ESSENTIAL CIVIL WAR CURRICULUM

Union and Confederate Engineer Operations in the Civil War

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Constructing Victory: Union Engineer Operations

At the outbreak of the Civil War the army was comprised almost entirely of three branches; infantry, cavalry, and artillery. The history of the war has traditionally been viewed exclusively, and rightfully so, through the exploits of these men. But they were not the only soldiers to serve. Lost in the immense volume of heroism and sacrifice of the combat arms is the significant contribution of another group, engineers.

The role of engineers in the Civil War had a very modest beginning. The entire engineer complement of the United States Army in January of 1861 consisted of 43 officers and a single company of enlisted troops stationed at the United States Military Academy at West Point. The officers made up the prestigious Corps of Engineers and the enlisted men provided training support for the cadets. As the political crisis between the North and South escalated this small group, minus a 16 man detachment placing batteries on Alcatraz Island, was called to Washington for the purpose of protecting public buildings, stores, and arsenals. Their duties during this time included serving as the escort for Abraham Lincoln during his inauguration on March 4, 1861.

When tensions seemed poised to explode into open warfare the small company of engineers was sent off to a threatened Federal outpost in the South. On April 3, 1861 the company set sail aboard the steamer *Atlantic* for Santa Rosa Island, Florida. They arrived at Fort Pickens at 3:00 a.m. on April 17 and were put immediately to work putting the works in a state of defense, building traverses, bomb proofs, and exterior batteries. Accordingly all wooden buildings were torn down to reduce the fire hazard and make way for new facilities. The defensive armament was also enhanced when heavy guns were mounted. The climate change, over-crowding, and scarcity of fresh rations made sickness prevalent. Despite efforts to supplement the fare from their own purses disease claimed two of their soldiers. They departed Florida on September 17 leaving their comrades buried in the sand outside the fort. Their small contribution to the successful defense of the fort would not be their last to the war effort nor were their losses.

The engineer company returned to Washington at the end of October to begin preparing defenses. During their absence the Union war effort had taken a dramatic turn

for the worse. Following the disasters at Bull Run and Ball's Bluff the possibility of a short war began to fade away. Desperately seeking a savior for the Federal cause, President Lincoln turned to Major General George B. McClellan. The "Young Napoleon" had the arduous task of shaping an army for the war he envisioned ahead. His first priority was to evaluate the existing force and make recommendations for its improvement. He had no illusion of rapid victory. He briefly stated his revised view of the war in a memorandum to President Lincoln only five days after assuming command. "In this contest it has become necessary to crush a population sufficiently numerous, intelligent, and warlike to constitute a nation."

The war plan he saw included operations throughout the border states and Deep South. This massive scope of operations over a huge geographical area, containing a multitude of natural obstacles to be conquered, would change the organization of Federal forces. As an engineer he saw the means to overcome these barriers – engineers – as completely lacking and was not afraid to say so. He estimated the force required to accomplish his plan at 273,000 men. In a letter to the President in late October General McClellan insisted that the number of engineer troops available to the army was entirely inadequate. His new army would include an engineer force of 7,500 soldiers that would be supplied with the necessary engineer and pontoon trains.

McClellan was the perfect advocate for an expanded engineer branch. Besides being the Commander of the Army of the Potomac he had significant experience in the engineer field. He entered West Point as something of a prodigy at 15 after the minimum age was waived and graduated second in his class of 1846. He was assigned to the engineers and spent several years working on a variety of engineer projects and command assignments. In 1855 his capacity for foreign languages landed him a prestigious appointment as United States military observer of the Crimean War. His experiences there fully enamored him to the European armies' use of large dedicated engineer forces. At that time European armies, particularly the French, were considered the model of military efficiency. He fully subscribed to Napoleon's Maxim XLIII, "Engineer officers should be encouraged in bringing this branch of their art to perfection, and in placing it upon a level with the rest."

The first steps to increasing the number of engineer troops were already in the works. On August 3, 1861 Congress authorized an additional three companies of engineers for the regular army. Three days later a company of topographical engineers was also authorized. To fill the newly authorized positions officers were dispatched to the northeast in search of recruits with suitable backgrounds. Captain Thomas Casey recruited Company B from the area around Portland, Maine. Captain James McPherson did the same for Company C in Boston.[1] Also working in Boston was Captain Charles Turnbull who was looking for men to fill the company of topographical engineers. He found only 10 suitable candidates and the idea was abandoned. The recruits reported to

[1] The third company, Company D, was not filled until July 1862 by transferring men from other companies.

Washington to begin training under Captain James C. Duane[2] in the newly designated Engineer Battalion.

