

THE EFFECTS OF RAILROADS ON THE
EMERGENCE OF OPERATIONAL ART DURING THE
AMERICAN CIVIL WAR, 1861–1865

A Monograph

by

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ABSTRACT

THE EFFECTS OF RAILROADS ON THE EMERGENCE OF OPERATIONAL ART
DURING THE AMERICAN CIVIL WAR, 1861–1865, by LTC Michael C. Manner, 41 pages.

The American Civil War has been called the first modern war. Despite the multiple books on the subject and historical study dedicated to the Civil War, little has been written on the impact of the railroad on the emergence of operational art. Moreover, even less has been written about the management of the railroad itself being a contributing factor to the successful application of the railroad to support operational art. The general picture most historians have is that the railroads were a tool to be used to support operations. But without the proper management of the railroads they would not have been able to support the war effort. The Union was able to apply operational art to the use of railroads consistently throughout the war by doing two things. First, they put the management of the railroads under one supervisor and, secondly, they consistently paid the railroads for their services. Conversely, the Confederates never consolidated management of the railroads and did not consistently pay the railroads for their use, ultimately leading to their downfall. This monograph examines how both sides in the Civil War utilized railroads, how this affected the emergence of operational art, and how the proper management of the railroads supported the demands that the Army placed upon them.

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ACRONYMS

CARL	Combined Arms Research Library
CGSC	U.S. Army Command and General Staff College
NCRR	North Carolina Railroad
SAMS	School of Advanced Military Studies
USMRR	United States Military Rail Roads

INTRODUCTION

Many scholars have called the American Civil War (1861–1864) the first modern war.¹ A number of technologies converged and accelerated during the conflict. Among them were the ironclad, the submarine, the repeating rifle, spotting and observation balloons, the telegraph, and the hand grenade.² The railroad was another new technology that fundamentally altered the nature of warfare in terms of both logistical arrangements and targeting. At the beginning of the Civil War in 1861, the United States had roughly 30,000 miles of railroad track. At the end of the war in 1865, there were 35,000 miles of serviceable track in the United States. At first glance this fact seems to be insignificant but that 5,000 miles of new track set in place the conditions that would allow southern and western expansion of the railroads after the Civil War. Moreover, by 1870, the miles of track would jump to 53,000 miles due to the replacement, repair, and westward expansion of the railroad lines in the United States. The fact that a train could move 150 tons of supplies per load on average - over one hundred times what an animal-drawn wagon could move - was instrumental in being able to move passengers and large amounts of supplies over large distances. Trains on average also moved their goods and passengers up to five times faster than animal-drawn wagons. These capabilities meant that trains became a principal factor in nearly every strategy to the point where the use and control of railroads “became the strategy.”³ As

¹Michael Leavy, *Railroads of the Civil War* (Yardley, Pennsylvania: Westholme Publishing, 2010), 13; James J. Schneider, *Vulcan's Anvil: The American Civil War and the Foundations of Operational Art* (Novato, California: Presidio Press, 1992), 1; Brian Holden Reid, *America's Civil War: The Operational Battlefield 1861-1863* (New York: Prometheus Books, 2008), 20; J.F.C. Fuller, *War and Western Civilization, 1832-1932: A Study of War as a Political Instrument and the Expression of Mass Democracy* (London: Duckworth, 1932), 95.

²Michael Leavy, *Railroads of the Civil War* (Yardley, Pennsylvania: Westholme Publishing, 2010), 13.

³Ibid.

Michael Leavy argues, “[i]f the notion of this being the first modern war is accepted, railroads had a lot to do with it. They were a principal factor in nearly every strategy to the point where the use and control of railroads became the strategy.”⁴ Railroads were thus crucial elements in the employment and synchronization of forces in time, space, and purpose. The Civil War, therefore, was not only an example of modern war; it is also one of the earliest examples of operational art.

This monograph argues that the use of railroads during the Civil War is an early example of operational art. To successfully employ this technology, planners had to account for the new rates and distances since the troops and supplies could now move further. Simultaneously, the armies had to recognize that the railroads would become targets to both themselves and the enemy. Many authors and historians have written on the subject of the American Civil War and a few have focused on the operational use and the importance of management of the railroads during the conflict. In addition to Leavy, scholars such as William Thomas and Thomas Weber considered the significance of railroads during the Civil War but none tied their use to operational art. Robert Epstein tells us that the Civil War was fought with new technology and that the use of the railroad affected “strategic deployment, logistics, command, control, and intelligence”⁵ but never talks about their influence on the application of operational art. Of those who have addressed related issues, none has used the application of operational art to show how the use and targeting of the railroads influenced the outcome of the Civil War. No one, moreover, has addressed how both the North and the South used railroads in their operations and how they helped to influence the application of operational art. In his paper titled “Vulcan’s Anvil: The American Civil War and the Foundations of Operational Art,” James Schneider did more than

⁴Leavy, *Railroads of the Civil War*, 13.

⁵Robert M. Epstein, *Napoleon’s Last Victory* (Lawrence, Kansas: University Press of Kansas, 1994), 181.

any other author to tie the emergence of operational art through the distributed operation during the American Civil War.⁶ His thoughts on railroads and logistics are tied to the planning of operations. By drawing upon multiple sources, I will explain how railroads were utilized during the Civil War and show a linkage to the emergence of operational art as it relates to the use of railroads in military campaigns.

This study begins with a discussion of the railroads in America before the Civil War including the amount of track, the different gauges used, and issues of railroad management; all areas that were significant once the war started. In section two, the discussion turns to the Civil War itself, covering the necessary background information for the reader unfamiliar with the conduct of the war. In this section, I discuss the precursors of the Civil War and the following buildup of armies and military infrastructure. In section three, I focus specifically on the use of the Railroads during the Civil War. The discussion then shifts to the issue of the movement of supplies and people over rail in section four, as opposed to over land or water, as it was more efficient in terms of cost to move troops and supplies by rail than by wagon or boat. In section five, we then turn to the issue of expansion of the railroads during the War. The North focused on planning for long-term railroad use and expansion. The South, however, did not, an error that contributed to its defeat. In section six, I discuss government support and planning, focusing on the importance of two notable figures, Daniel C. McCallum and Herman Haupt, whom the United States Military Railroad hired to run the railroads of the North. The analysis then turns in section seven to the deliberate targeting of the rails and the impact of guerrilla attacks on the railroads. Finally, I offer my conclusion that the Union Army better utilized, for a military advantage, the railroads that existed in the North and then the South as they captured territory because they not

⁶ James J. Schneider, *Vulcan's Anvil: The American Civil War and the Foundations of Operational Art* (Fort Leavenworth, Kansas: Presidio Press, 1994), 20.

only identified early on the operational advantage of the railroads, but also the advantages of consolidated management and continued improvement. The Union Army was better at planning railroad usage to support their operations. This application of operational art through the use of railroads would be a recurring theme throughout the Civil War. The North's application of operational art as it pertained to the use of railroads might not have been the deciding factor of who would eventually win the American Civil War, but it was a major contributing factor to the North's victory.

THE AMERICAN CIVIL WAR, 1861 – 1865

The idea that the American Civil War was the first “modern war” is critical to understanding the emergence of operational art and the impact of the application of new technologies on planning. The use of railroads by both the Union Army and Confederate Army is a perfect example of an emerging technology being utilized as a tool for the application of operational art. This use of the railroads was a contributing factor in multiple battles and campaigns so much so that the use of the railroad was starting to become a vital part of the initial planning of operations.

