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Brick Versus Earth: The Construction and Destruction of Confederate Seacoast Forts Pulaski and McAllister, Georgia

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BRICK VERSUS EARTH: THE CONSTRUCTION AND DESTRUCTION OF CONFEDERATE SEACOAST FORTS PULASKI AND McALLISTER, GEORGIA

by

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ABSTRACT

The United States government created America's third coastal defense system during the early-to-mid nineteenth century based upon the recommendations of the Board of Engineers of 1816. The engineers of 1816 believed the most economical means of protecting America was the construction of large, permanent forts along key areas of America's coast.

Union forces under Brigadier General Quincy Gillmore seized Fort Pulaski in April of 1862. Pulaski was one of the most formidable forts built under the third system. Gillmore required two months to install the weapons used against Pulaski; most of the time was spent installing smoothbore Columbiads, the standard breaching weapon of the day. Yet the weapons that destroyed Pulaski were lighter, rifled guns. Gillmore attributed the fort's destruction to rifled weapons, and found the smoothbore guns practically worthless during the engagement.

All forts built by Southern engineers prior to the fall of Pulaski, prior to the proof of the superiority of rifled weapons over permanent works, were earthen forts. Masonry's obsolescence was not a factor in the decision to build earthen works. The South needed forts immediately, for it faced an enemy that had invaded its soil and established a base on its shores. The change in construction material from masonry to earth was not in response to the recognition of a new threat, the rifled weapon, but because the Confederacy lacked the time and resources to build forts like Pulaski.

Earthen forts like Fort McAllister, Georgia, were able to withstand repeated

attacks by the United States Navy and emerged unscathed. The largest guns in Federal service, 15" Columbiads, were used on several occasions against McAllister. The fort did not fall until assaulted by a greatly superior land force.

Although the lessons provided by earthen forts did not change the immediate future of coastal defenses, they did have an impact later in the nineteenth century. Under the Endicott system of the 1880s, engineers constructed coastal forts as one-tier works with dispersed batteries. The materials used were earth and reinforced concrete. By the turn of the century the impressive forts of the third system were abandoned in favor of the Endicott forts.

I:
America's Coastal Defense and the Bernard Report

During the opening months of the American Civil War, Confederate engineers supervised the construction of earthen coastal forts capable of withstanding the power of spiraling projectiles. The change in construction material from masonry to earth was not in response to the recognition of a new threat, the rifled gun, but due to the cost of fort construction. The Confederacy did not have the money, materials or time required to construct bastions of brick and mortar. What the Confederacy did have was plenty of earth, timber and slaves. Earthen forts were inexpensive, easy to build and practically invincible against bombardments from the United States Navy, although most eventually fell when assaulted from land.

The U.S. Government initially delegated the construction of permanent coastal works to the Army Corps of Engineers in 1802. Construction of these works spanned decades and cost hundreds of thousands of dollars. American military engineers considered Fort Pulaski, which guarded the coastal entrance to Savannah, Georgia, to be one of the strongest forts in the American coastal defense when it was completed

in 1847 (see illustration #1, "Savannah River Area").[1] Ironically, Pulaski became the first fort obliterated by the new use of an old idea: the rifled gun.

Fort Pulaski, located on Cockspur Island at the mouth of the Savannah River, acquired its name from the Polish Count Casmimir Pulaski who died while defending Savannah against a British attack during the American Revolution.[2] Construction of the fort began in 1828 and was officially completed in 1847. The fort had walls seven and a half feet thick, constructed of brick. Pulaski fell quickly when attacked because its walls were inflexible; instead of the walls absorbing or deflecting artillery rounds like other construction material, they crumbled. Pulaski was comprised of a pentagon-shaped main work surrounded by a moat and had an advance battery. At the time bombardment began on 10 April 1862, the fort housed a garrison of 385 troops armed with forty-eight guns of mixed calibers. The commanding officer, Colonel Charles H. Olmstead, surrendered the fort on 11 April 1862 after federal batteries breached the southeast wall (see illustration #2, "Tybee Island").[3]

Earthen forts like Fort McAllister, which guarded the southernmost river entrance to Savannah, withstood repeated attacks from the largest and most powerful smoothbore and rifled weapons in the U.S. Navy's arsenal. McAllister began as an impromptu battery of field pieces established to guard the Ogeechee River at a place

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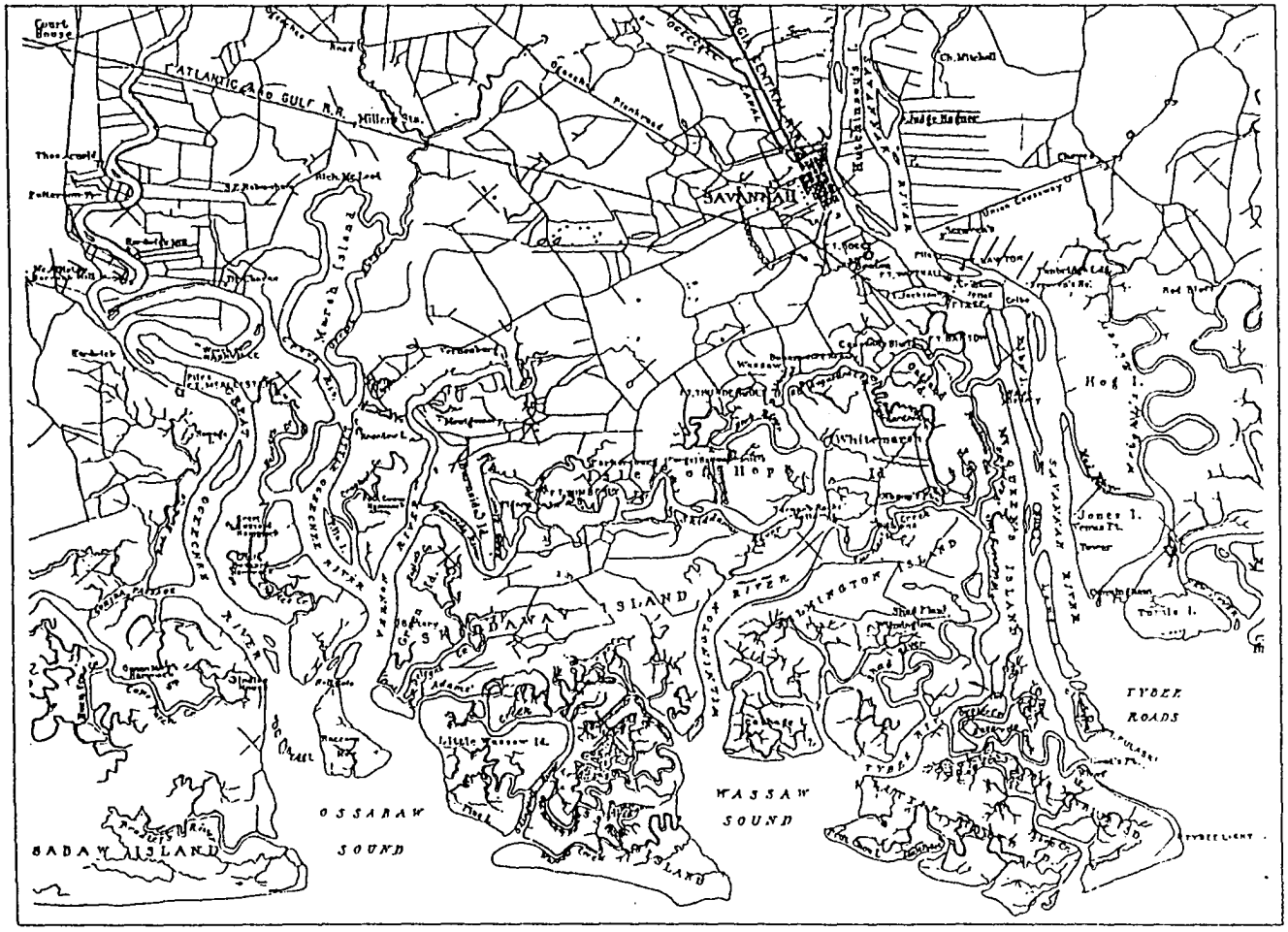
[1]Rogers W. Young, "Board of Engineers", The Georgia Historical Quarterly, vol. 20, 49.