The additional regulars were the first step toward building an effective engineer force, however McClellan was not satisfied. The size of the engineer force was still not appropriate for the mission he saw ahead. With the need for long term engineer support recognized, Lieutenant Colonel Barton Alexander, chief engineer, pointed out that the country was filled with men qualified to fill the purpose and that, "we must secure their services." With this in mind McClellan decided to supplement the regular engineers with volunteers. He selected two regiments, the 50th New York Infantry and the 15th New York Infantry to be assigned as engineer troops. The infantry designation was almost certainly a ruse to circumvent the previously mentioned recruiting restrictions. The leaders of these regiments had recruited their men among the many sailors and mechanics specifically as engineers. After a short time in infantry brigades they were also sent to Washington for training under Lieutenant Colonel B. S. Alexander. Under his tutelage they learned their role as pontoniers, and became somewhat familiar with those of sappers and miners. As expected both units were officially designated regiments of engineers with congressional approval on October 25, 1861.

The change in status also meant a change in the organizational structure of the units. Under the new regulations the engineer regiments were to be comprised of 12 companies of 150 enlisted soldiers.[3] The job of equipping the new brigade and regular battalion fell to Capt. Duane. McClellan's ever vigilant eye for detail did not rest when it came to his efforts. He issued specific instructions to Duane to avoid the purchase of India-Rubber pontoons which he considered, "entirely useless". He was to buy the new model French bridge train. Along with the bridging materials he purchased other engineer tools and wagons for their transportation. The first pontoon boats began arriving on December 17, 1861. The first bridging drills were conducted after the Christmas holiday and the soldier's view of the clumsy craft was quickly altered from their first impressions.

"They afterwards became fast friends and companions. They excelled a gymnasium for the development of chest and muscle; they sheltered us from the rain and the sun; they hid us from the foe; they carried our wounded, and received our dead. When as veterans with discharges in our pockets, we took our last look at the camp, our eyes lingered

[2] Graduated West Point Class of 1848, assigned to Company A Engineers. He would later author the influential *Manual for Engineer Troops.*

[3] Because the two New York regiments had been recruited as infantry they contained only ten companies. The additional companies were not recruited until December. The excess recruits from the 50th were transferred to help the 15th fill their ranks.

longest where the old arks were parked, battered and plugged but fitted and equipped, ready for another move." [4]

The training, including standard infantry drill, marksmanship, and even some artillery practice continued into February of 1862. On the 24th the Battalion was ordered onto a train for Sandy Hook, Maryland. A camp was established at the end of a railroad bridge with Sibley tents used to shelter the men. No fires were allowed for fear of detection by the nearby Confederate pickets. Companies B and C unloaded the bridging material during the night of the 26th and work began the next morning. Company A was given the honor of throwing what is believed to be the first wooden pontoon bridge in United States military history. By 1:00 p.m. a bridge of 41 boats (840 feet) was completed with the exception of a hawser that was added later in the day to relieve the stress on the anchors from the current.

Newton Timothy Hartshorn, a New Hampshire native and member of the Engineer Battalion, recalled the episode in his wartime diary this way:

Tuesday Feb 25th '62

At sunrise a searching wind sprung up from the East - the Companies ("A" "B" and "C") now formed on the track and took up the line of march for Sandy Hook at which place we spent the morning moving cars to allow our baggage to pass - but few troops were here, a battery of 12lb Parrott guns and a Regt. commanded by Col. Geary. By noon we had moved up opposite Harpers Ferry, Va. now occupied by our pickets and selecting a spot between the canal & river just above the piers of the destroyed Rail Road bridge, pitched our Sibley tents established our kitchens &c and when night came. The men having gathered straw &c laid down to sleep comfortably while the wind howled and shrieked around the cliffs that rose perpendicularly some hundreds of feet above.

Wednesday Feb 26th '62

The company was turned out at 2 o'clock in the morning to unload the Pontoons which then arrived; the object of our journey was now evident - the construction of a Pontoon Bridge across the Potomac. The work was hard, the weather cold and the morning dark. One fell 20 feet into the canal but luckily escaped with a good wetting and a severe fright

An abutment was built on the bank dug away just above our camp and the bridge commenced immediately and finished in 9 hours. It was 830 feet long (the longest Pontoon Bridge ever built in the New World) and contained 41 boats.

General McClellan crossed as the last chess (decking piece for the bridge) was laid. On March 1 a flying bridge of two boats lashed together was made for a crossing at

[4] Gilbert Thompson, *The Engineer Battalion In the Civil War* (Washington Barracks DC: Press of the Engineer School, 1910) p. 6, entry for January 2.

Harpers Ferry. The new men had proven the value of their training. It was time to go to work.

The hysteria created by the image of Confederates swooping into the Capital gave the newly formed units another mission. The city was to be defended by a series of works. Under the supervision of Brigadier General John G. Barnard, new forts, renovation of some existing works and connecting strong points with new entrenchments was commenced. Work of this scale was impossible to accomplish with so small a force. General Barnard's Report of the Defenses of Washington on page 82 stated, "In the autumn of 1861, after the line had become permanently established, details of troops were almost entirely withdrawn, (in consequence of the paramount necessity of drilling and organizing the mass of raw volunteers) and a large force of hired laborers and mechanics was placed upon the work."