The Beginning

On 20 December 1860, South Carolina seceded from the United States of America. The citizens of South Carolina felt that this action was the only one that would allow them to maintain an agricultural economy that was completely dependent on slave labor. A majority of people in South Carolina felt that the election of Abraham Lincoln in November of 1860 was a threat to this system and their livelihood. The people in South Carolina were not alone in this belief, so beginning in January 1861 and continuing through April of that same year, the states of Mississippi, Florida, Alabama, Georgia, Louisiana, and Texas all followed South Carolina in

seceding from the Union.⁷

Building the Army

In February 1861, former United States Secretary of War Jefferson Davis was elected as the first president of the Confederacy and “two days after Lincoln’s inauguration, Davis, with Confederate congressional authorization, called for 100,000 volunteers for 1 year’s military service.”⁸ This combined with the earlier seizure of all but four U.S. military installations in the South were the first steps in building a Confederate Army that would grow to 35,000 men by April 1861, an Army that was twice the size of the current forces in the United States Army.⁹ Then, on April 12, 1861, Confederate forces started the bombardment of Fort Sumter, Charleston, South Carolina. The attack continued for the next day and a half and ended with Major Robert Anderson surrendering the fort in the Charleston Harbor to the Confederates.¹⁰ After the battle, Major Anderson’s after action report stated:

“Having defended Fort Sumter for thirty-four hours, until the quarters were entirely burned, the main gates destroyed by fire, the gorge walls seriously impaired, the magazine surrounded by flames, and its door closed from the effects of the heat, four barrels and three cartridges of powder only being available, and no provisions remaining but pork, I accepted terms of evacuation offered by General Beauregard, being the same offered by him on the 11th instant, prior to the commencement of hostilities, and marched out of the fort Sunday afternoon, the 14th instant, with colors flying and drums beating, bringing away company and private property, and saluting my flag with fifty guns.”¹¹

⁷R. Ernest Dupuy and Trevor N. Dupuy., *The Encyclopedia of Military History: From 3500 B.C. to the Present* (New York: Harper and Row Publishers, 1977), 869.

⁸Dupuy and Dupuy, *The Encyclopedia of Military History: From 3500 B.C. to the Present*, 869.

⁹Ibid.

¹⁰W.A. Swanberge, *First Blood: The Story of Fort Sumter* (New York: Dorset Press, 1990), 312.

¹¹Ibid., 332.

Following the attack on Fort Sumter, President Lincoln called for 75,000 three-month volunteers¹² to build the Union Army with the goal of quickly suppressing the insurrection.

In the days following the surrender of Fort Sumter, four more states, Virginia, Arkansas, Tennessee, and North Carolina, seceded from the Union. The population of the 11 seceding states was around 9 million and of that population, 3.5 million were slaves. The 22 Northern states had a population around 22 million. This gave the North a relative ratio of 5 to 2 people in favor of the North.¹³

RAILROADS IN THE UNITED STATES PRIOR TO 1861

The birth of railroads in the United States came in 1827 when the city of Baltimore gambled on building a small railroad that would become the Baltimore & Ohio. When completed in 1853, the railroad connected the port city of Baltimore to the Ohio River 379 miles away.¹⁴ The Baltimore & Ohio railroad project is important because it was typical of railroad construction projects in the United States that began in the late 1820s and later surged in the 1850s.¹⁵ The efficiency and speed of shipping goods by rail was also slowly starting to reduce the use of shipping goods by steamboat and barges. Railroads were starting to change how manufacturers and farmers were shipping goods in the United States. For example, in 1820 the port of New Orleans was handling around 58 percent of all west-bound cargo compared to 23 percent in 1860. Merchants were starting to see not only the time saving benefits of shipping goods by rail but also

¹²Dupuy and Dupuy, *The Encyclopedia of Military History: From 3500 B.C. to the Present*, 869.

¹³Ibid.

¹⁴John E. Clark Jr., *Railroads in the Civil War: The Impact of Management on Victory and Defeat* (Baton Rouge, Louisiana: Louisiana State University Press, 2001), 7.

¹⁵Robert R. Hodges Jr., *American Civil War Railroad Tactics* (Oxford, England: Osprey Publishing, 2009), 5.

the monetary benefits. Even goods shipped only part way by rail could arrive up to thirty days faster than the cargo shipped by steamboat.¹⁶ The sheer size of the United States was helping to increase the need for railroads that could move goods and people in a timely manner. The country was quickly becoming too big to continue to rely on muscle power to move both goods and people from one place to another. In the ten years preceding the Civil War, the United States had been experiencing a relationship between the northern and southern states that some have compared to a “cold war.”¹⁷ This conflict was tied to the differences of social, cultural and economic ideas that were developing in the two parts of the country. In the North, the construction of the Railroads created a need for a workforce that was filled by mostly immigrants of military age; this influx shifted the proportion of fighting-age males in the North from 2.33 to 1 in 1820 to 3.31 to 1 in 1860, relative to the same population in the South.¹⁸

From a military standpoint, railroads are considered lines of communication and lines of supply. Their importance was based upon their ability to move troops, weapons, ammunition, and supplies (including food, fuel, medicine, equipment, etc.) from rear areas to forward positions that supported military operations. Additionally, they are used for quickly evacuating the wounded, removing furloughed soldiers, and transporting prisoners of war to rear areas (as well as surplus supplies and worn out equipment). Thomas Weber said that railroads act “like rivers,” and can serve as “avenues of invasion” into hostile territory.¹⁹ Juncture points are especially critical, as they can be used to establish a supply depot, to secure a line of communication, and

¹⁶Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 10.

¹⁷William G. Thomas, *The Iron Way* (New Haven: Yale University Press, 2011), 54.

¹⁸Ibid.

¹⁹Thomas Weber, *The Northern Railroads in the Civil War 1861-1865* (Bloomington: Indiana University Press, 1952), 25.

even to advance into enemy territory.²⁰ With such operational importance, railroads become critical military objectives.²¹

In 1860, twenty-five railroad companies on average each operated two hundred or more miles of track, with ten of these twenty-five railroad companies located in the South.²² In 1861, the United States had roughly 30,000 miles of railroad lines in six different gauges that moved people and goods around the country. Trains were now quickly becoming a part of how America was conducting commerce. Along the rail lines, small towns started to spring up due to the high demand for wood and water to fuel the trains, as the steam engines of the day consumed large amounts of both resources.

Railroad lines of different gauges are neither compatible nor connectible to each other. The gauge of the track is the inside distance measured between the rails. These gauges ranged from 4 feet 8.5-inches to 6 feet. Although some train cars had adjustable axles or wheels with a wider rim on the wheel to allow the car to operate on other gauges, both methods were unsafe and tended to cause accidents. Roughly one-third of the railroad lines in the United States were located in the South. The railroads of the United States were growing as fast as track could be laid down. At the beginning of 1861, civilian railroad leaders, predominantly from the Northern states, started to see how advantageous it would be to start joining existing lines. Thus, the implementation of a standard gauge would be necessary to achieving this goal.²³ So this idea of a standard or common gauge was just starting to gain a following before the war started and would

²⁰Ibid.

²¹Ibid.

²²Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 12.

²³Ibid.,18.

prevail through the war. As new rails were laid or as old or destroyed lines were replaced, the new standard gauge of 4 foot 8.5 inches was utilized as the standard whenever possible. This standard gauge would help railroads move goods further and faster without the need to transfer the load from one railroad to another as they moved to their final destination.