[2]Georgia State Archives, Atlanta, Georgia. "Forts", 1542-17, 5V.

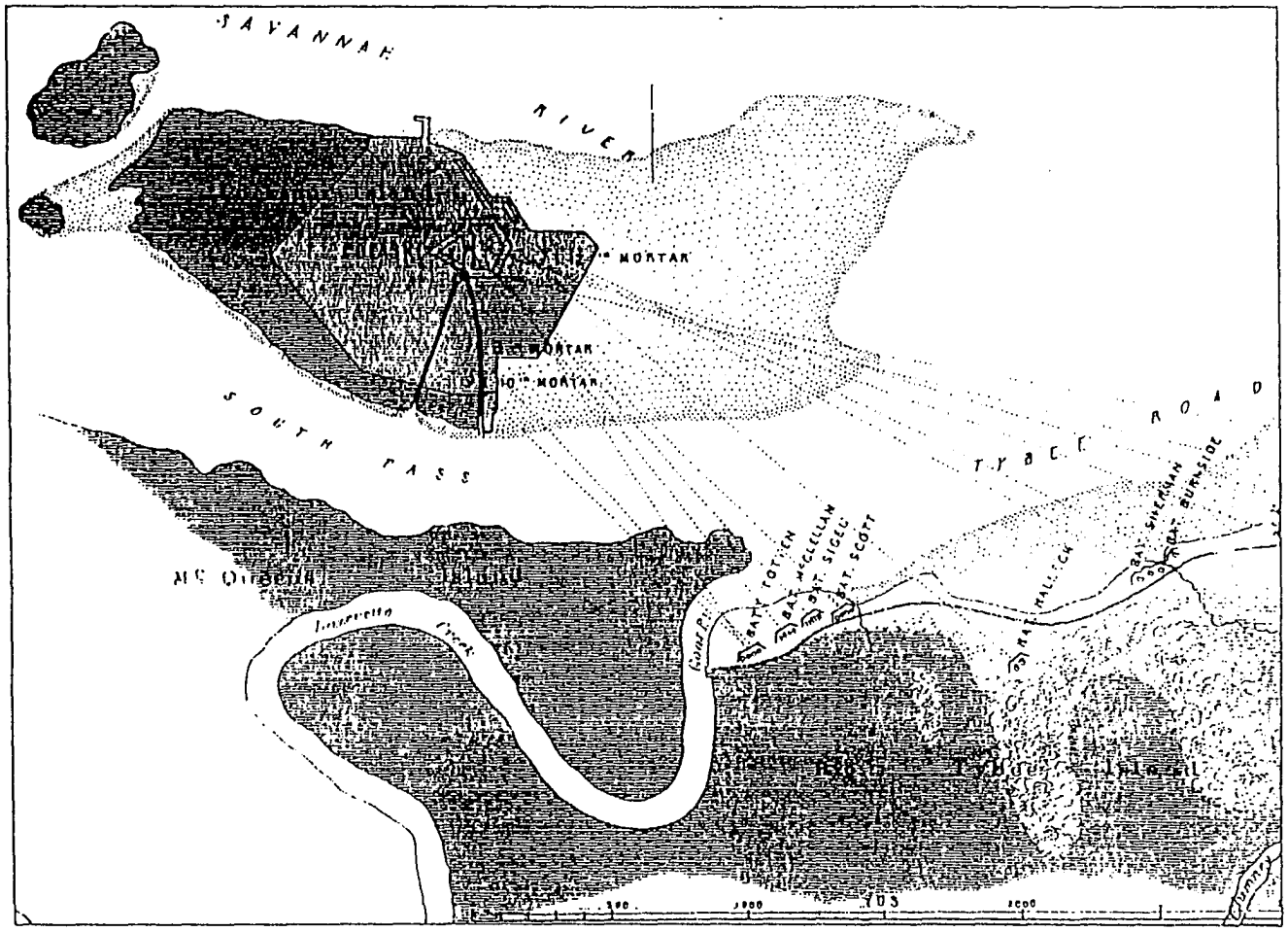
[3]General Q. A. Gillmore, Official Report to the United States Engineer Department of the Siege and Reduction of the Fort Pulaski Georgia (New York: Van Nostrand, 1862) 9 & 36.

I. Savannah River Area



O.R. (Navy), Series I, Vol. 13

II. Cockspur And Tybee Island



Gillmore, Siege and Reduction

called Genesis Point, the "back door" to Savannah. The fort received its name from a prominent local family who owned the land. Construction of the fort began late in January 1861 and eventually included several bombproofs to house munitions, supplies and a hospital. Improvements to the work included a ditch, a retractable bridge, palisades and land mines. McAllister resisted nine attacks by Union ships. The fort did not fall until 13 December 1864, when nine regiments of the Fifteenth U.S. Army Corps stormed the fort and disarmed the 230 man garrison.

HISTORY OF U.S. COASTAL DEFENSE

Because the Confederacy adopted the framework of the U.S. coastal defense system, an understanding of America's early defense strategy is necessary in order to put Forts Pulaski and McAllister into perspective. In 1816 Congress authorized a board of military officers to create an integrated coastal defense plan. President James Madison appointed to the board Lieutenant Colonel Joseph Totten (U.S. Army), Captain Jesse D. Elliott (U.S. Navy) and Brevet Brigadier General Simon Bernard (U.S. Army).[4] Members of the board continued to survey the United States coast after the issuance of their report in 1821, and spent a total of sixteen years

[4]Totten served on the board for its sixteen year existence and spent twenty years as Chief of Engineers for the U.S. Army until his death in 1864. In his honor this system of coastal defense is referred to as the "Totten" system. Bernard was a French military engineer and served as Napoleon Bonaparte's aide-de-camp. After returning to French service in 1832, he was promoted to Lieutenant General. He served in positions of aide-de-camp to the king, Inspector General and twice briefly as Minister of War.

mapping the U.S. from Maine to Georgia, and parts of the Gulf coast.[5] Their report covered the use of the navy as both an offensive and defensive force, the establishment of coastal and harbor fortifications in strategic areas, the necessity of good interior lines of communication and the creation of a regular army with a well-organized militia.[6] For sixty years the report served as the most important document with respect to America's coastal defense and influenced future leaders of both the United States and the Confederacy.