Construction of the capital defenses would last until the spring of 1864 when a line of 68 forts, almost 100 artillery batteries, and 20 miles of rifle pits and trenches were completed. The engineers would be long gone by then, moved off to support the combat operations of the Army of the Potomac. The trained engineer force assembled for these operations did not come near the 7,500 men that McClellan thought necessary, but performed all the tasks required of them. The Regular Army Engineer Battalion and the volunteers of the Engineer Brigade would play important roles in every campaign fought by the Army of the Potomac.

Another important engineer asset that operated away from the Army of the Potomac in the east was Wrigley's Independent Company of Pennsylvania Engineers. The company was mustered in at Camp Struthers, Philadelphia in August, 1862 and was comprised, "of sailors, of blacksmiths, and of carpenters, and among its non-commissioned officers accomplished draftsmen and mathematicians." [5]After a short stay working on the Washington defenses, the company was transferred to Harper's Ferry and served out its term assisting operations there and in West Virginia. The company mustered out at Harper's Ferry on June 20, 1866.

Not unlike the situation in the Army of the Potomac, the Department of the South soon saw its need for engineers outstrip the available resources. Once again volunteer troops were called upon to fill the void. Another regiment was raised in New York for this purpose.

While the bulk of Civil War history concentrates on the great battles in northern Virginia and the west, the early Union operations in the South have been largely ignored. In many places in the newly declared Confederacy, especially along the southeastern coast, Federal footholds remained throughout the war or were gained shortly after the commencement of hostilities. Naturally, wherever Union forces existed there was a need

[5] Samuel Penniman Bates, *History of Pennsylvania Volunteers 1861-65* (Harrisburg Pa: B. Singerly State Printer, 1869-1871),5, Part 2, p. 918.

for engineer support. The unit tasked to this area was the 1st New York Engineers.

The 1st New York Engineers differed from its older Empire State brothers, the 50th and 15th, in that they were specifically recruited and organized with engineering tasks in mind (thus the designation of 1st Engineers). The unit was the brainchild of Edward W. Serrell, a well-respected and very experienced civil engineer, who used his political influence to get authorization to recruit his force. Realizing the deficit in troops trained for such duty available to the Union military leaders he campaigned locally and nationally for the formation of, "a regiment of volunteer engineers." The offer was accepted by Secretary of War Cameron on September 27, 1861 who also recognized the deficiency in engineer troops and encouraged Serrell to recruit, "(as) many companies as possible." The final authority for the formation of the regiment, however, rested with the Governor of New York, Edwin Morgan. Pressed by Cameron, the governor not only granted his approval but also helped persuade the New Jersey governor, Charles Olden, to allow men of his state to enlist in the unit. Recruiting began immediately and the units were filled primarily from recruits in the New York City area but also collected soldiers from throughout New York and New Jersey. Some Pennsylvanians also found a home in their ranks. By October of 1861 Serrell was awarded the rank of Lieutenant Colonel and the mustered companies were moving to join Brigadier General Thomas W. Sherman and the Department of the South. According to Sherman's General Order 15 a battalion of engineers from the 1st (Companies A-E) departed Fort Monroe on October, 1861 for Hilton Head, SC aboard the steamer *Star of the South.* These men would begin the long and illustrious war record of the 1st New York Engineers. The large geographical area of the Department of the South required the regiment to be split into detachments. These small groups saw service from North Carolina to Florida.

Undoubtedly the most famous action taken by the 1st New York Engineers was the construction of the "Marsh Battery." Major General Quincy Gillmore requested that batteries be constructed that could take the enemy batteries on James Island and the city of Charleston under fire. The first officer assigned the task declared it impossible, but Serrell would have none of it. He assumed personal responsibility and conducted a series of experiments to establish the capability of the soil (mud) to support weight. After careful consideration of the results of these trials Serrell believed the soil could be stabilized enough to receive the weight of a siege piece. A plan was presented to Gilmore for the construction of a battery on August 2, 1863. It was immediately accepted and several days were spent setting up support activities to supply lumber and other materials. On August 10 Serrell's men and large details from the 7th New Hampshire began construction of the battery.

The construction began with a parapet and rectangular frame of sheet piling driven by a lever activated ram. The first measure to reinforce the soil was "a thick stratum of grass." This was covered by two layers of tarpaulin followed by "15 inches of well rammed sand". A platform of three layers of 3 inch pine planks topped off the

position.[6] The work was declared prepared to take an eight inch Parrott rifle on the 17th. The final tally of material used in the construction of this battery, all of which had to be transported by hand over a mile on a four foot gangway makes the seven day work a marvel. Materials included:

13,000 sandbags
123 pieces of 15-18" diameter pine logs (Piling)
5000 feet 1" boards
8 Tarpaulins 18X28 feet
9156 feet of 3" pine planks
300 pounds 4" spikes
300 pounds 7" spikes
600 pounds of assorted iron pieces
75 fathoms of 3" rope

This material list did not include the materials that were used to build the gangway. The battery was completed with a service road to the edge of the river. The gun from this battery shelled the city on August 22-23 and earned the nickname of the "Swamp Angel."