Railroad management was extremely important due to the vast distances that railroads covered. The success of the railroad organization was dependent on its management. As a rule, a general superintendent (most often an engineer) who served as the senior line officer with three managers reporting directly to him supervised the various railroad lines. First, there was a master of roads, who oversaw the maintenance of tracks, switches, bridges, railroad buildings, and water towers. Second, in charge of all the maintenance of train engines and train cars was a master of machinery who was also responsible for the running of the machine and maintenance shops. Finally, a master of transportation not only built the train schedules but also made sure that all passengers and cargo went to the correct destination in a timely manner. As the railroads grew, line management was further decentralized with these masters delegating duties to division superintendents who were responsible for managing one-hundred mile sections, which was perceived at the time as the “maximum control radius.”²⁴ Without this breakdown of managerial duties and the limit of distance for control, railroads could not have been successful in their business.

Railroads prior to the outbreak of the Civil War were expanding in the Northern states at a far faster rate than the railroads in the Southern states. This meant that there were more train engines, rolling stock, and rail lines that the Union Army could utilize as required to move the its soldiers and supplies. Railroads in America were quickly becoming a very lucrative business, so

²⁴Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 14.

they were managed and expanded accordingly.

Northern Railroads

At the start of the Civil War the North had about 21,000 miles of railroad lines that crisscrossed the upper United States. The railroads in the industrialized Northern states prior to the Civil War were used mainly for commercial purposes. Many of these lines were the same gauge, but because of private ownership, this did not always mean that the railroads connected. Therefore, cross loading of people and cargo was necessary when crossing from one railroad company to another. As discussed earlier, railroads were starting to move to a standard gauge but the change would take time, money, resources, and most importantly, a shared vision of what railroads would become in America. Operationally unconnected railroad lines were the cause for the delays of soldiers, equipment, and supplies as they waited to be cross loaded from one train to another. Sometimes this delay was compounded by having to wait for the other train to show up.²⁵ On occasion the trains that would show up had a different type or amount of cars, thus adding to the friction of transferring from one railroad to the other.²⁶

With an eye to the future, in July 1862 Congress signed the Pacific Railroad Act. The Act allowed for the construction of a railroad moving east from California and connecting to the 100th meridian at the western edge of Iowa.²⁷ Out West, the 5 foot (1.52 m) gauge was the common gauge in California. Large cities like San Francisco, Sacramento, and Lincoln wanted this gauge because its railroads were already built in this gauge. However, Congress sided with the rail companies of the northeast and declared that the standard gauge on the new Pacific

²⁵Ibid., 47.

²⁶Ibid.

²⁷John Westwood and Ian Wood, *The Historical Atlas of North American Railroads* (New York, New York: Chartwell Books, 2007), 106.

Railroad would be 4 ft. 8 in. (1.44m).²⁸ This congressional decision ended the gauge debate in the United States and established the standard gauge that would be used throughout the country and is still in use today. This one act would bring the necessary change to allow for the connecting of railroads as required without adjustment to rails or rolling stock. By doing this, it allowed for many more cities and railroad systems to connect railroad lines as they expanded.

The city of Philadelphia is a good example of the organization of a majority of the railroads in the cities. Three railroads surrounded the city and each one serviced a different section. However, none of the three tracks connected with each other so there was no way to move around the city, only through it and to do so would cause a cross load from one railroad to another.²⁹ These rail companies and the cities they serviced were in no hurry to construct new rail lines that to them seemed to benefit only the federal government's need for rapid wartime expansion. Therefore, when the U.S. Congress drafted a proposal to build its own railroad that would connect Washington, D.C. to New York, railroad companies started to realize that the government was serious about their desire to connect the North's major cities to support the needs of the Civil War. With the threat of government-owned and subsidized railroads becoming a reality, Northern railroads became more responsive to the government's needs. In 1863, the lines connecting the three railroads of Philadelphia to create a ring around the city were completed.³⁰

Southern Railroads

The Confederacy would be the first to construct a railroad in the United States that was purely military in nature. This would be a precursor of things to come, as both sides in this

²⁸Westwood and Wood, *The Historical Atlas of North American Railroads*, 106-108.

²⁹Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 47-48.

³⁰Ibid.

conflict would utilize railroads. A spur of five and a half miles off the Orange & Alexandria Railroad constructed over four months beginning in November of 1861 would become the Centreville Military Railroad. The new spur that connected Manassas Junction, Virginia to Centreville, Virginia, would see plenty of use during the Second Battle of Bull Run.³¹ When looking at the raw statistics, at the time of secession the South had one-third of the miles of track in the United States, “one-third of the freight cars, one-fifth of the locomotives, one-fifth of the railroad workers, one-eighth of rail production, one-tenth of the telegraph stations, and one-twenty-fourth of the total American locomotive production.”³² In contrast to the North, the South had approximately 9,000 miles of railroad lines that moved people and goods. At the outbreak of the war, Richmond, Virginia had no less than five railroad companies that brought trains into the city and not one of them connected with any of the others.³³ This was not uncommon in the South. This led to longer transit times for all materials that traveled through the urban areas or had to transit long distances. The constructed rail system in the South was comprised of small, short-run lines that connected farms to the shipping ports. Very few of these railroad lines connected the South’s cities to each other. Many of the existing railroad lines were not in the right locations or running in the right direction to support movement of troops or supplies by rail.³⁴

As one moved into the mid-south there were only three major railroad lines that connected the major cities of the South. The first ran from Memphis, Tennessee to New Orleans,

³¹Leavy, *Railroads of the Civil War*, 17.

³²Christopher R. Gabel, *Rails to Oblivion: The Decline of Confederate Railroads in the Civil War* (Fort Leavenworth, Kansas: U.S. Army Command and General Staff College Press), 1.

³³Robert R. Hodges Jr., *American Civil War Railroad Tactics* (Oxford, England: Osprey Publishing, 2009), 6.

³⁴Gabel, *Rails to Oblivion: The Decline of Confederate Railroads in the Civil War*, 4.

Louisiana the second was from Corinth, Mississippi to Mobile, Alabama and finally the most important was the line that ran from Chattanooga, Tennessee to Atlanta, Georgia, both of these cities were the major rail centers in the South.³⁵

RAILROADS DURING THE AMERICAN CIVIL WAR, 1861-1865

The Early Use of Railroads During the War, 1861-1862

At the beginning of the Civil War, both sides utilized what railroads they had at their disposal. However, it is imperative to understand that almost all of the railroads in the United States at that time were under private ownership. Prior planning and payment needed to be coordinated. Usage was at the discretion of the railroads' owners. No laws or provisions were in place to allow the military to commandeer or take control of the railroad for military use. Despite this early challenge, the relative ease with which both sides were able to move men and supplies was staggering, but one of the limiting factors was that supplies and men could only go where the trains had rails to take them. As a rule, trains could move cargo up to five times faster than animal-drawn wagons. This was not only faster but reduced the amount of resources needed to move that cargo.³⁶ This faster travel meant two major things. First, the cargo that trains carried had a better chance of getting to the battlefield faster and usually in better condition. Second, soldiers that rode on the trains arrived ready to fight vs. soldiers that had to foot-march to their destination.³⁷ At the start of the Civil War, the South had many short run railroads that although they were of different gauges, not connected, and limited haul capacity, could be used to support

³⁵Gordon L. Rottman, *The Great Locomotive Chase: The Andrews Raid 1862* (Oxford, England: Osprey Publishing, 2009), 7.

³⁶Christopher R. Gabel, *Railroad Generalship: Foundations of Civil War Strategy* (Fort Leavenworth, Kansas: U.S. Army Command and General Staff College Press), 3.