There were several aspects of American society that the board's members had to take into consideration if they were to convince Congress to act upon their report. First and foremost, Americans feared that a large standing army could be used against them.[7] Second, Congress consciously decided to rest the safety of the nation on its citizen-soldiers even though, as a general rule, militia units could not stand successfully against an army of regular soldiers in open battle. Because militias were politically and locally popular they retained a strong presence in American military policy. Third, the federal government operated on a very small budget. It simply

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[5]National Park Service, "Tales of Old Fort Monroe, Pamphlet #4: General Simon Bernard: Aide to Napoleon, Designer of Fort Monroe" (Fort Monroe: The Casemate Museum, 1993) 3.

[6]"Revised Report of the Board of Engineers on the Defense of Coast of the United States, 1826" [RRBE], Record Group 77, Box 2, United States Archives, Washington D.C.

[7]This fear was inherited from the British tradition. The Newberg Conspiracy of 1783, when George Washington dispersed a large group of Colonial officers on the verge of rebelling, reinforced these fears. The Society of the Cincinnati, composed of Revolutionary War Officers and their descendants, also strengthened fears about the military.

could not afford to spend large sums of money on defense year after year. Another item that factored into the report was America's geographical isolation from European powers. The primary foreign threat to the U.S. would come from the sea, with Great Britain being the most likely adversary due to unresolved issues from the War of 1812.

THE BERNARD REPORT[8]

The militia was a popular organization, but not a militarily strong or efficient one. The board recognized that Congress would not enlarge the regular army and had to find some way to compensate for the militia's deficient military skills. The board did this by recommending an active navy capable of being both an offensive and a defensive force, and by strongly recommending a massive construction program for coastal fortifications.

The U.S. Navy could work independently and in conjunction with coastal defenses. Offensively, the navy could be used to seek out an invasion force and sink its transports. In this light the navy could be seen as a limited offensive force and still be justified to Congress because of its primarily defensive role. Building a fleet during the 1820s cost approximately $6,600 per gun for ships-of-the-line, $6,500 for frigates and just under $5,000 for smaller ships. Maintenance costs ran seven to eight

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[8]RRBE, Record Group 77, Box 2.

percent of the original figures per annum, which was less than the cost to support ground units with the same number of men.[9]

The bulk of the report dealt directly or indirectly with coastal fortifications. Approximately two thousand miles of shoreline ran from Maine to Georgia but only a few places had developed into mature harbors.[10] Fortifications denied the enemy prime spots for landing an army and increased the difficulty of amphibious landings. The works provided militia units a better position from which to defend while waiting for regular troops to arrive.[11] The integration of militiamen into garrisons was easier than integration into mobile armies. Forts also gave militiamen added confidence.

An underlying theme throughout the report was economy. It played a very important role in developing the defense strategy. In financial terms coastal fortifications and the militia were the most economical instruments available for defense. Forts lasted decades and militiamen were only paid if utilized.[12] The

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[9]Henry Wager Halleck, Elements of Military Art and Science: or Course of Instruction in Strategy, Fortification, Tactics of Battles & Embracing the Duties of Staff, Infantry, Cavalry, Artillery, and Engineer. Adapted to the use of Volunteers and Militia (New York: D. Appleton and Company, orig. pub. 1846) 207. One should be cautioned that these figures are rough estimates only, for accurate records were not kept for all vessels.

[10]Gilbert Sumter Guinn, Coastal Defense of the Confederate Atlantic Seaboard States 1861-1865: A Study in Political and Military Mobilization, dissertation (Columbia, South Carolina: University of South Carolina Press, 1973) 1.

[11]Russell F. Weigley, The American Way of War: A History of United States Military Strategy and Policy (New York: MacMillian Publishing Company, Inc, 1973) 60.

[12]Emmanuel Lewis, Seacoast Fortifications of the United States: An Introductory History (Washington D.C.: Smithsonian Press, 1970) 4.

Bernard report recommended using forts still in existence from the Revolutionary War if possible as a way to conserve funds.

Important works could be manned by the same number of regular troops in war as in peace, with local militia units supplementing the strength in a crisis. During peacetime the cost of maintenance of permanent works was kept to a minimum by garrisoning a company of men or hiring caretakers. The added cost of training raw recruits did not exist and volunteers ate and slept at home, further reducing costs. Using this defensive approach only required the U.S. to raise a small offensive force to seek out the enemy in time of war. The report also pointed out the hidden savings achieved by reducing the drain on the work force and allowing the economy to continue at a more normal pace.

The Board listed three areas of priority for coastal construction, selecting specific harbors and coastal sites for each priority. Military convenience as well as economic prudence dictated the use of major commercial ports as naval bases. Therefore the first priority was the construction of forts to protect America's largest cities, naval bases, roads of rendezvous and "positions that could do great harm to the country."[13] Savannah was included as a priority one area.

The projected cost of construction for the first three priorities was $16.54 million dollars. The cost was broken down as follows: priority one forts, $9.69 million; priority two forts, $2.31 million; priority three forts, $4.54 million. The

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[13]RRBE, RG 77, Box 2.

peacetime garrisons for these forts were 2,610 men, 666 men and 3,911 men respectively.

To justify the expense of construction the report discussed in detail the theoretical cost of repelling an invading army of 20,000 soldiers without the use of fortifications. The report estimated the cost of raising, training, equipping and campaigning 77,000 troops (the estimated number required) for six months to be $23.1 million.[14] With a cost of $17 million and a life span of decades, coastal forts were a bargain.

The 1821 Bernard report gave specific recommendations for improving America's defense and backed those recommendations with surveys and numbers justifying the expense. The report was the first attempt to standardize and integrate the coastal defenses of the United States. It reinforced the ideas and beliefs held among Congressional leaders regarding the military and encouraged them to continue with a small army supported by militia. Because of the report's importance, its contents would have been known to future Confederate leaders, such as Jefferson Davis who served as U.S. Secretary of War under President Franklin Pierce. The Report remained the cornerstone for America's coastal defense until the Endicott Report of 1886, which incorporated new technologies and lessons learned from the American Civil War.

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[14]All figures found in RRBE.

CONFEDERATE COASTAL DEFENSES

Why did the United States view Pulaski alone as sufficient to protect Savannah whereas the Confederate government in Georgia felt the need to build McAllister? This thesis is concerned with Southern strategy only as it related to coastal defense, to put into proper perspective why the forts were built and defended at their respective locations.

Confederate priorities paralleled those listed in the Bernard report: to protect vital areas and force an enemy to land as far away from those areas as possible. However, the Confederacy had additional reasons for defending its ports. Southern states did not have the military materials to fight a prolonged war; Confederate industry was in its infancy. If the war continued for an extended time, imports of military hardware would become critical.[15]

Money became an equally important reason for keeping port cities open. Due to the South's agricultural economy, the majority of its capital was invested in land, slaves and cash crops. Export of cotton and tobacco was absolutely vital for raising revenue. Confederate President Jefferson Davis initially favored rationing exports in hopes that European textile industries would pay exorbitant prices and pressure their governments to mediate a truce.[16] This economic goal was closely tied to a third and

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[15]James M. McPherson, Battle Cry of Freedom: The Civil War Era (New York: Oxford University Press, 1988) 547.

[16]Davis recognized the failure of this policy, for European textile industries had stockpiled American cotton prior to the war and then found new sources after the war had started. The Confederate government also failed to properly regulate and enforce the growing and export of cotton.

arguably the most important reason for keeping port cities open: diplomatic recognition.[17] Confederate ports were the only links to the outside world. The C.S.A. sought military aid and recognition from Britain and France. Before these nations would openly assist, they had to officially recognize the Confederacy. If the South were still part of the Union, as U.S. President Abraham Lincoln insisted, then he would have declared its southern ports closed. Instead Lincoln issued a blockade of the ports, tacitly recognizing the Confederacy as a separate entity. This situation may have involved semantics, but was an important step toward recognition.