Other work in this area included impressive watch towers, bridges, and other facilities. By 1864 the need for engineers in this theater no longer required the entire regimental presence of the 1st New York. The regiment, minus four companies left behind to support ongoing operations, were removed and attached to the Army of the James. Besides their work in the South the regiment also saw service in the Bermuda Hundred Campaign, the crossing of the James, the advance to and siege of Petersburg, and sent a detachment to North Carolina for operations against Fort Fisher and Wilmington in the last months of the war.

As the possibility of war grew larger several units were assembled in the West. The thought that the war would be a short one prompted these early units to be recruited for short terms of service. In Missouri Major General John C. Frémont used his authority as commander of the Department of the West to assemble an engineer force that included:

Balz's Company Missouri Sappers and Miners who served from October 1861 to February 1862.

Worster's (Voerster's) Independent Company of Sappers and Miners. This small unit served a 90 day tour of duty working primarily on the road from Springfield to Rolla, Missouri.

[6] United States War Department, *War of the Rebellion: Official Records of the Union and Confederate Armies*(Washington: Government Printing Office, 1880-1901), Series I, volume28, p. 233, Report of Colonel Edward Serrell.

Gerster's Independent Company of Pioneers. Mustered into service in August 1861 and served during Frémont's campaign against Springfield and also on the Rolla road. They mustered out in September of 1862

The long term solution in the west was somewhat different. The need for engineering skills and the troops to use them was just as dire but there was no cadre of trained troops to support the building of such a force. It was totally incumbent on the civilian engineering and construction communities to fill the void. Three organizations stepped up to meet the challenge.

1st Michigan Engineers and Mechanics

In Michigan, the failure of Wilson's Regiment left the Michigan units that had been formed for it with no place to go. Rather than accept failure, four prominent men from Grand Rapids decided to pursue the idea with the formation of a regiment entirely from the state of Michigan. The four men were well acquainted with the construction field and associated enterprises; Wright Coffinberry (Surveyor), Baker Borden (Master Carpenter), Perrin Fox (Contractor), and James Sligh (Merchant); but needed an advocate to push the issue through the appropriate channels. They turned to William Innes, a civil engineer who had made a name for himself building railroads in the state, and offered him command of the unit if he could get it approved. Innes immediately contacted Secretary of War Cameron for authority to move forward with the plan. Secretary Cameron readily agreed to accept the regiment pending the approval of Michigan's governor. Innes, the four original founders, and political heavy weight Wilder Foster met with Governor Blair on September 12, 1861 and an agreement was struck to form the 1st Michigan Engineers and Mechanics. On September 13th, Special Order No. 76 was issued from the Governor's office calling for troops to fill the rolls. Under the Special Order, the recruiting drive specified that "...none but mechanics or engineers will be received." A rally point for the enrolled men was declared at Marshall and the unit rapidly began to take shape. By October 1st all but a small portion of the regiment was on hand with companies from: Grand Rapids - B, C, D, F, I, and M; Ionia and Albion - A and E; Kalamazoo – G; Jackson – H; Marshall – K and At large – L.

The regiment was mustered in on October 29th. Transforming the engineer recruits from civilians to soldiers was the first order of business for the newly formed units. The 1,032 men of the 1st Michigan Engineers depended on the efforts of Colonel Innes and his quartermaster officer, Major Enos Hopkins, to supply the necessary equipment. To the extent possible the two men used local firms to furnish the personal clothing and equipment for the troops. Firms in Jackson and Detroit supplied:

1000 coats, shirts, pants, hats, and sets of mess utensils
2000 Flannel shirts and drawers
300 Mess Pans

120 Kettles
10 Mess Chests
12 company desks
10 Drums and bugles
55 axes
50 hatchets
25 shovels and picks

Engineer specific equipment, weapons, and transportation to be provided by the Federal government proved much harder to procure. The overtaxed supply system sent Innes on a paper chase that frustrated him into writing Brigadier General Don Carlos Buell with complaints. There was little relief however and the delays continued. By November only enough obsolete Belgian muskets were on hand to allow one company to drill at a time. Ammunition for live firing was not had until the regiment arrived in Kentucky. The regiment also moved with only 80 of the 280 horses required to fully equip them. Another interesting addition to the unit was a two gun battery of brass field pieces commanded by John Dennis. The artillery had a short term of service with the regiment. It was ordered away to join that branch in late December and never saw duty with the engineers.