³⁷Gabel, *Railroad Generalship: Foundations of Civil War Strategy*, 3.

operations. It is believed that the Confederacy could have used these railroads for a short time to sustain and move its soldiers until the Union quit fighting. Nevertheless, in order for this strategy to work the South would have to plan how it would make up for its shortages of trained railroad men, railroad specific equipment, and the raw materials needed to repair and maintain the railroads.³⁸ Unfortunately, the South did not rise to the occasion. Its civilian managers and military planners did not use the railroads to their full advantage. They lacked the ability to think beyond their immediate needs and did not have the foresight to take control of the railroads and their management as their Northern counterparts had done with great success. President Davis and his cabinet never tried to consolidate the Southern railroads under one administrator and did not push for the establishment of priorities for the railroads, so the effective and efficient management of this critical resource was never realized.³⁹ This lack of support from the Davis administration to the Confederate military planners' request to put all the South's railroads under control of one manager would come back to haunt them on multiple occasions throughout the war.

Use of the Railroads, 1863-1865

As the war continued, the Union Army planners could plan to use, almost at will, any railroad they needed whereas their Southern counterparts had little opportunity to do the same because of limited serviceable lines, the shortage of rolling stock, the location of lines, and the lack of support from their Southern railroad managers. Both sides were now either building or modifying train locomotives with armor plating and building specialized front- and rear-armored artillery cars. Both sides were also starting to utilize infantry escorts to deter attacks and help

³⁸Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 19.

³⁹Ibid., 21.

defend the trains themselves. However, trains were not the only things targeted as a way to stem the flow of men and materials along the rails. As the destruction of railroad line infrastructure became more common, bridges also became a common and lucrative target. The railroads began to employ measures to allow faster repair times. One innovation by Northern bridge engineers was the prefabrication of bridge trusses. Workers saved time at the bridge repair site by building these bridge sections beforehand and moving the sections by rail to the replacement location. This allowed military planners to gauge how long a repair would take based on how many bridge sections needed replacement. In addition, in response to the attacks on bridges, some critical bridges were fortified. As an example, the L & N railroad had bridges that looked more like frontier forts than bridges and had small garrisons to match; these attacks on bridges caused the Union Army to commit both men and resources to ensure the bridges' serviceability.

By now, the railroad's use by both the Union and Confederate Armies had changed to not only troop and supply movement but also the conduct of evacuating casualties, moving prisoners of war, and moving reinforcements to support continuous operations. The railroads were allowing the Union commanders to plan campaigns that would cause "destruction throughout the strategic depth of the enemy."⁴⁰ This would prove to be the railroad's major contribution to the birth of operational art.

MANAGEMENT OF THE RAILROADS

President Lincoln understood what it took to run a railroad. During his time as an attorney, he was afforded a firsthand look at how a railroad was run over the years when he represented five of the railroad companies in Illinois.⁴¹ This experience in dealing with railroads

⁴⁰James J. Schneider, *Vulcan's Anvil: The American Civil War and the Foundations of Operational art* (Novato, California: Presidio Press, 1992), 61.

⁴¹Webb Garrison, *The Lincoln No One Knows: The Mysterious Man Who Ran the Civil*

and how they were managed would pay him dividends when dealing with the Northern railroad companies. The War Department, with President Lincoln's support, established the United States Military Rail Roads in January of 1862, a new agency that would change how the Union Army interfaced with the men that ran the railroads of the North.⁴² This new agency had military authority over the railroads and the telegraph network that was alongside the rails. In the North, railroads sometimes received payment for their services whether they provided a service or not. By doing so, owners were able to maintain a constant influx of capital that they in turn used to improve lines and trains as required to meet the demands placed on them. In addition, the Northern railroads had well over twenty times the amount of rail cars, or rolling stock that the southern railroads had at their disposal (451,000 rail cars vs. the South's 19,000).⁴³ This disparity of resources created a more planner-friendly environment that allowed Union Army planners the flexibility to not only utilize the railroads but gave them the luxury of being able to plan and forecast for the use of the railroads to move both men and supplies as required.

The North had leaders that focused on efficient management of the line's rolling stock and management of the railroads. Daniel C. McCallum took the job of General Manager of the United States Military Railroads in February 1862.⁴⁴ He hired Lewis Baldwin Parsons to act as captain of the railroad system. Parsons discovered many areas of waste and abuse and worked to organize a system that would benefit the railroad but also save the government money. There were several examples of railroad abuse or inefficiencies. First, any government officer could issue a railroad voucher. This led to unauthorized passengers traveling at the expense of the

War (Nashville, Tennessee: Rutledge Hill Press, 1993), 45.

⁴²Leavy, *Railroads of the Civil War*, 14.

⁴³Rottman, *The Great Locomotive Chase: the Andrews Raid 1862*, 7.

⁴⁴Weber, *The Northern Railroads in the Civil War 1861-1865*, 38.

United States Government. Because the conductors and ticket agents had no way of knowing which vouchers were valid and which ones were not, they were forced to honor all vouchers that were collected costing the government a considerable amount of money.⁴⁵ Second, tickets for soldiers or other official travellers were usually bought in blocks as both individual and group tickets. Extra tickets would go unused or given away to unauthorized users. This resulted in still more unnecessary expense to the government. Third, when soldiers traveled, the railroad received payment for the trip in accordance with the original plan. If the soldiers' mission changed and they got off the train early, the government still paid for the original trip.⁴⁶ These unregulated systems and poor practices were costing the government unnecessary expense that was adding up to large sums of money that could be put to better use. Mr. Parsons put systems in place that ensured that the government only paid for actual numbers of soldiers moved over actual miles.

Movement of Citizens vs. Soldiers and War Supplies

The railroads in the North received payment for their services as performed so the railroad companies had a steady flow of income and, in most cases; improvement went hand in hand with government use. This was not always the case, however. Initially, the Northern railroads resisted coming to the aid of the Union. At first, the railroad companies did not understand their role because the Union Army was not utilizing the railroads as a common practice. At the beginning of the Civil War, as the Union Army started to use the railroads, the rail companies were worried about reimbursement, so supporting the war was not always their first priority. As a result, the Railways and Telegraph Act was passed on January 31, 1862. This

⁴⁵Ibid., 39–40.

⁴⁶Ibid., 40.

formally authorized “Union forces to commandeer any railroad necessary to support military operations.”⁴⁷ After this act was passed, the Northern railroads worked with the Union Army rather than run the risk of having the government outright take over control of their lines and rolling stock. The North had taken the first steps in ensuring that they would have the control of the railroads necessary to be able to count on a fast and efficient way to move men and equipment as needed to support operations.

In contrast, in the South the daily upkeep of the rails was lacking and the everyday usage without the normal necessary maintenance was starting to become a factor in the serviceability of the rails. Before the war started, the railroads of the South were just barely meeting the demands placed upon them. Because of over use, improper construction, and poor quality materials, the South’s railroads were in poor condition.⁴⁸ The South also did not have access to railroad supplies or enough of the skilled labor necessary to make repairs as quickly as required to maintain the operational tempo needed to support operations. In 1861, eighty percent of all the United States factories and heavy industry was located in the North and this advantage only increased the North’s advantage as the war went on. As Northern factories stopped shipping goods south and the Union Naval blockade of the South prevented the importing of foreign made goods, the South was not able to maintain the railroads at the same level as they had before the war.⁴⁹ Another issue with the decentralized control of the South’s railroads was the limited understanding of the actions of individual commanders by holding resources for themselves or not returning trains in a timely manner. These actions would desynchronize already resource-limited plans and time lines and caused the disorganization of railroad traffic up and down the rail

⁴⁷Westwood and Wood, *The Historical Atlas of North American Railroads*, 92.

⁴⁸Leavy, *Railroads of the Civil War*, 16.