Because the C.S.A. did not have much of a navy, forts were more important for the defense of southern cities than for northern cities. Savannah was one of only three Confederate port cities of significance on the Atlantic coast.[18] After the fall of Pulaski in 1862, McAllister kept Savannah open. Even as late as March 1864, Union vessels were still chasing blockade runners.[19] This is the significance of Fort McAllister. Militarily, the fort was not important in the strategic sense. The amount of supplies that passed under the protection of McAllister's guns was minuscule when compared to ports like Charleston or Wilmington. Tactically the fort was insignificant until the arrival of Sherman's army to the Savannah area. What made

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[17]McPherson, Battle Cry of Freedom, 547.

[18]Those cities were Wilmington North Carolina, Charleston South Carolina and Savannah Georgia. Although Jacksonville Florida had the potential to become an important port, this potential never materialized. The Chesapeake Bay was also an important area for imports, although it was one of the first areas to be closed by the blockade.

[19]The CSS Swift was chased without capture on 9 February, 1864, and the CSS Persis was unsuccessfully pursued on 15 March, 1864.

Savannah important was not its tangible contributions like imports of medicine and military hardware, but its intangible contributions. The city served a political and symbolic purpose by remaining open. Politically, Savannah served as a link to European nations. The city became a symbol of resistance for the people of Georgia, and with the arrival of each blockade runner came new hope that the Confederacy might survive.

II:
Weapons, Ammunition and Defilement[1]

The nature, availability and use of artillery during the 19th century determined a fort's construction, defense and destruction. Growth in the field of artillery was slow at the time work began on Fort Pulaski in 1828. However, starting in the 1840s advances in gunpowder, projectiles and metallurgy significantly increased the power of artillery, thus reversing the traditional advantage of masonry forts over armies. Although the tools of war changed, the tactics followed for reducing permanent works remained the same.

Most of the advances made during the 1840s and 1850s in the field of artillery were by men working with private industries or on their own accord without government financing. No official system existed for the lateral dissemination of information except through irregularly updated manuals. Officers, both active duty and militia, read manuals written by men like Professors Dennis Hart Mahan, Henry Wager Halleck and Lieutenant John Gibbon in order to remain up-to-date on the latest technological and tactical changes.[2]

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[1]All weapons mentioned refer to artillery in the U.S. arsenal.

[2]Dennis Hart Mahan, Summary of the Course of Permanent Fortification and the Attack and Defense of Permanent Works, for the Use of the Cadets of the United States Military Academy (Charleston, S.C.: Steam Power Press of Evans & Cogswell) 1862; Halleck, Elements of Military Art and Science; and Lieutenant John Gibbon, The

SMOOTHBORE WEAPONS[3]

Each group of weapons was classified by use: seacoast, garrison (called siege if used to reduce a fort) or field. The types of artillery included guns, howitzers, Columbiads and mortars.[4] Guns were the most powerful weapons because of their mission: to batter down obstacles. Guns had short barrels, large calibers and were employed as direct fire weapons with low trajectories. Guns were named after the weight of the shot fired, such as a twelve-pounder or twenty-four-pounder gun. The largest weapon held by the U.S. Army during the 1850s was the forty-two pounder seacoast gun. Smaller garrison guns were frequently used to supplement the armament of seacoast works to save money.

Howitzers fired hollowed projectiles against troops and could be used to set fire to ships and towns. Howitzers were named by weight of the projectile for smaller calibers or the diameter of the barrel for larger calibers. They could effectively tear down fragments of masonry walls by ricocheting rounds.[5] Garrisons

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Artillerist's Manual, Compiled from Various Sources, and Adapted to the Service of the United States (Glendale, New York: Benchmark Publishing Company, Inc.) originally published in 1860.

[3]For actual ranges of all smoothbores, see Appendix B.

[4]U.S. Army, The Ordnance Manual for the Use of the Officers of the United States Army, 2nd edition (Richmond VA: West and Johnson, 1861) appendix.

[5]Warren Ripley, Artillery and Ammunition of the Civil War (Charleston, S.C.: The Battery Press, 1984) 52.

often kept a few field howitzers available, for during an attack they could be rolled from undercover to repel an assault.[6]

The Columbiad was an American invention, designed and created by Colonel George Bomford in 1811. Columbiads first saw service during the War of 1812 and were considered ideal for defending channels due to the larger caliber, long range and high trajectory. The original versions were iron fifty-pounders that only fired solid shot.[7] Sometime before the 1850s, Columbiads were redesigned to combine the long barrel of the gun with the large bore of the howitzer. This made them an unusual creature capable of firing both solid shot and shell. Columbiads quickly became favorites among artillerymen after the weapons were reinstated in the 1850s.[8]

Mortars used the momentum of the falling shot to create damage. They were short chambered pieces that fired projectiles at great elevations. The range was limited and the accuracy was unpredictable, but they did cause massive damage when they struck a target. Mortars were designed to crush magazines, bombproofs and disrupt communications within a structure. They were grouped into heavy (or seacoast), light and stone mortars.[9] Stone mortars had thirteen-inch diameters and

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[6]Gibbon, The Artillerist's Manual, 45, 66-67.

[7]Halleck, Military Art and Science, 280 fn.

[8]Gibbon, The Artillerist's Manual, 66-67, 71-72.

[9]There were two other mortars, the Coehorn and Ervouette, but neither saw field service with the U.S. Army.

were used to clear rubble from a breached wall by pulverizing the debris. Clearing the rubble gave an advance party enough room to storm the work.[10]

RIFLED WEAPONS

Experiments with weaponry during the 1840s and 1850s included the rifling of all types of artillery. Since the primary weapons of armies were guns, most of the pieces rifled were guns. Projectiles from smoothbores battered targets by kinetic energy, or brute force. Because of the power imparted to a projectile by rifling, the shot burrowed into a target and either weakened or destroyed it by causing spider cracks throughout the target area. The number of grooves or the amount of spiraling varied from rifle to rifle and became the defining characteristic for a particular weapon's manufacturer.

The manufacturing process caused limitations on the size and styles of weapons (like breech loading and rifling) until the 1860s. The casting of cannons had remained constant for centuries with little real improvement until the 1850s, when Captain T. J. Rodman of the U.S. Ordnance Corps developed a method for casting artillery on a hollow core. The "hollow core" method greatly extended a weapon's longevity and safety.[11]

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[10]Gibbon, The Artillerist's Manual, 68-69.

[11]The process involved casting a gun on a hollowed core while running cool water through it. The metal cooled from the inside out causing the strain of the metal to form toward the inside, thus increasing the strength. Gibbon, The Artillerist's Manual, 93-96.