The Regiment departed for Louisville, Kentucky on December 17, 1861. The logistical problems were eventually ironed out. Other problems included the refusal of about 30 soldiers of Company K who refused to muster in under the leadership of Captain Emory Crittenton. The men were placed under arrest and the remaining 40 men sworn in. The pay issues that would plague the 1st Michigan and nearly all volunteer engineer organizations had also arisen. When the promised pay failed to materialize the men were given the option to leave the regiment and approximately 30 men chose to do so. The severity of the problem prompted Innes to travel to Washington to plead the case of his men. The War Department showed little sympathy for the plight of the engineers stating that no authority existed to pay volunteer engineers. Innes was steered to President Lincoln to seek such authority that was necessary to allow the regiment and to pay them as engineers. During his personal meeting with the President Lincoln it was agreed and orders were issued accepting the unit. Unfortunately pay difficulties continued to plague the unit throughout its existence.

Bissell's Engineers of the West (Later the 1st Missouri Engineers)

In Missouri, as the three month enlistments of the 10th Missouri Volunteers began to run out, Colonel J. W. Bissell, the commander, proposed, "to enroll within the states of Missouri, Iowa, and Illinois a full regiment of men who shall be, all of them, either mechanics, artisans, or persons accustomed to work as laborers under mechanics." The proposal was approved by Colonel Frank P. Blair and forwarded to Major General Frémont who endorsed it with the brief statement, *"I concur*." The recruiting circular promised potential recruits that regular army pay would be supplemented by 4 cents a day

for mechanics and 25 cents a day for laborers and that the Regiment would not be subjected to guard duty.

The additional pay proved to be an excellent enticement and the units formed rapidly starting in late July, 1861. The companies were recruited as follows:

Company A - St Louis and East St Louis
Company B - Paris, Illinois
Company C - Prairie City, Illinois
Company D - St. Louis and Fiora, Olney, Rushville, and Carlyle, Illinois
Company E - Adrian, Michigan (Originally recruited for the 1st Michigan Engineers)
Company F - Dubuque, Iowa
Company G - Cape Girardeau, Missouri
Company H - Paris, Illinois
Company I - At large in Iowa
Company K - Burlington, Iowa

Most of the companies were mustered with the bare minimum of soldiers and were significantly reduced by examinations by medical authorities. The numbers were "afterward recruited to the required number."[7]

Even before Bissell's entire regiment of 907 men could be gathered, the elements on hand were put to work. Companies A and B were sent to East St. Louis to load ammunition and associated ordnance supplies onto the steamer *Empress.* The two companies then followed the steamer to Cape Girardeau and began work on fortifications, under the direction of Captain Henry Flad of the Topographical Engineers (later commander of Company B). The four forts, A, B, C, and D, mounted 24lb. and 64 lb. guns and, were produced by 'indefatigable exertions" by Captain Flad and his men. The end result was lauded by the commanding officer at Cape Girardeau, Colonel C. Marsh, 20th Illinois, who stated in a letter to Major General John Frémont, "The appearance of the works of itself speaks to their capability." Also completed were a hospital and bakery for the troops there.

In October orders were received to bridge the White River to assist units retreating from the area. Using standing timber as material for the structure, the two companies began construction at 11:00 p.m. By 5:00 a.m. the next morning a suitable bridge was in place to allow the passage of the troops. The bridge was then destroyed to delay any pursuit.

The remainder of the regiment was moved to Otterville in September to work on the Lamine Railroad Bridge and defensive works to protect it. Company F was sent to a

[7] Dr. W.A. Neal, *An Illustrated History of the Missouri Engineer and the Twenty-fifth Infantry Regiments*(Chicago: Donahue & Henneberry, 1889),p. 14.

nearby sawmill to produce timber for the construction of the bridge and quartermaster storage facilities. Additionally a small detail from Company D was ordered to Jefferson City to repair railroad switches and sidings. Work continued on the Lamine Bridge until November 21 when it was discontinued. The 700 foot long bridge was never fully completed by the regiment. Other projects at this time included stables and corrals at Sedalia, a road from Sedalia to Warsaw, details for the repair of army wagons, and repairs to military buildings.

The extra duty money for the engineers also created problems for Bissell's command.

Failing to get the funds to pay the promised amount, despite a constant flow of requests, Bissell dispatched Captain E. M. Hill to St. Louis to seek the funds. This attempt to quell the growing discontent of his soldiers initially met with failure as the Chief Quartermaster claimed to have insufficient funds to meet the demand. Captain Hill kept up his efforts until February 23 when he could finally report to Bissell that he had secured $5,000. The money was distributed on the 25th and the pay disputes were temporarily put aside just in time for the regiment to receive orders to move to New Madrid. Other problems included the arrest and conviction of Captain J. H. Vreeland for embezzling rations. He was cashiered from the service on December 18, 1861.

