lloyd Tilghman (WP 1836) had begun construction of a new fort on the Tennessee River across from Fort Henry that would occupy high ground comparable to Columbus Grant began flooding his superior, Henry W. Halleck (WP 1839), with telegrams asking for permission to attack. Eight in

⁵ Davis served on active duty until 1835. He returned to active duty as colonel and commander of a volunteer regiment he recruited in Mississippi for the Mexican War, in which he served with distinction.

⁶ Interestingly, Smith had been one of Grant's teachers at West Point, but served under him during the Civil War without any complaint I have ever seen.

⁷ *Personal Memoirs of Ulysses S. Grant*, Great Commanders Series, (1994): 116-123; Nathaniel C. Hughes, Jr. *The Battle of the Belmont: Grant Strikes South* (Chapel Hill: University of North Carolina Press, 1991).

one day I counted when I went through his telegram book in the National Archives some years ago.⁸

Fort Henry was not poorly designed, but very poorly sited. It was in the flood plain. This was due to political considerations, not military doctrine, due to respect for Kentucky's "neutrality" that restricted both sides early in the conflict. Polk's move to Columbus had ended that neutrality as a consideration, opening the way for purely military solutions. Tilghman diplomatically questioned the competence of the officers who built the fort in the flood plain soon after he took command.⁹ He almost immediately began building a new fort in a more defensible position, named Fort Heiman, after the engineer in charge. It was across the river, on high ground, and in Kentucky. He had concluded (rightly) that Fort Henry was simply not defensible. The new fort would be. Grant knew, both theoretically and from experience, that he could not let the new fort be finished. Further, the Confederate fort on the Cumberland River, Fort Donelson, was well along in its construction. Waiting would allow the Confederacy to erect two more formidable obstacles to his successful completion of his mission – gaining control of the rivers. The war in the western theatre was about to move from watching and waiting to action because of engineering developments.

Permission to attack Fort Henry finally secured, Grant and his naval counterpart, Flag Officer Andrew H. Foote, moved against Fort Henry on the east bank of the Tennessee. He sent troops under C.F. Smith to take the new fort, Fort Heiman, on the west bank. Tilghman did not make more than a symbolic effort to defend the fort because he knew it was hopeless. He sent most of his troops to Fort Donelson, still under construction, on the Cumberland about fifteen miles to the east. He surrendered to Foote before Grant arrived. Grant and Foote had designed and built a fleet of a new type of warship, designed for river warfare. They were highly effective at Fort Henry. More important is Grant's sense of urgency in preventing the completion of Fort Heiman and avoiding another Columbus-like obstacle to his overall mission to open the rivers. This, I would suggest, is the first sign that he is beginning to understand the new nature of the war he is fighting. Similarly, and to reinforce the point, he departed from doctrine and moved immediately against Fort Donelson lest it too be completed and form another major obstacle. Standard doctrine called for consolidating his position, securing his supply lines etc. While gunboats are less successful, Fort Donelson is captured, and Grant plays a decisive role in the success of Union forces – exposing himself to fire and physically turning troops around as well as a brilliant tactical insight that secured victory. Grant led from the front. But despite his success he is still reprimanded and removed from command by Halleck for attacking without permission. He had not followed the manual. But Grant is now a national

⁸ Grant's Telegram Books are in RG 393, National Archives of the United States.

⁹ Kendall D. Gott, *Where the South Lost the War: An Analysis of the Fort Henry-Fort Donelson Campaign, February 1862* (Mechanicsburg, PA: Stackpole Books, 2003): 105.

hero and his successful demand for unconditional surrender resonates in a North that has seen little success other than Grant's.

There is a lot more that could be said about Donelson, I am one of those who see it as the most decisive battle of the War.¹⁰ But for our purposes suffice it to say, Grant was driven by his understanding of the problems properly sited and properly designed fortifications presented and he had no doubt his opponents were capable of doing both. They were following, literally, the same manuals. He simply had to act before they could finish their work. He had to move – maintaining movement and momentum, rather than regrouping. Moving quickly and decisively to seize advantage is included in Mahan's and Halleck's books, to be fair, but it is underemphasized. More emphasis is placed on consolidation and securing supply lines.