Experiments in the United States and Europe resulted in many prototypes for rifled artillery, but three types of American rifles had become practical and acceptable by the time Fort Pulaski came under attack: Dahlgren, Parrott and Brooke. Admiral John Dahlgren (USN) designed several rifled howitzers and iron guns for use aboard ship. John Parrott designed and produced the most popular and economical rifle of the Civil war[12]. John Mercer Brooke created the Confederate version of the Parrott.[13] Due to limited resources the Confederacy could not mass produce these weapons.[14]

Another "rifled" weapon in use, the James rifle, was not a rifle but rather a method of rifling. General Charles Tillinghast James developed a method for converting smoothbores into rifles during the 1850s.[15] Due to the nature of the rifling, the weapons could only use a special projectile called the James projectile. Rifling smoothbores allowed them to fire projectiles that weighed twice as much as smoothbore rounds. This was due to the rifled rounds being elongated instead of spherical in shape. Thus 32-pounders became 64-pounders and 42 pounders became 84-pounders. James' rifling method was the first widely used by the U.S. military; as a result all rifled smoothbores were often referred to (inaccurately) as James rifles.[16]

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[12]Parrotts were durable and inexpensive (slightly more than smoothbores). These two reasons made Parrotts attractive to the US government despite safety problems and mediocre performance.

[13]The durability of Brookes and the distinction of being the only "home grown" rifle made them very popular among Southern forces.

[14]Ripley, Artillery and Ammunition of the Civil War, 109-110, 127-128.

[15]General James did invent one rifle, a fourteen-pounder.

[16]Ripley, Artillery and Ammunition of the Civil War, 19, 300

Great Britain led the way in rifle experimentation and production. By 1860 four types of British rifles were manufactured in substantial numbers: the Armstrong, Blakely, Whitworth and Clay. The reliability and accuracy of the first three weapons made them very attractive to artillerymen who had the opportunity to use them. The only British weapons used at or against either fort were two Blakelys emplaced at Pulaski.

PROJECTILES

Projectiles available during the 19th century were classified as either shot or hollow shot (shell). Shot was a solid projectile made of iron and named by weight. The spherical shape produced the greatest accuracy in smoothbores because as it rotated the same amount of surface area was always facing forward. An additional benefit included little deflection when hitting an object.[17] Other types of shot available included bar, canister, chain and grape[18]. Although phased out by canister, the name "grape shot" was often used interchangeably with the name "canister shot."[19]

Hollowed shots were projectiles filled with powder designed to break apart with the explosion of the internal powder or upon impact with a target. They were

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[17]Gibbon, The Artillerist's Manual, 155-156.

[18]Still available, quilted grape had been phased out in preference to the economy of the stand of grape by the 1860s. Quilted grape and bar shot were inaccurate due to the rotary motion of the shot, but severe damage could result if either hit a ship's rigging or mast.

[19]Gibbon, The Artillerist's Manual, 160.

named by weight for smaller calibers or by inches for larger weapons. Shells were designed to kill troops, set fires and destroy light structures. Due to their lighter weight, shells had less accuracy and shorter ranges than shot. A shell's ability to cover a larger area offset these deficiencies. Three types of shell used in forts were spherical case (also known as shrapnel), carcass and grenades.[20]

DEFILEMENT

Professors Dennis Hart Mahan and Henry Wager Halleck became the two most prominent American military thinkers during the 1840s and 1850s. Both served as officers in the U.S. Army and taught engineering and military tactics at the United States Military Academy in West Point, New York. As instructors and writers these two men had a significant impact upon the future military leaders of the Civil War. Both wrote books discussing tactics, including how to defile permanent works.

Their writings reiterated the purpose of coastal defenses as found in the Bernard report. They outlined three standard methods of taking permanent coastal works: maritime attack, siege or land assault. Each method had advantages and disadvantages, and the choice of method depended on the terrain around the fort, the size and quality of the work, the size and quality of the garrison and the attacking force, the resources of both, the possibility of reinforcements and the time schedule of the attacking army.

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[20]Shrapnel was named after its inventor, British Lieutenant Shrapnel. Information regarding shells is found in Gibbon, The Artillerist's Manual, 163-166. See glossary for description of each shell.

The advantages of attacking by sea included the economy of men and the element of surprise. Gun for gun, ships required fewer men to operate and support than an army. However, as a general rule land batteries were superior to ship batteries. Seacoast fortifications provided protection for both the guns and crews. In casemate guns only the protruding muzzle was exposed. Aboard vessels the ship's planks offered some protection, but often this "protection" became deadly: when a 42-pound solid shot slammed into the side of a ship, splinters from the planks could become deadly projectiles. The ratio of exposure to enemy fire for a gun crew in a permanent work compared to a similar gun crew aboard the deck of a ship was estimated at 1:20.[21]

Ships had a greater critical factor than forts. The only way to cripple a fort was to destroy most of its guns facing the water or destroy its magazine. A ship had four areas, which if damaged severely, would cripple the vessel: crew, sails/riggings, rudder, and water line. Ricochets proved to be a menace to ships as well. If a hot projectile fell short it could bounce on the water and still hit its target with considerable force. Mortars constituted the greatest threat against ships. If a round fell through a ship it would sink within minutes.[22]

The most important factor for a land battery's superiority was the accuracy and range of the weapons. Land based weapons had stable platforms; ships did not. The only compensations needed when firing from a fort were the few feet of

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[21]Halleck, Elements of Military Art and Science, 163.

[22]ibid.

horizontal and vertical movement of the target. Cannons aboard ships constantly moved up and down. A few degrees off at the origin of fire magnified itself considerably after several hundred yards. The only way to compensate was to move closer to the fort, thus becoming a better target. It was not uncommon to overshoot an objective completely. For example, when French ships bombarded the castle at St. Juan d'Ulloa in 1838, approximately 2,000 yards distance lay between the ships and castle. Of the 8,250 rounds fired by the fleet only about three hundred hit the fort. The remainder overshot. To successfully breach masonry or stone walls required the smoothbore weapons to be within one thousand yards. The damage to ships was much greater than the damage to masonry walls at that range.[23]

Defensive works had greater concentration of firepower. Arms of sailing vessels were distributed evenly on either side; only half the guns could focus on a target at any one time. Not only could garrison guns shoot with better accuracy at longer ranges, most of them were mounted toward the sea. The disadvantages of using the navy led to joint operations with the army. A good example of this was the final campaign against Fort Fisher, North Carolina on 23 December, 1864. In this campaign the navy was used to bombard the fort prior to the land assault.[24]

As an engineer Gillmore knew the advantages permanent works had over naval vessels. This is why he chose to attack Fort Pulaski from land batteries instead of

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[23]ibid., 189-191.

[24]Larry H. Addington, The Patterns of War Since the Eighteenth Century, 2nd edition (Indianapolis: Indiana University Press, 1994) 77-78.

attempting an attack by warships. Union forces attacking Fort McAllister had no choice but to attack from water; swampland and thick underbrush prevented Federal forces from building land batteries. The difference in vulnerability and fire control explains, in part, why McAllister was able to inflict more damage to its attackers than it received while using considerably less ammunition.

The last method used to defile a permanent work was a siege and/or land assault. The purpose of a siege was to starve the garrison into submission. Sieges were the safest way for an army to take a permanent work and allowed full use of the captured fort with minimum reconstruction. Unfortunately sieges took from several weeks to several months. As wars modernized armies could not afford to wait long periods of time for a garrison to fall. Sieges evolved into a way of reducing the garrison's morale and will to fight prior to an assault.

The standard method taught at West Point for assailing fortifications divided the assault into three stages: the investment, opening of the trenches and reduction of the work[25]. The investment included all reconnaissance, surveillance and analysis of the information gathered. Investments took from a few hours to a few days. The engineer's job included determining the shape, size, age, armament and layout of both the fort and the garrison. He had to pinpoint exterior and adjacent defensive works, fields of fire, dead angles and caliber of weapons.[26]

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[25]Mahan, Summary of the Course of Permanent Fortification, 319.