Patterson's Company of Mechanics and Engineers

In Somerset, Kentucky another prominent citizen, William Franklin Patterson was using his connections to put together a unit (including his father) for engineering duties. This small unit; never more than 43 men; would perform services that far exceeded that which would be expected of their numbers.

They mustered at Camp Haskins, Kentucky in October of 1861. The unit was heavily involved in the actions centered on control of the Mississippi River. They attempted to construct a bridge under heavy fire at Chickasaw Bayou and demolished the fortifications at Arkansas Post.

But it was Grant's campaign against Vicksburg that provided the backdrop for their largest contribution. By Special Order No. 177 they were reinforced with 300 detailed pioneers for the move down the Louisiana side of the river to bypass the Vicksburg defenses. During these operations they moved with the lead elements constructing over 1,300 feet of bridging to overcome the bayou dominated terrain. They also converted a flatboat into an improvised gunboat for the advance on Carthage. Using two commandeered sawmills to produce lumber, they built twenty flatboats that were used to ferry 150 tons of supplies for the move across the river. These boats were then used to bridge Mound Bayou. On the Mississippi side of the river they continued their bridge building efforts with spans over Bayou Pierre and the Big Black River. During the siege they worked tirelessly on batteries and saps until the surrender.

After the fall of fortress Vicksburg Patterson took his unit to New Orleans and

spent their time building water wagons and pontoon boats for XIII Corps.[8] They moved to Brazos Santiago, Texas and marched up the coast from Arransas Pass, bridging Cedar Bayou on the trip to Pass Cavalla. During their four month stay there they constructed a variety of support facilities. A return to New Orleans and participation in the operations around Alexandria, Louisiana finalized their role in the war. They mustered out on January 22, 1865 at the conclusion of their three year commitment.

The accomplishments of these units were well recorded by the supported commanders.

When Braxton Bragg led the Confederates into Kentucky the Michigan engineers were broken up to support the various elements of the Union army that went into pursuit. The battalion headed by Major Hopkins (Companies A, C, and H) fought with Rousseau's Division at Perryville and suffered 17 Casualties (14 Wounded and 3 Missing or captured). The willingness of the engineers to act as warriors, as well as engineers, was well noted by Buell in his report of the battle, "I cannot omit to make honorable mention of the Michigan Regiment of Mechanics and Engineers. It has not only rendered invaluable service in its appropriate duties during the past year but at Chaplin Hills (Perryville) and on other occasions it has, in whole or in part, gallantly engaged the enemy."

The reports of General Pope also reflect great credit on Bissell and his men. Of the New Madrid operation Pope wrote, "Col. J. W. Bissell, Engineer Regiment, rendered me most valuable service both before and during the bombardment of the place. He conducted the erection of the heavy batteries and remained in them until the enemy evacuated the place."

Praise for the engineers was even more noteworthy in the official report of the Island No. 10 surrender. "Of Colonel Bissell and his Engineer Regiment, I can hardly say too much. Untiring and determined, no labor discouraged them, and no labor was too much for their energy. They have commenced and completed a work which will be memorable in the history of war."

From Cumberland Gap came Brigadier General George Morgan's commendation of Patterson's small band, "Nor can I close this report without expressing my deep obligations to Captain W. F. Patterson and the men of his command. He has rendered me constant and invaluable services during the two past months in making roads and constructing bridges on the various routes upon which my troops and supplies have been received."

This type of praise would follow the engineers from the early months of the war to the

[8] The pioneer attachments were returned to their units on August 5, 1863. The move to New Orleans was made by the original band.

victory march in Washington. These available troops proved most valuable but could not meet the overall need for engineer troops. The near disaster at Perryville and the lethargic pursuit of Bragg's retreating forces convinced the Lincoln Administration that Buell needed to be replaced. Selected to replace him, partly because of his engineer background, was Major General William S. Rosecrans.

Rosecrans saw the failure of his predecessor, General Don Carlos Buell, as linked to the inability to establish and maintain transportation infrastructure to support the logistical requirements of the army. He was not going to make the same mistake. Rosecrans faced a severe shortage of men capable of maintaining his supply lines in the rugged back country of Tennessee. His was going to be an army on the move and to move you needed engineers. The 1st Michigan was the only dedicated engineer asset on hand and it was not enough. Rebuffed in his calls for engineer reinforcements because it would take "an act of Congress to raise them", he formulated his own plan instead. On 3 November 1862 he issued General Order No. 3 calling for the formation of an "engineer corps" from the assets already on hand. "There will be detailed immediately, from each company of every regiment of infantry in this army, two men, who shall be organized as a pioneer or engineer corps..."

It could be argued that no more well thought out General Order was issued during the Civil War. For whatever Rosecrans' faults might be, the formation of the Pioneer Brigade was an innovative solution to his problem, a command decision that would pay off handsomely.