⁴⁹Westwood and Wood, *The Historical Atlas of North American Railroads*, 87.

line for days at a time.⁵⁰

Movement of Supplies

“The railroads’ high speed introduced time as a factor in business. Passenger trains between Cincinnati and St. Louis took sixteen hours, and freight trains thirty, compared with seventy hours by steamboat. Cincinnati to Pittsburgh took fifteen hours by rail, three days by river. When the Boston & Lowell extended its tracks to Concord, New Hampshire, in 1842, it reduced travel time from five days north and four days south via canals and the Merrimack River to four hours each way.”⁵¹

Trains in the North were capable of moving as much as 150 tons of supplies per trainload. This ability of the North to move large quantities of supplies over large distances twenty-four hours a day made it possible to sustain the large Union Armies as they pushed their way into the southern states. On average, the railroads could move goods and passengers up to five times faster than animal-drawn wagons, and the train could haul about one hundred times the tonnage a wagon could. The efficiency of the railroads compared to animal-drawn wagons was incredible. The most that a wagon could move was about 15,000 tons per year on average compared to a train that in the same year could move up to 3.5 million tons.⁵² “General Sherman’s campaign of 1864 fielded 100,000 men and 35,000 animals whose supplies were all shipped by rail from Louisville to Atlanta. Sherman estimated that the single railroad track did the work of 220,000 mules and 36,800 wagons.”⁵³ When considering the advantages of trains vs. animal-drawn wagons, the simple fact is that when a train arrives at its destination the animals still needed to be cared for whether they are working or not unlike the train that only needed to

⁵⁰Ibid., 88.

⁵¹Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 8.

⁵²Ibid.

⁵³Westwood and Wood, *The Historical Atlas of North American Railroads*, 91–92.

consume fuel when it was operational.

EXPANSION OF THE RAILROADS DURING THE CIVIL WAR

During the Civil War, the expansion of the railroads both in the North and the South was dependent on four major factors: management, labor force, capital, and need. The most important factor was also the one with the most difference in approach and application from North to South. It came down to who managed the railroads. The individuals who ran military railroads in the North were railroad men hired by the government because they had the experience and skills required that the military did not. These men had the authority to conduct rail operations in support of military operations as they saw fit.⁵⁴ However, in the South the opposite was true. The Confederate Army did not have any authority over the railroads and no one person or agency had any authority or management over the South's railroads. Therefore, each Southern railroad company continued to operate as an independent organization that had no vision of a shared goal. The men who were managing the North's railroads planned for the future expansion of the railroad system, while in the South they did not. Some of the prominent southern railroads realized that the growth of the railroads could only help their businesses grow. It was difficult for them when they encountered resistance to that growth from their own regional leaders. Confederate leaders resisted as well; leaving the South with fewer and fewer resources.⁵⁵ As the war progressed and lasted longer than was expected, the South opted against the idea of consolidation of resources that would have generated more trains that could have been used in support of Confederate forces.⁵⁶

⁵⁴Gabel, *Rails to Oblivion: The Decline of Confederate Railroads in the Civil War*, 7.

⁵⁵Leavy, *Railroads of the Civil War*, 139–140.

⁵⁶Ibid.

At the beginning of the war, Union General William Tecumseh Sherman recognized that crucial to the North's victory was that as the Union Army pushed into the South it needed to not only control rail lines but also maintain the ability to extend existing rail lines so his Army could use the trains to sustain his maneuver.⁵⁷ While General Sherman saw the need for railroad expansion, the South, while making some attempts at building railroads, after 1862 lacked the funding and foresight for railroad expansion in the South.⁵⁸

The North already had a better network of railroads that although connected also continued to expand throughout the war.⁵⁹ At the beginning of 1860 the railroads of the North had 21,276 miles of track and at the end of the war in 1865, they had 25,372 miles - a difference of over 4,000 miles.⁶⁰ A few of the expanded lines were the Ohio and Mississippi Railroad connected to the Erie Railroad, the New York Railroad connected to the Erie Railroad, and a line connected from Youngstown to Cleveland.⁶¹

GOVERNMENT SUPPORT AND PLANNING

The most important factor in the successful utilization of the railroads during the Civil War was the management of their use. Whereas multiple owners continued to manage the Southern railroads, the Northern railroads fell under military management while still being owned privately. The difference was that the North made it lucrative for the railroads to cooperate with the military. The United States Military Railroad (USMRR) ensured the railroads received

⁵⁷Thomas, *The Iron Way*, 75–76.

⁵⁸Westwood and Wood, *The Historical Atlas of North American Railroads*, 97–99.

⁵⁹*Ibid.*, 99.

⁶⁰Weber, *The Northern Railroads in the Civil War 1861–1865*, 15.

⁶¹Weber, *The Northern Railroads in the Civil War 1861–1865*, 15–17.

adequate payment for their services of moving soldiers and equipment. Payment would prove to be the biggest factor in the South where railroads were not always interested in cooperating with the Confederate Army because of continuous issues with payment for services. The Union Army's outstanding support from the Railroad Companies of the North was because of three major factors. First and foremost, it paid the rail company's competitive rates for all services performed. Second, the government left the control and management of the northern railroads in the hands of the civilian managers that already ran the railroad. And lastly, the United States Government passed a law that gave the military the authority to take control of any railroad that it needed to conduct operations as needed in a time of emergency. These three factors would ensure a fair and equitable relationship between the Railroad companies of the North and the Union Army that lasted throughout the Civil War.⁶²

The North selected Daniel C. McCallum as the director of the USMRR; his credentials and reputation as a pioneer in the field of running and organizing railroads was unsurpassed.⁶³ Daniel C. McCallum was a pivotal figure in the job of General Manager of the United States Military Railroads. He recognized the necessity of turning the railroads into the best possible system of support for the war effort. Under his guidance, "a total of 1,201 miles of railroad were at one time or another operated as military railroads in the states of Kentucky, Tennessee, Georgia, Alabama, Mississippi, Arkansas, and Missouri. The figure was almost exactly double the 611 miles of railroad operated in Virginia, and more than four times the 293 miles operated in North Carolina."⁶⁴

⁶²Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 72.

⁶³Gabel, *Rails to Oblivion: The Decline of Confederate Railroads in the Civil War*, 7.

⁶⁴Weber, *The Northern Railroads in the Civil War 1861–1865*, 206.

Herman Haupt worked alongside Mr. McCallum in running the United States Military Railroad. His shared vision with Mr. McCallum of how the railroads needed to support military operations was paramount in shaping the use of the railroads. Mr. Haupt had three rules that he insisted be followed to the letter by his subordinates to ensure smooth operation of the Military Railroads as they supported operations:

1. Not to allow supplies to be forwarded to the advanced terminus until they are actually required, and only in such quantities as can be promptly removed.
2. To insist on prompt unloading and return of cars.
3. To permit no delays of trains beyond the time fixed for starting, but when necessary and practicable, to furnish extras, if the proper accommodation of business required it.⁶⁵

The crucial function in running the military railroad efficiently was to ensure that the management was picked from the best qualified people possible. When asked how to ensure that the railroads would be dependable, Mr. Haupt asserted bluntly, “[a] single track road in good order and properly equipped may supply an army of 200,000 men, when, if these conditions (three rules) were not complied with, the same road would not support 30,000.”⁶⁶ He determined by study of supply requests that the quartermasters were wasting supplies. The main problem was that units ordered too many supplies, unloaded them without any urgency, and then when unable to move them were quick to abandon the supplies when the Union Army was forced to withdraw. Mr. Haupt imposed his three rules as standard operating procedure. This ensured that his trains would not be delayed and his timetables would be adhered to so trains would not be

⁶⁵Leavy, *Railroads of the Civil War*, 53.