[26]Gibbon, The Artillerist Manual, 433-434, 439-441.

At the end of the surveillance the reconnaissance force isolated the work and its garrison while the main body arrived.[27] The "opening of the trenches" marked the official beginning of the second stage (see illustration #3, "Defilement of Permanent Works"). A line of circumvallation was dug around the fort. The attacking force built batteries along this line and emplaced its heaviest guns inside redoubts. Construction and emplacement of the batteries occurred during the night to prevent the garrison from knowing the exact location. Work was performed in strict observance of noise and light discipline. All weapons on the same parallel had to be emplaced on the same night and then commence firing at first light with the objective of silencing the enemy's guns. After the batteries were emplaced work began on the outer trench, or sap.[28]

Small trenches (called boyaux) approximately six feet wide were dug from the line of circumvallation in a zig-zag manner to the outer parallel. This prevented enfilade fire by the enemy. Huge sap rollers covered the approach of the men digging the trench.[29] Once the boyaux reached the location of the next parallel the trench branched into a "T". Along each parallel redoubts were constructed for siege weapons. This routine was followed until all the parallels were complete. The first parallel lay approximately 600 yards from the most advanced portion of the main

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[27]Gibbon, The Artillerist's Manual, 433.

[28]Ripley, Artillery and Ammunition of the Civil War, 252.

[29]Sap rollers were large gabions (woven brushwood baskets filled with dirt) stuffed with fascines, which preceded the men in the saps.

III. Theory of Defilement

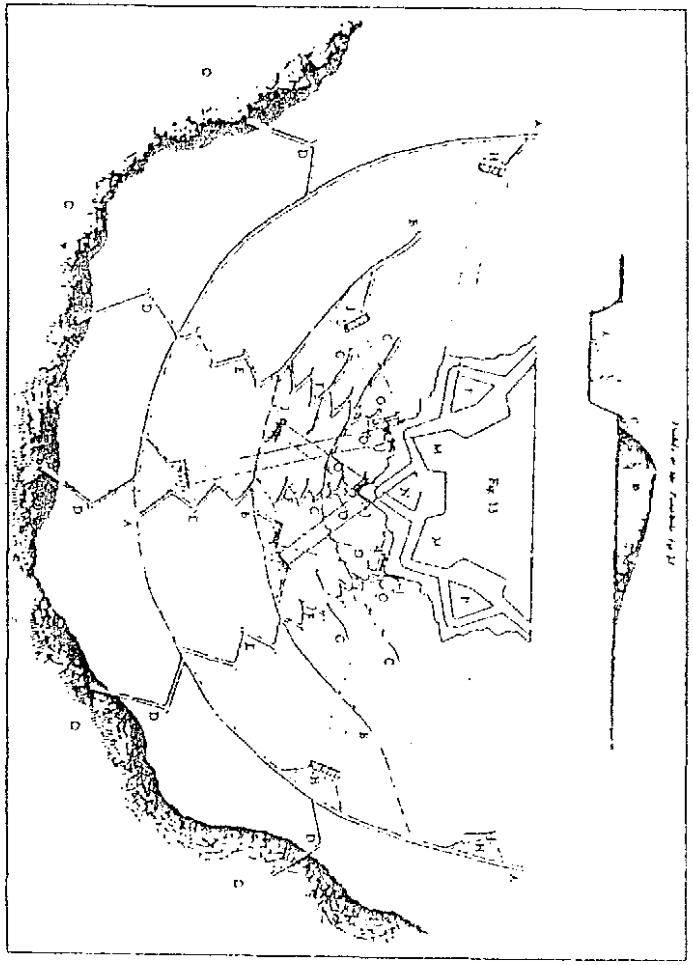
Explanations of Illustration III

Shows a plan for the attack of A permanent work

A. First parallel
B. Second Parallel
C. Third parallel
D. Boyaux leading from the Depots of the trenches to the first parallel
E. Boyaux from the first to the second parallel
F. Boyaux from the second to the third parallel
G. Demi-parallel (optional)
H. Enfilading batteries on the first parallel (redoubts)
I. Enfilading batteries on the second parallel (redoubts)
J. Breaching batteries
M. Bastions of the front attack
N. Demi-lune
O. Breaching batteries (protected by cavaliers)
P. Demi-lunes
Q. Line of Circumvallation

Profile of the trenches (parallel with the right border)

A. Trench
B. Parapet
C. Berm between trench and parapet



Hallack's Elements of Military Art and Science

work, the second 300 yards and the last, sixty yards. As the range of weapons increased so did the distance of the initial parallels from the fort.[30]

Construction of berms inside the third parallel allowed the besieging troops to use plunging fire to drive the defenders from the covered way. Breaching batteries located on the second and third parallels around salient points usually started to batter down the wall just prior to, or after the fort's covered way was abandoned. Another trench was dug around the front and sides of the covered way (referred to as "crowning the covered way"). Tradition called for the commanding general of the offensive forces to offer the garrison commander a chance to surrender just prior to the assault.[31]

This three-phase plan of attack on permanent works had been passed down to generations of cadets at West Point, with modifications to compensate for increased ranges and power of artillery pieces. At the outbreak of the American Civil War these tactics were still being taught by Professors like Halleck and Mahan. These tactics were being practiced by regular army officers like General Quincy A. Gillmore, who followed these steps when he attacked Fort Pulaski. Even the advice given by General Robert E. Lee to Colonel Olmstead during Lee's November 1861 visit to Pulaski reflected the same tactics.

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[30]Ripley, Artillery and Ammunition of the Civil War, 253.

[31]Ripley, 252-253.

III:
Let the Work Begin: The Construction of Forts Pulaski and McAllister

Throughout the 19th century engineers sought ways to improve fortification defenses in an attempt to remain one step ahead of the technology and tactics used against such works. Unlike frontier forts, those located on the coast had a significant advantage over their primary threat: ships could not maintain parity until the late 19th century. Nations could afford to spend tremendous time and resources constructing permanent works because improvements in weaponry were more advantageous for forts than for vessels. The key to such works was permanence. Pulaski took eighteen years and over one million dollars to construct and had a projected life span of decades. By contrast, the key to earthen forts was expediency. Forts like McAllister were built within months and were expected to be abandoned within a year or two.

SITE SELECTION AND FORT DESIGN

The ideal location for a seacoast fort was at the mouth of a harbor or river, preferably on an island. Coastal sites allowed for earlier detection of a fleet and longer time to track its direction of travel. An island fort, like Pulaski, provided safety against land assault.

The foundation became the most important technical consideration for the construction of forts, especially for multi-tier works. The cost of the foundation could easily constitute the largest single expenditure for a fort, excluding its armament.[1] If a viable threat from land existed, then the walls had to be arranged to provide flanking and supporting fire along all parts. This allowed more protection for the defenders and permitted other parts of the fort to defend a breached wall. Because the threat to seacoast works was from the sea and not land, most seacoast forts were designed as polygonal shaped.

The polygonal system took a variety of shapes including star and pentagon-shaped forts. These designs were simple to build and had a large internal space for troops. They did not allow for secondary defenses inside or outside of the fort, with the exception of a moat, and often incorporated the magazines into the walls of the structure. The magazines, usually located on the same wall as the sallyport, had a demilune to provide protection against a direct attack.[2] Because the strength of the fort was determined by the number of guns that could be brought to bear on a target, coastal forts were usually multi-tier structures.