This was no shot in the dark. The men were to be selected specifically for their ability as craftsmen, the most promising lieutenants and non-commissioned officers assigned to lead them, and they were to be well equipped. Taking no chances, Rosecrans included the following list in his order:

Equipment for 20 men.
6-Felling axes.
2-2 1/2"- augurs
2- 2"- augurs
6-Hammers
6-Hatchets
20lbs - Assorted Nails
40lbs - Assorted Spikes
2- Cross-cut Saws
2-Hand Saws
2- Hand-saw Files
2- Cross-cut Files
6 - Spades
2- Shovels
3- Picks
1 - Coil of Rope

1 - Wagon
4 - Horses or Mules

Division quartermasters were to make immediate requisitions to fill these needs. The idea, for all its brilliance, did encounter some resistance and problems early on. Regimental commanders disliked losing good men and may have considered assigning their malcontents, but they were warned not to forward any of their "dregs" for this duty. The men did not want to leave their units, but quickly adapted to their new role, favoring it over Infantry duty. They were soon proud of the distinct crossed hatchet sleeve insignia of the Pioneer Brigade.

Originally the men were to be drawn together only when needed but this idea proved impractical. Instead three battalions of consolidated tradesmen supported his three Corps. They numbered around 3,000 men under the command of Captain James St Clair Morton. The Pioneers would make a name for themselves at Murfreesboro. Beside their invaluable engineering contributions they made a bold stand against Brigadier General McCown's Confederate Division assault. The success came at a high price. The casualty list reported 12 Pioneers dead and another 23 wounded. Rosecrans commended their steadfast bravery, resolve, and sacrifice in his official report, "Among the commands which deserve special mention for distinguished services in the battle is the Pioneer Corps."

The unit would continue its valuable service until recognized as an independent unit. Oddly the status they had sought spelled the end of the Pioneer Brigade. Being officially recognized as engineers came with three stipulations; a new regiment would be formed of Veteran Volunteer Engineers, three year men only were allowed to reenlist in the new status for the duration of the war and duty would be confined to fort construction in Tennessee.

The options gradually drained away the strength of the brigade until they were disbanded with Special Order No. 129 on September 10, 1864.

Like their brothers in the eastern theater the engineers in the west supplied their commands with all three of the basic elements of engineer function:

Mobility/Counter-mobility Operations - This includes work done to enhance the movement opportunities of friendly forces and deny the same to the enemy.

Survivability Operations - This includes work done to enhance the ability of friendly forces to survive enemy operations. The classic example would be any fortifications or defensive works.

Sustainability/Counter Sustainment Operations - This includes any work done to build or maintain logistical support facilities. The destructive portion of their work during the Savannah and Goldsboro campaigns also denied the already badly strapped

Confederate logisticians the ability to adequately provide for their forces.

Additionally the western engineers also provided additional firepower at critical moments. The engineers not only kept pace with the march across about a third of the width of the North American continent but often led the way over a wide variety of challenging terrain. The unique structure of the engineers in the west also defined the different role of the combat engineers and construction engineers that still exists today. The men of these units indeed earned the "esteem and confidence of all commanders".[9]

With their work finally finished the remaining engineers were issued new uniforms and took part in the Grand review, "some of them carried short picket spades" hanging from their belts. The war was over and the engineers had contributed greatly to the Union victory. This success did not come without a price.[10]

50th New York Engineers - 20 Killed 207 died by disease
15th New York Engineers - 7 Killed 122 died by disease
1st New York Engineers - 27 Killed 121 died by disease
1st Michigan Engineers and Mechanics - 13 killed and 247 dead by disease.
1st Missouri Engineers -16 Killed and 147 dead by disease.
Patterson's Kentucky Engineers - 1 Killed and 5 dead by disease.
The Pioneer Brigade - At least 12 killed and an unknown number dead by disease.

It seems almost impossible that these units that had so much ability to do work necessary to alleviate the root causes of the spread of disease did nothing and suffered badly as well. It is a macabre comment on the nature of medical knowledge that more was not done in this field. Proper latrines and separation of water supplies from them, as well as what we now think of as common sense moves could have saved so many.

Supporting the Cause: Confederate Engineer Operations

The Confederate armies took a different attitude toward engineering activities. This work was done by detailed "pioneers" from the ranks. This system proved to be cumbersome and a new method needed to be developed. Engineers in the Confederate army finally got the official recognition of the government in May 1863.This is not to say that they had not already performed important service. The development of the Confederate engineer corps began on March 7, 1861 with the Congressional approval of two companies of "*sappers, miners and pontoniers,"* and concluded with the authorization to organize a force of 477 officers and 9,920 enlisted men. Of course these numbers were never even close to being filled but they do reveal a growing sense of importance towards such troops.