⁶⁶Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 64.

delayed. His controls also ensured that the Quartermasters ordered only the supplies needed and in the quantities required so that units could manage them once offloaded. This control ensured that none of the supplies were wasted, stock piled, or worse yet, abandoned. This allowed units to empty the supplies off the train in a timely manner to ensure the quick return of all empty rail cars for prompt use by other units.⁶⁷ The leaders of the Confederacy stumbled when they ran into problems and did not have the ability to make things up as they went. President Davis and his staff ignored the need for control and made many mistakes in how they reacted to the problems that arose. Ultimately, the Southern government did not plan how to use its limited supplies to their best advantage and wasted its war effort.⁶⁸

Initially, Southern railroads carried Confederate soldiers for free. They realized they could not sustain this benefit and “reached an agreement that called for the government to pay the railroads two cents per man per mile for troops, with a sliding schedule for freight. These rates, unfortunately, covered less than half of Southern railroads’ prewar operating costs.”⁶⁹ Poor payment for services caused dissension between the railroads and the Confederate government. The railroads did not have much incentive to cooperate fully with the government.⁷⁰ The Confederate government did pass a law giving them the right to take control of the southern railroads during military emergencies; however, they never exercised that right. Because the Confederate government did not pay the railroads the fair market rates or did not pay at all they were vulnerable to financial hardship as a measure to protect the railroads. Sometimes this meant

⁶⁷Ibid.

⁶⁸Ibid., 21.

⁶⁹Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 39.

⁷⁰Ibid., 40.

not putting the support of the war first. This practice made it difficult for the Confederate Army to plan on their support of the war effort.⁷¹

Connecting Lines and Cities

One example that illustrates the Confederacy's poor attempts at upgrading its railroad services was the connection between Danville, Virginia and Greensboro, North Carolina. It was a forty-mile link that the North Carolina Railroad (NCRR) insisted that the government build with the same gauge track as the NCRR's, but they wouldn't allow it to actually join with their tracks. Because the tracks in Virginia were of a different gauge, all cargo had to be removed from one train and put on another at both ends of the track.⁷² Problems like these caused many timely delays. The ability to connect the tracks would have aided in the ability to move men and supplies quickly, it also would have allowed trains to surge from one area to another as needed.⁷³

Keeping the Railroads Running

It took a large number of men to keep the railroads going during the war. An average train with 100 tons of goods needed approximately five to seven men to run it. The positions were: an engineer, a fireman, a conductor, and several brakemen. Railroads also needed men for track maintenance, station agents, telegraph operators, switch-men, craftsmen, laborers, and accountants.⁷⁴ With all of the men needed to keep the railroad running well, both the North and the South needed to ensure that they kept those positions filled.

⁷¹Ibid., 73.

⁷²Ibid., 45.

⁷³Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 46.

⁷⁴Gabel, *Rails to Oblivion: The Decline of Confederate Railroads in the Civil War*, 19.

The South lost many skilled men to the Confederate Army. In their place, the railroads used black men and slave labor to fill that need for workers.⁷⁵ Even with the use of black men and slave labor, the South still did not have enough men for all the work necessary to keep the railroads running efficiently. Slave owners were also reluctant to allow their slaves to work on the railroads because it was an opportunity to escape to the North.⁷⁶ The North, however, had no real shortage of manpower because of the overwhelming difference in population almost two and a half times that of the Southern states.⁷⁷ This does not mean that they did not have their issues with having enough men to work the railroads. They handled it differently. The Conscription Act of July 1863 established that telegraph operators and railroad engineers could not be drafted.⁷⁸ Railroad managers begged to have all of their employees released from military service because of their expertise. However, the General Order 99, Draft Regulations of August 9, 1863, released just railroad engineers.⁷⁹ This type of forward thinking allowed the railroads to keep at least some of their skilled men to ensure that the railroads ran smoothly.

Besides the men needed to run the railroads, the railroads also needed large quantities of wood and water. The North ran trains on both wood and coal. This flexibility helped to keep trains running.⁸⁰ This gave them a distinct advantage over the South in their ability to keep the railroads running efficiently. The North depended on “watering stations” that were established

⁷⁵Hodges, *American Civil War Railroad Tactics*, 38–39.

⁷⁶Gabel, *Rails to Oblivion: The Decline of Confederate Railroads in the Civil War*, 19.

⁷⁷Hodges, *American Civil War Railroad Tactics*, 38.

⁷⁸Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 57.

⁷⁹*Ibid.*

⁸⁰Hodges, *American Civil War Railroad Tactics*, 40.

along the routes.

The railroads also required good quality maintenance. Both the North and South had problems with this issue. Rail was made from soft iron and required maintenance to remain usable.⁸¹ The railroads in the North began using steel since it was stronger and more durable.⁸² Unfortunately, due to limited iron availability, the South was unable to do the same. The South only had approximately ten rolling mills to produce and fabricate iron in 1861, which was sufficient for peace-time production. However, they had limited ability to create replacement parts for war-time production. They also occasionally destroyed a rolling mill to keep the Union from using it.⁸³ In 1863 the South had so few replacement parts that they had over fifty trains that could not be used due to maintenance issues.⁸⁴ Railroad performance decreased as maintenance declined. As maintenance declined, speeds went down thus requiring more runs to ensure that all needed tonnage was moved.⁸⁵ The railroads of the South were unable to maintain any real dependable support after 1863.

TARGETING OF RAILROADS

In a letter to President Lincoln, George B. McClellan discussed his approach for fighting the war. He discussed how the railroads presented a different but also significant facet of war. Railroads, “introduced a new and very important element into war, by the great facilities thus

⁸¹Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 48.

⁸²Ibid., 49.

⁸³Leavy, *Railroads of the Civil War*, 140–141.

⁸⁴Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 50.

⁸⁵Gabel, *Rails to Oblivion: The Decline of Confederate Railroads in the Civil War*, 16.

given for concentrating at particular positions large masses of troops from remote locations, and by creating new strategic points and lines of operations.”⁸⁶ McClellan created a blueprint to fight the war and win. Several locations McClellan considered as the “enemy’s points of concentration” were Savannah, Charleston, Mobile, Pensacola, Montgomery, New Orleans, and even Tampico, Mexico.⁸⁷ President Lincoln agreed to an extent. He created a plan that used Confederate railroads to go further into their territory. He wanted McClellan to “attack directly south into Virginia and to control the Orange and Alexandria Railroad and the Richmond, Fredericksburg, & Potomac Railroad.”⁸⁸ The president thought that if the Union controlled those railroads, it would cut off the Confederacy and reduce their area of operation.⁸⁹

Two other Union leaders that targeted the Confederate railroads were General Sherman and Herman Haupt, a director of the United States Military Railroad (USMRR). According to General Slocum, Sherman’s army had a three-step plan for destroying railroads. Sherman’s thousand men would break into three sections to destroy up to five miles of track a day.⁹⁰ Section #1 entailed loosening the ties from the track. Section #2 involved moved the ties into piles and burning them to heat them up. Section #3 culminated the destruction of the ties by bending and twisting them into a circular shape. These were nicknamed “Sherman’s Bow Ties.”⁹¹ General Sherman was probably the most productive when it came to destroying Confederate railroad track and bridges.

⁸⁶Thomas, *The Iron Way*, 77.

⁸⁷Ibid.

⁸⁸Ibid., 90.

⁸⁹Ibid.

⁹⁰Weber, *The Northern Railroads in the Civil War 1861-1865*, 210.

⁹¹Westwood and Wood, *The Historical Atlas of North American Railroads*, 97.