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[1]General LeLouterel, Manual of Military Reconnaissance, Temporary Fortification and Partisan Warfare, for Officers of Infantry and Cavalry, translated by John M. Richardson, (McPherson & Co: Atlanta Ga, 1862) 31, 42-43.

[2]Mahan, Summary of the Course of Permanent Fortification, 71-75, 173-175.

FORT CONSTRUCTION

Most of the time involved in constructing forts went into building the main work (see illustration #4A, "Typical Fort Cross Section," and illustration #4B, "Typical Fort Schematic"). Demilunes provided safe havens for troops preparing to depart the work and served to protect the fort's entrance and main magazines. The primary threat to the demilune was an assault, so its armament usually consisted of field weapons and a few heavier pieces to attack the enemy's siege cannons. The covered way, actually part of the demilune, served as a protected position for infantry along the rim of the demilune. Many forts had detached works, which consisted mainly of batteries that supplemented a fort's firepower. Their purpose was to keep ships further away from the main work. Batteries were often included in the design of a fort because the cost was low.

Permanent works, by definition, had to be constructed of durable materials like brick or stone. They were the two permanent materials used to construct seacoast fortifications. The biggest advantage to brick was its availability. All large cities and many smaller ones had brick foundries. There had to be stone quarries in the region for construction with stone to be cost effective, so few U.S. coastal forts were built of stone. Military engineers and many officers, particularly artillerymen, knew that the time and cost of construction of earthen forts as well as repairs during combat were considerably less. But erosion of earthen works required increased maintenance and

this in turn increased long-term costs. An important stipulation to American coastal works was that they should be economical.[3]

PULASKI'S PRELIMINARY CONSTRUCTION

Bernard hand-picked Cockspur Island as the spot for the fort that would defend the mouth of the Savannah River. The island, situated off the elbow of Tybee Island, was sheltered from storms in the Atlantic, yet commanded the entrance to the Savannah River. Troops located in the lighthouse on Tybee Island could provide early warning of enemy ships. What made Cockspur the ideal choice was its defense against attack by land, traditionally the weakest point in a seacoast work's defense. The nearest solid land capable of holding siege guns was on Tybee Island, approximately 1,700 yards away and thus beyond the effective range of available weapons. The surrounding river banks, primarily swampland, made siege practically impossible. An amphibious assault would be suicide, for landing craft would be within a few hundred yards of the fort's guns anywhere on the island.

Congress approved the site in 1826 and appointed Major Samuel Babcock the engineer in charge. Babcock began to survey the island after its purchase in 1827. The initial survey revealed the ground would not support one tier, let alone the three-tier fort Babcock had drew. He designed a series of pilings and grillage to provide

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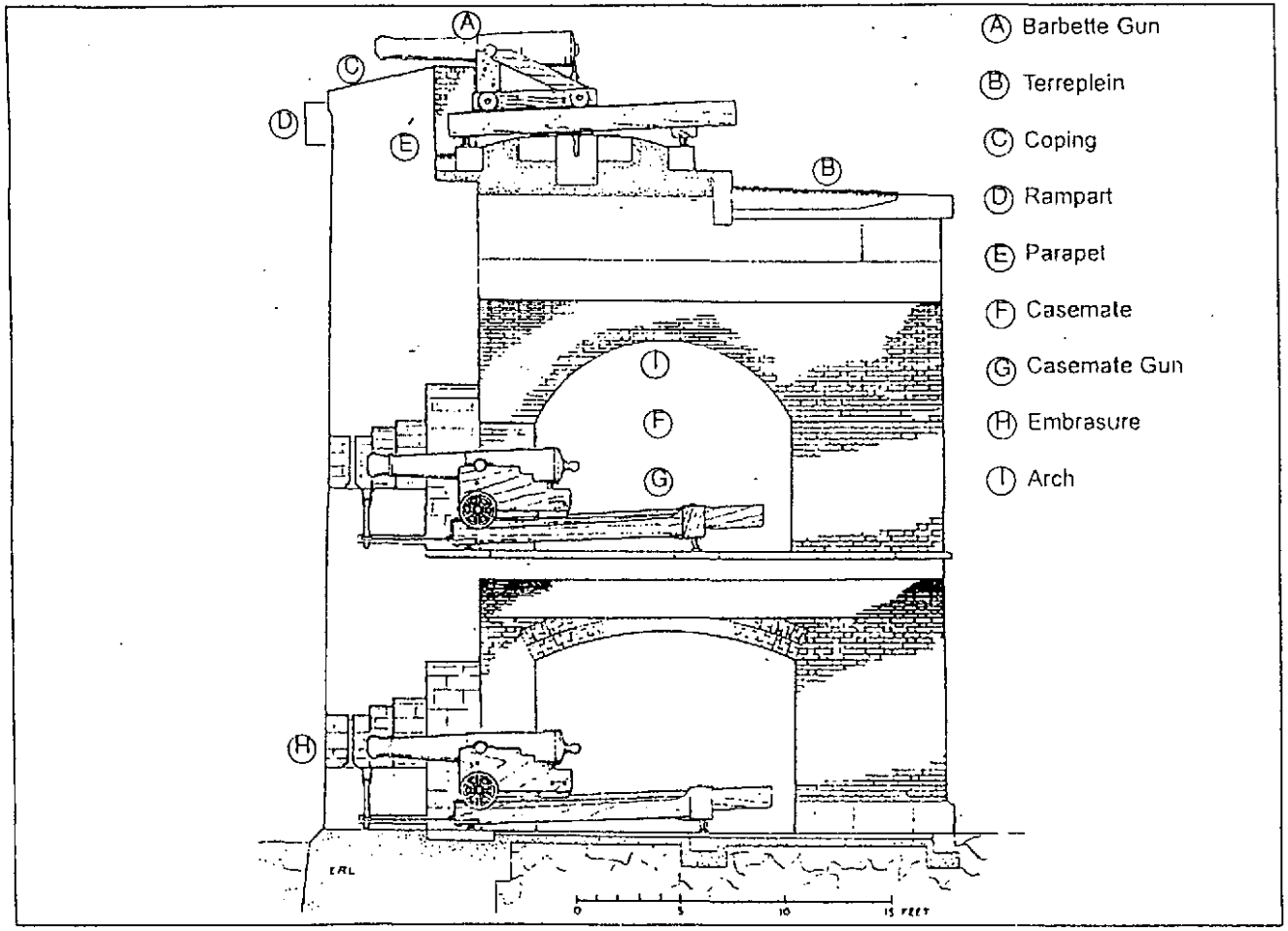
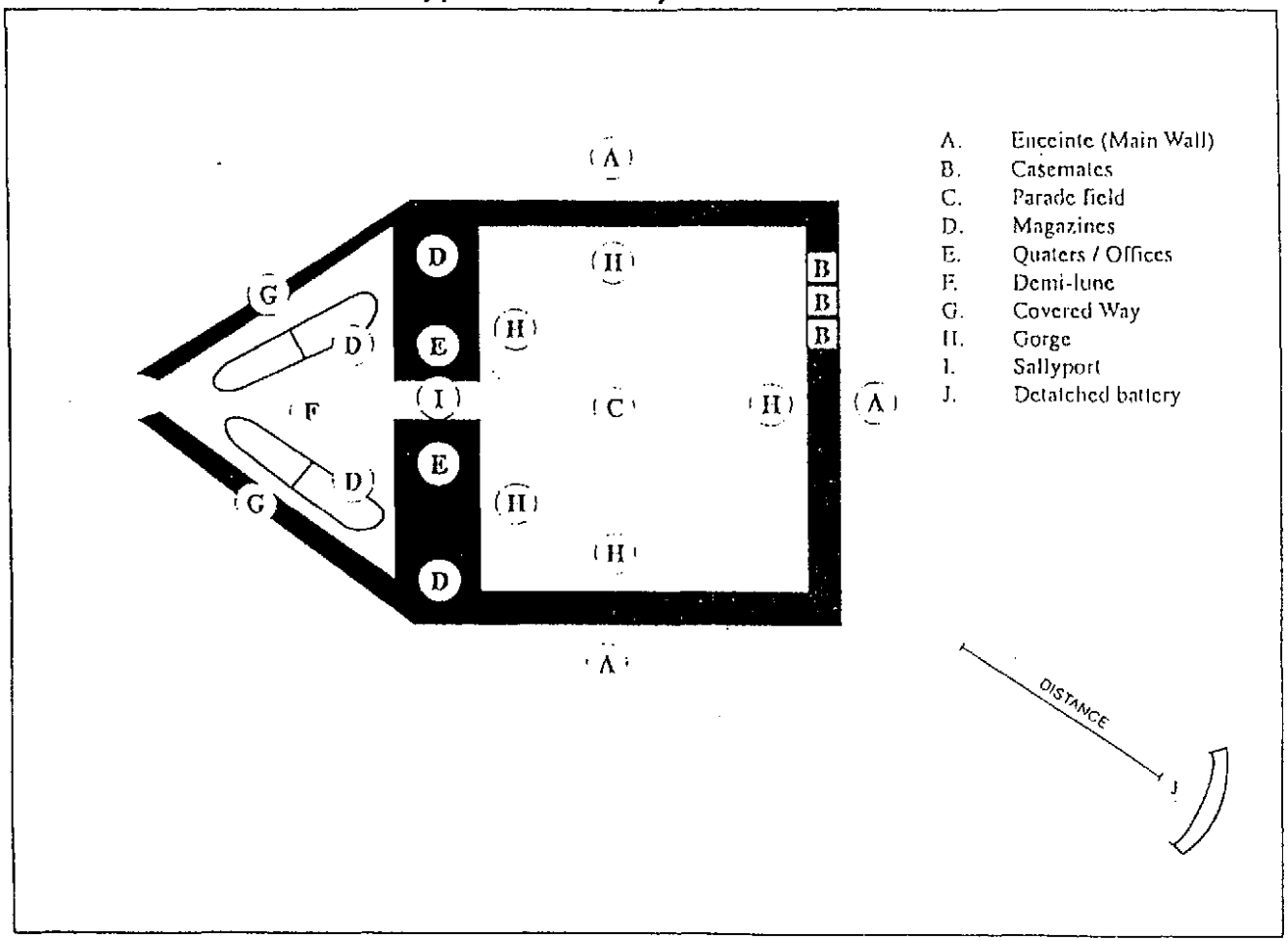
[3]Dennis Hart Mahan, Summary of the Course of Permanent Fortification and the Attack and Defense of Permanent Works, for the Use of the Cadets of the United States Military Academy (Charleston, S.C.: Steam Power Press of Evans & Cogswell, 1862) 35-40.