A short history of the corps:

[9] *O.R.*. I,44, 56, Report of Captain Orlando Poe on the Savannah Campaign.

[10] Thompson, *The Engineer Battalion in the Civil War*, p. 98.

March 1861	Congress approved an additional 50 positions in the Provisional engineers. Instead of West Pointers many of these positions were filled by civil engineers.
April 1862	The number of positions in Provisional Corps was raised to 100.
December 1862	Col. Gilmer, Chief of Engineer Bureau, formulated a plan to organize four regiments of engineer troops.
May 1863	General Order No. 66 created the Confederate Engineer Corps. The creation of the corps was thought out to the last detail. The men would be pulled from existing units, "with a view to their mechanical skill and physical fitness" to form a 100 men engineer company for each division. The company would consist of: "1 captain, 1 first lieutenant, 2 second lieutenants, 8 sergeants, 7 corporals, 40 artificers, 45 laborers" and the option to add 2 soldier "musicians." Each regiment would contain ten companies with a staff of 1 colonel, 1 lieutenant colonel, 1 major, 1 adjutant, 1 quartermaster sergeant, and 1 sergeant major. Two of the companies in each regiment would be formed specifically as pontoniers and be *"furnished with a bridge train complete."*

Pay was dictated for each position in the organization. From highest to lowest the scale ranged from $210 per month for the colonel to $13 per month for thelaborers and musicians.

General Order No. 90 followed with instructions on how these new units were to be employed. Each task that was to be deemed appropriate for the regiments was spelled out in detail. Using this guideline the new units were assembled.

1st Engineer Regiment

This regiment was organized at Richmond in the fall of 1863, against the wishes of Robert E. Lee who resisted until overruled by the War Department, one of the very few times that this happened. Apparently Lee did not like the idea of losing combat power to form support units.

According to Lieutenant Colonel William W. Blackford, second in command of the new unit, the formation of the unit was facilitated by the new Confederate draft laws: *"The conscript law was just then being enforced and a class of men were brought in by it which, by selection among them, afforded the very best of material for filling a regiment such as ours."*

These men, mostly older, into their thirties, married, and good craftsmen, mechanics, and farmers, had avoided service to this point but now found the perfect place to render their skills in the service of their new country. The regiment was filled out to nearly its full compliment. The field and company grade officers were mostly civil engineers that were appointed, not elected as was the custom in some conscripted regiments, and the NCO corps was equally comprised of talented professionals. Despite

being comprised mainly of conscripts the discipline was excellent under this leadership. The regiment served until the end at Appomattox. Some of their accomplishments include:

Road repair in Richmond

Repair of railroads and bridges

Prison guard duty

Construction of Bevill's Bridge over the Appomattox

Pontoon bridge over the Staunton River

Pontoon bridge over the Appomattox at Good's Bridge

Losses were 2 killed, 28 wounded with 213 surrendered at Appomattox.

2nd Engineer Regiment

This regiment was formed in the summer of 1863. The unit was never united as a full regiment. Detachments from the regiment served as such:

Companies A and E - North Carolina

Companies B, F, and I - Alabama

Company D - Georgia

Companies C, G, H, and K – Virginia

Seven men of this regiment surrendered with the Army of Northern Virginia.

3rd Engineer Regiment

This regiment was formed in the summer of 1863 from a nucleus of the previously existing engineer forceMajor Stephen W. Presstman's Confederate Engineer Battalion. The regiment contained only 8 companies, seven supported operations in Tennessee and Georgia, while the eighth company served with General Jubal A. Early in the Shenandoah Valley.

Company B, Captain Henry M. Pharr's Company, saw service typical of the engineers that served in the Atlanta Campaign. Its duties included:

26 August - Built bridge over West Chickamauga River,200 feet long.
8 September- Floored railroad bridge at Resaca, Georgia and built trestle approaches.
12-14 September - Finished trestle bridge over Oostanaula River
17 September - Assisted building railroad bridges that had been burned at Catoosa, Georgia., Georgia
12 October - Framed bridge for Tennessee River

18 October - Bridged Clear Creek
21 October Assisted in construction of railroad bridge at Charleston, Tennessee
November-December - Stationed Etowah, Georgia

Company E saw service with Early in the Shenandoah Valley and compiled an similar record. Contrary to the general order forbidding these troops to be used outside their field, the unit lost 27% of its 37 assigned officers and men fighting as infantry at New Market, VA.

4th Engineer Regiment

This regiment was headquartered at Shreveport, Louisiana, and saw like service in the Trans-Mississippi.

1st Engineer Battalion

Another smaller unit was formed in the winter of 1864, the 1st Engineer Battalion. This unit was formed with men from Arkansas, Texas, Louisiana and Missouri and also saw service in the Trans-Mississippi. Two companies served in Galveston until surrendered in June 1865. The other two served in General Sterling Price's 1864 Missouri adventure and were disbanded in Louisiana.

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