Columbus brought Grant into close contact with two of major advances since Napoleon that neither Mahan or Halleck had addressed – the steamboat and the railroad. Columbus was the northern terminus of the Mobile and Ohio Railroad and was on the Mississippi. Troops and supplies could move from Cairo to Columbus by steamboat and then be loaded onto railroad cars for movement South. Troops and freedmen who found their way to Columbus provided the labor. Fast forward through Shiloh and the siege of Corinth; Grant's star continues to rise. His target is now Vicksburg and he had new ways to move men and material.

One of the modern aspects of the Civil War was the military use of railroads. Napoleon had not had railroads either to use or to contend with. They did not figure at all in Mahan's work – he famously said nothing new could be learned about warfare after Napoleon. Halleck, who also wrote on tactics and strategy, was similarly silent on the subject. Halleck's nickname "Old Brains" originally a compliment to his wisdom at an early age became an acknowledgement that military engineering and what he referred to as the art and science of war had passed him by. One of the huge advantages the North had was an extensive rail system by 1860 which when combined with its rivers and canals allowed fairly rapid movement North of the Ohio. South of the Ohio there was much less mileage, but both sides quickly grasped the significance and incorporated the railroad into standard doctrine about strategic points. Columbus, KY was the northern terminus of the Mobile and Ohio Railroad, the major north-south line in the South. Corinth, Mississippi was the place where the Mobile and Ohio crossed (literally) with the Memphis and Charleston. Disrupting railroads was attractive to Confederate forces behind the lines and few were better at it than Nathan Bedford Forrest. In the words of long-time chief historian for the NPS Ed Bearrs, "Bedford Forrest could wreck a railroad." This ability of Forrest's was especially challenging for Grant because he counted on the railroad to bring him supplies and reinforcements that arrived in Columbus Kentucky by river for the Vicksburg campaign. In the course of my research in the Day Books for Columbus in the

¹⁰ Gott, *Where the South Lost the War*.

National Archives I came across a little known unit formed there whose assignment was to go out and fix damaged track and bridges. They appear to have had a locomotive and several flat cars and could respond quickly to keep men and supplies moving. Grant had frequent conflicts with the commanders at Columbus who rarely met his standard for efficiency. One after another they disappear from the records to an obscure assignment. But, the repair unit kept busy. I need to do more research on this.

Polk abandoned Columbus without a fight after the fall of Fort Donelson and related events. It was quickly converted to a major Union supply and troop transshipment point; Memphis has fallen. Union forces have taken New Orleans. Vicksburg remains blocking complete Union control of the Mississippi. Control of the Mississippi will cut off the trans-Mississippi Confederate states from the others. Grant must take Vicksburg. Vicksburg, however, poses a substantial challenge. Its bluffs are well above the river providing excellent positions for artillery. The river meanders and there are numerous tributaries and swamps making approach from almost any direction difficult. Vicksburg is a formidable challenge. John C. Pemberton (WP 1837) is in command, and he has prepared the city's defenses well.

Grant's tenacity had been tested at Shiloh. Many, if not most, would have withdrawn after the horrific first day, but he stayed and prevailed. Vicksburg not only tested that tenacity but called on Army engineers in new and challenging ways repeatedly. Plan A, a two-pronged attack led by Grant and Sherman beginning in late 1862, failed due to attenuated supply lines and Confederate cavalry attacks which forced Grant to withdraw to Memphis, leaving Sherman alone and ultimately unsuccessful. Crossing the river and advancing through bayou country, which involved extensive efforts to build canals to facilitate movement of men and materiel, was also unsuccessful. So, Grant scraps Plan B and immediately moves on to the next plan. To quote perhaps the leading scholar of the Vicksburg Campaign Terry Winschel, "In characteristic fashion and with grim determination, Grant ordered Major General John A. McClernand of the Thirteenth Corps to open a road from Milliken's Bend to New Carthage on the Mississippi River below Vicksburg. The movement began on March 31, 1863, and thus the Vicksburg Campaign began in earnest. As Grant's infantrymen slogged their way south through Louisiana, corduroying roads and building bridges each step of the way, the Union fleet commanded by Rear Admiral David Dixon Porter prepared to run by the batteries at Vicksburg."¹¹ Grant was bogged down, on Plan C at least, and his enemies in Washington and elsewhere were becoming more vocal. Sending McClernand ahead to engineer roads and bridges would speed things up. Speed had served him well at Fort Donelson.