Not to be outdone, Herman Haupt had his own highly effective techniques for destroying the enemy's railroads. He created an instruction booklet with precise directions and pictures that showed how to put a track out of commission quickly.⁹² Haupt had to improvise when it came to the tools he used since many tools were too heavy to carry. He created special tools for pulling up rails and blowing up bridges.⁹³ "For disabling locomotives, Haupt patiently considered recommendations but as far as he was concerned nothing worked better than a cannon ball through the boiler. As for wrecking rolling stock, fire was the way to go. Haupt figured his elite cavalry had, by war's end, destroyed over 400 cars."⁹⁴

In the first few months after Virginia seceded in 1861, the extensive destruction of the Confederate railroad network shocked and surprised them. One railroad line from Petersburg, Virginia, attempted to take apart their railroad and bridges in order to keep it out of enemy hands but also to be able to recreate it for later use.⁹⁵ "But the Confederate military intervened, took over the operation, and immediately destroyed the bridge and several miles of railroad. The self-inflicted wrecking was only the beginning, a foretaste of what would eventually come to characterize the Confederate defensive strategies."⁹⁶ This is a prime example of how little the Confederate military thought ahead. Instead of saving the rails and bridgework for future use, they destroyed it all so nobody could use it. While it hindered the Union, it also hindered themselves.

The Confederates showed other signs of shortsightedness in railroad planning by seizing

⁹²Leavy, *Railroads of the Civil War*, 56.

⁹³Ibid.

⁹⁴Ibid.

⁹⁵Thomas, *The Iron Way*, 70.

⁹⁶Ibid.

recently laid track and the trains that rode it. The reallocation of rolling stock and railroad supplies was also an issue that was contentious with Southern railroad companies.⁹⁷ In November 1862, just five years after its creation and one year after it had finished its forty-five mile route between Pensacola and Montgomery, the Alabama and Florida had all of its rails dismantled and moved to the Mobile and Great Northern Railroad.⁹⁸ Another railroad suffered the same fate. The Pensacola and Mobile had five miles of track in 1861 but lost it all, including their machinery, to the war the effort.⁹⁹ “Expecting to fight large decisive battles, Confederate leaders such as General Joseph Johnston, who was defending Atlanta, seemed willing to give up their railroads when necessary.”¹⁰⁰ However, this continued dismantling of the network they needed to fight the war only hindered their war effort repeatedly. They were defeating themselves.

The Andrews Raid

Arguably the most famous Civil War raid was the Andrews Raid, sometimes referred to as the Great Locomotive Chase. In Big Shanty, Georgia on April 12, 1862, Union soldiers boarded the “General”, a Southern locomotive at a water stop, and without a fight captured it. The soldiers then at high speed started a push to Chattanooga along the Western & Atlantic Railroad, wreaking havoc along the way by destroying railroad and telegraph infrastructure along their path. The now-captured “General” was being pursued by the Texas and other Southern locomotives that eventually caught up with the raiders. The fate of the raiders was swift, with a quick trial that resulted in some of the raiders being hung. Eventually a total of eight raiders

⁹⁷Ibid., 70–71.

⁹⁸Ibid.

⁹⁹Ibid.

¹⁰⁰Thomas, *The Iron Way*, 151–152.

escaped and returned to Union lines. All the raiders that survived the ordeal were awarded the country's first Medals of Honor.¹⁰¹

James Andrews, known as a “scout,” saw that burned bridges on the rail line kept trains from arriving at their destination in Chattanooga for almost a week.¹⁰² He went to Brigadier General Ormsby M. Mitchel with the idea to raid the Western & Atlantic Railroad. His idea was to take a group of twenty-four men and gain access to the Confederate railway. He suggested that they dress as civilians to make the trek through the enemy's region to Marietta, a small town north of Atlanta. Once there they would steal a train and ride it to Big Shanty, Georgia.¹⁰³ The plan was for the raiders to steal the train as it stopped for breakfast and then a short way down the line stop and cut the telegraph line and damage the track to slow anyone that pursued them.¹⁰⁴

When the actual raid took place, it was not without its problems. The chosen soldiers had to travel in small groups to avoid unwanted attention. They also had to use cover stories so that the locals would not be suspicious of them as they traveled to Marietta. Once they all arrived in Marietta, they bought rail tickets for different destinations the next day. Unfortunately, Cpl Martin Hawkins and Pvt John Porter did not tip the hotel clerk where they stayed for the night and because of this, the clerk did not wake them to catch their train.¹⁰⁵ Hawkins was the engineer and because he missed the train, he failed in the most important part of the mission. Even though key personnel were missing, Andrews did not abort the rest of the mission. Pvt Wilson Brown stepped in and took over the duties of the missing engineer. They stole the locomotive and

¹⁰¹Leavy, *Railroads of the Civil War*, 80.

¹⁰²Rottman, *The Great Locomotive Chase: The Andrews Raid 1862*, 11.

¹⁰³Ibid., 15.

¹⁰⁴Ibid., 15–17.

¹⁰⁵Ibid., 26.

continued down the track, stopping to cut telegraph wire and remove rail. Unfortunately, they eventually caught and hung most of the raiders. Although the raid itself did not do much physical damage and only caused minor delays and had no major impact on military operations, it did show that a few raiders could flow behind enemy lines without any external support and conduct operations that could target the railroads to support larger operations and campaigns.¹⁰⁶

Attacking the Railroads

“By 1864, the Confederates realized the importance of railroads and they continuously attempted to knock them out of operation.”¹⁰⁷ General John B. Hood was one of the more notable Confederate figures that destroyed many railroad tracks and bridges. He destroyed over 76 miles of railroad track and more than 1,200 feet of bridges. From November through December 1864, General Hood’s Tennessee campaign was responsible for the destruction of all of the bridges from Nashville, Tennessee south to Decatur, Georgia.¹⁰⁸ This act of sabotage demonstrates how the railroad infrastructure was critical to the application of operational art, as this act slowed the resupply of Union forces as they were forced to repair these bridges in order to continue the resupply of the Army.

“The Confederacy conducted many bold railroad operations; most notably raids that interrupted enemy advances through wholesale destruction of track and equipment...Stonewall Jackson’s operations against the Baltimore and Ohio shut much of that railroad down for almost a year. A carefully placed horseshoe on a rail would send a train spilling down an embankment.”¹⁰⁹

¹⁰⁶Ibid., 59.

¹⁰⁷Weber, *The Northern Railroads in the Civil War 1861-1865*, 203.

¹⁰⁸Ibid., 205.

¹⁰⁹Leavy, *Railroads of the Civil War*, 17.

The Confederate Congress in an attempt to legitimize and legalize the bands of partisans already operating against Union forces passed the Partisan Ranger Act of 1862. The act gave President Davis the authority to commission officers to allow the recruitment of partisan units. Even though they acted independently, these partisan units were still expected to follow the same regulations as soldiers in regular Army units, and they received the same pay. The difference was that a partisan unit was able to raise funds by selling any captured equipment to the Confederate Government.¹¹⁰

The significance of this act was that it created an environment that allowed the Confederate government to legitimize ununiformed guerrilla forces as legitimate soldiers. The problem was that many of these units did more harm than good, and because their attacks were not always synchronized with the Confederate Army's operations or long-term objectives, they caused unnecessary friction and issues. A successful raider tactic employed on both sides to slow or render a railroad unusable was the damaging or destruction of bridges in enemy territory. A way of doing this was the burning of bridges in rough terrain because the bridges of the period were constructed primarily of wood. The hard part was getting a fire big enough and hot enough to burn on its own – which took quite a bit of time – without someone noticing and putting it out before causing substantial damage to the bridge. As the war went on and as new bridges were built and damaged ones replaced, the wood used was usually green fresh cut wood, thus adding to the complexity of lightly armed raiders burning bridges. Another tactic that was employed was the use of explosives to destroy or damage bridges. This was also logistically challenging for the raider force but carried out with success by both sides during the war. A drawback to the damaging of bridges by any means was that sometimes the same army that damaged the bridge might later seek to use it for their own purposes, necessitating its repair or reconstruction. An

¹¹⁰McLachlan, *American Civil War Guerilla Tactics*, 11.

understanding of the overall campaign plan was needed before raiders were sent out against these targets or whole Armies would be stalled by the acts of a few well-intentioned raiders.