In April Grant prepared for his next assault on Vicksburg. He moved his troops along the route McClernand had prepared on the west bank, while David Porter repositioned the

¹¹ <http://www.civilwar.org/battlefields/vicksburg/vicksburg-history-articles/vicksburgwinschelhg.html>

Union naval vessels by running the defenses of Vicksburg at night on April 6. All but one ship survived the gauntlet. A moonless night, all the lights on the boats out, but as soon as they reached Vicksburg bales of cotton along the bank were lit to illuminate the night's sky and silhouette the Union ships. Grant then made a forced crossing at Grand Gulf and he began his campaign to take Vicksburg from the South.

Rather than march north on Vicksburg, Grant directed his army in a northeasterly direction in order to cut the rail line that connected the Hill City with Jackson and cut the Confederate garrison off from supplies and reinforcements. In a seventeen-day period, which is often referred to as the blitzkrieg of the Vicksburg Campaign, Grant's army marched more than 200 miles, and overcame Confederate resistance in five battles. The first battle occurred at Port Gibson on May 1, the second at Raymond on May 12, and the third on May 14 when the Union army captured the capital of Mississippi. Not wishing to waste combat troops on occupation, Grant neutralized Jackson with the torch then turned west toward his objective — Vicksburg. En route from Jackson to Vicksburg, his force inflicted devastating casualties on the Confederate army commanded by Lieutenant General John C. Pemberton at the Battle of Champion Hill on May 16. On the following day, May 17, Grant soundly defeated Confederate forces in a battle at the Big Black River Bridge, hurling Pemberton's army into the defenses of Vicksburg.¹²

Two frontal assaults on the city's defenses failed with the loss of nearly 4,000 men — the beginning of the "Butcher Grant" theme — and Grant began a siege in late May. A siege is military engineering running all out but it also directly involves the civilian population.

As May slowly faded into June, Union soldiers began to dig approaches toward the Confederate line. Forming first zigzag trenches to frustrate enemy fire and then parallels, Grant moved up his infantry and artillery first to within 300 yards, then 200 yards, then 100 yards. The digging continued as Union soldiers worked their way up to the parapets of Vicksburg. Their object was to get as close as possible, then tunnel underneath the enemy works, hollow out rooms, fill them with black powder, and blow them up, hopefully destroying the fortifications of Vicksburg. Union soldiers excavated thirteen approaches at different points along the siege line; the most successful of which was known as "Logan's Approach." Situated along the Jackson road, Logan's Approach inched forward toward the Third Louisiana Redan. Excavating a sap (or trench if you will) that was seven feet deep and eight feet wide, Union fatigue parties reached the Third Louisiana Redan on June 23. They carved a gallery directly under the fort and made preparations for mining.¹³

¹² <http://www.civilwar.org/battlefields/vicksburg/vicksburg-history-articles/vicksburgwinshcelhg.html>

¹³ Ibid.

On July 3 Pemberton offered surrender and on July 4, 1863, Grant took Vicksburg. Persistence and skilled military engineering that was innovative and effective had succeeded in overcoming numerous obstacles and reverses. Grant did this based on his experience beginning with his response to Polk's seizure of Hickman and Columbus. He had redefined how war was to be fought. He shifted the emphasis to the overall objective, not the individual encounter. He emphasized speed over consolidation. He understood the importance of steamboats and especially railroads in creating a new environment and redefining strategic places. He took these lessons and new insights to Chattanooga and eventually to the eastern theater and victory.