CIVIL WAR CAMPAIGNS THAT USED RAILROADS TO SUPPORT OPERATIONS

When one looks at the application of operational art during the Civil War one cannot easily separate the use of railroads during the execution of the campaigns from the eventual outcome of the campaign. Understanding that almost all the major battles that occurred east of the Mississippi River occurred no more than twenty miles from a railroad line is critical to understanding how railroads were used during the conflict.¹¹¹ In a majority of cases, the successful use of the railroad had a direct effect on the outcome of the campaign. Three different campaigns serve as good examples of the application of operational art and the use of railroads to support operations that were instrumental in the success of the campaign. The first is Longstreet's 1863 campaign that ended with only half of his force at the battle of Chickamauga. The second is General Grant's 1864 campaign that ended with his capture of Petersburg. The third is General Sherman's Atlanta Campaign from May to September 1864, which moved an Army parallel to the railroad that would supply them. An analysis of these three campaigns shows the effects that a well-managed and maintained railroad can have on a campaign.

The Longstreet Movement

General James Longstreet was trying to take a division into northwest Georgia to reinforce General Bragg's position at Chattanooga.¹¹² The movement needed to be coordinated with efficiency and speed. And once again, the South failed to be able to manage this task.

¹¹¹Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 5.

¹¹²Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 83.

Quartermaster General Alexander R. Lawton and chief of the Confederate Railroad Bureau, Major Frederick W. Sims, were in charge of coordinating the movement using the railroad. The act of planning a campaign that was centered around the use of a railroad was complex and labor-intensive and with the limitations put on the Southern planners it was harder yet. Without the authority to take control of the railroad, the Longstreet campaign was at the mercy of the railroads, and as a result planners were forced to all but beg the railroads for their support (with little success).¹¹³ Because the planners had not given the railroads all the necessary information, the support they did receive was disjointed and haphazard.¹¹⁴ The confusion related to the lack of information resulted in troops wasting many hours waiting for available trains. General Longstreet's progress was dependent on the railroad and how many men and supplies it could move with its limited rolling stock.¹¹⁵ As a result only half of his forces made the 950-mile journey in time to be of any help at the Battle of Chickamauga. This example shows how critical the ability to maintain and control the railroads was to the military if they were to be employed to support maneuver forces.

General Grant's 1864 Campaign

In General Grant's 1864 campaign, the application of operational art was demonstrated by the continuous use of the railroad to support his army's movement toward Richmond, Virginia. General Grant's Army utilized no less than five railroad lines and the USMRR laid new track in order to support his movement.¹¹⁶

¹¹³Ibid., 92.

¹¹⁴Ibid., 93.

¹¹⁵Ibid., 96.

¹¹⁶Gabel, *Railroad Generalship: Foundations of Civil War Strategy* , 22.

General Sherman's Atlanta 1864 Campaign

The Atlanta campaign was so dependent on using the railroad to resupply its forces that it was a requirement that in order to begin the campaign, all rails and rolling stock needed to be on hand to support the operation.¹¹⁷ As General Sherman moved south, the USMRR was required to lay more track down to support the Army's movement. After General Sherman was done with the rails that had been laid in support of his movement from Chattanooga to Atlanta, the rails were removed to ensure enemy forces could not use them behind his Army.¹¹⁸ This constant use of the rails and their removal shows the application of operational art to support his campaign.

All three of these campaigns had one common theme – they all depended on the use of railroads to move men and materials. The success and failures of all three of these campaigns hinged on the successful management of the railroads.

AT THE END

At the end of the Civil War in 1865, the USMRR was responsible for the operation of 2,100 miles of track, 419 train engines, and 6,330 various types of rail cars at a cost of 30 million dollars.¹¹⁹ In 1865, General St. John wrote a report about the resources of the Confederacy, with a section on the Confederate railroad system. In his report, he discussed how the Confederate railroad at the start of the Civil War was a “powerful military instrument, capable of shaping campaigns and winning battles.”¹²⁰ From 1861 until the end of 1863, even with the maintenance

¹¹⁷Clark, *Railroads in the Civil War: The Impact of Management on Victory and Defeat*, 5.

¹¹⁸*Ibid.*, 5.

¹¹⁹Leavy, *Railroads of the Civil War*, 203.

¹²⁰Gabel, *Rails to Oblivion: The Decline of Confederate Railroads in the Civil War*, 26.

and management issues, the railroads of the South still performed at a rate that was a benefit to the Confederacy. This ability to use the railroads helped to feed and move Confederate supplies and soldiers on numerous occasions that avoided their defeat or capture. The correlation between the successful use of the railroads and the ability of the South to win battles was no surprise to those that were starting to understand the utility in the use of railroads to support operations. But by 1864, the railroads that the Confederates still controlled were broken down shells of what they had been originally. Many of them were unusable due to lack of maintenance and supplies. Because of this lack of ability to use the railroads, this loss in capability was one of the early indicators that the defeat of the Confederacy was imminent. In his report, General St. John said that the “decline and ultimate collapse of the railroads paralleled the downfall of the Confederacy itself.”¹²¹ This statement was an example of just how important railroads had become to successful operations and ultimately victory itself.

CONCLUSION

In the end it was not the miles of railroad at the beginning of the war or the amount of rolling stock, the amount of men that worked on the railroads, or even the amount that a train could move that made the difference – it was the management of the railroads that proved decisive. After looking at the idea that the American Civil War (1861–1864) was the first modern war and using this notion to gain an understating of how the conduct of the Civil War gave rise to operational art, it is critical to understanding how important new technology was and how it played a role in the conflict and the birth of operational art. The railroad proved itself to be the most important new technology at the time, fundamentally altering the nature of warfare in terms of both logistical arrangements and targeting. The 35,000 miles of track that were in use at the

¹²¹Ibid.

end of the war was important, but more significant was what was to come over the next five years, when the amount of track in the United States would jump to 53,000 miles. The lessons learned during the Civil War only helped the railroad companies become more efficient at not only building railroads but also managing them. As the Army moved away from animal-drawn wagons and began to utilize railroads whenever possible, the benefits became obvious. Railroads could move one hundred times the load five times faster. The use of the railroad quickly became an application of operational art and control of this key infrastructure was crucial to successful campaigns. Railroads had become crucial elements in the employment and synchronization of forces in time, space, and purpose. The Civil War, therefore, was not only an example of modern war; it is also one of the earliest examples of operational art. This Monograph has explained how the use of railroads during the Civil War was an early example of operational art. By successfully employing this new technology, planners were able to apply the new rates and distances that troops and supplies could now move to ensure continuous operations while identifying the significance of the enemy's railroads and targeting them accordingly to prevent their use. The importance of the management of railroads during the conflict cannot be overstated. It was the difference between being able to conduct operations that flowed from one battle to the next or sure defeat. Once the railroad proved itself both a reliable and efficient way to move both supplies and soldiers in support of continuous operations, its contribution to the emergence of operational art was a natural progression of the art of war.

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