IVA. Typical Masonry Cross Section



Lewis, Seacoast Fortifications

IVB Typical Masonry Fort Schematic



support and drainage for the foundation. Twenty-three hundred to twenty-five hundred pilings were eventually installed to support each wall.[4]

In 1831 Babcock retired due to poor health. His replacement, Lieutenant Kenneth F. Mansfield, performed his own survey and concluded that Babcock had erred in the initial survey. In September of 1831 Mansfield revised the plans by expanding the foundation and shifting the center mass of the fort a few degrees from its original axis. These significant changes increased the cost of construction and delayed completion of the fort, but were necessary to ensure that the fort be as soundly constructed as possible. Congressional and military leaders expected coastal works to remain active for decades.[5]

Each year work stopped during the summer due to heat, humidity, dysentery and malaria. The time spent on construction of the fort averaged six to seven months out of each year. Even though personnel protected and maintained the property between work periods, some maintenance time was always required prior to resumption of work.

Most of the work completed between 1832 and 1837 was on the foundation (constructing pilings, grillage, crosswalls and counter-arches).[6] The work produced nothing one could identify as a fort. Construction of the main wall (enceinte) began in 1837, ten years after the project began. Between 1837 and 1839, all embrasures

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[4]RG 77, Box 6, B665.

[5]Rogers W. Young, "Board of Engineers", The Georgia Historical Quarterly, vol. 49, 43.

[6]Counter-arches provided additional support for the weight of the casemates.

and their arches were completed as well as the piers and internal walls. An extended work year enabled the main body of the fort to be completed by October 1839.[7]

The finishing touches within the fort began in 1840. The work included completing the quarters, filling and leveling the parade ground, excavating, filling counter-arches for additional casemates and miscellaneous work on the gorge. As of 30 September, 1842, approximately $739,000 had been spent on the construction of Pulaski, roughly twice the original estimate of $333,000.[8] Mansfield's replacement, Captain B. L. Alexander, resumed work 1 November, 1844 and finished all but miscellaneous items for the fort. The work performed in 1845 and 1846 included maintenance and minor construction such as carpentry, plastering, sloping and sodding. Anderson declared the fort officially completed in 1847.[9]

The chart below gives the reader an idea of how massive a project coastal fortifications were.

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[7]RG 77, Box 105, M409.

[8]RG 77, Box 107, M976 & RG 77, Box 108, M1058, Box 109, M1380.

[9]RG 77, Box 2, A573; Box 1, A474.

Yearly Expenditures for Fort Pulaski[10]

YEAR	AMOUNT APPROP.	INFLATION RATE (1828= $1.00)	1967 DOLLARS	EST. AMOUNT TO COMPLETE	EST. OF COMPLETION	REQUESTED FOLLOWING YEAR
1828	$ 25,000	$ 25,000.00	$ 75,757.00	+	+	$ 75,000
1829	$ 75,000	$ 77,250.59	$234,375.00	+	+	$ 50,000
1830	$ 5,000	$ 5,150.64	$ 15,625.00	+	+	$ 0
1831	$ 0	$ 0.00	$ 0.00	+	+	$ 0
1832	$ 46,000	$ 41,869.00	$153,333.34	+	+	$ 82,000
1833	$ 75,000	$ 66,000.00	$258,260.69	+	+	$105,000
1834	$ 82,000	$ 74,642.00	$273,333.34	+	+	$105,000
1835	$ 0	$ 0.00	$ 0.00	$395,948	+	$155,000
1836	$170,000	$170,000.00	$515,151.52	$331,711	1838	$239,000
1837	$ 90,000	$ 92,727.28	$264,705.89	+	1840	$220,000
1838	$100,000	$ 97,000.00	$312,500.00	$215,000	1841	$140,000
1839	$ 15,000	$ 14,550.00	$ 46,875.00	$171,0000	1843	$ 43,767
1840	$ 59,000	$ 53,690.00	$196,666.67	+	+	$ 43,767
1841	$ 35,000	$ 32,900.00	$112,903.23	$129,0000	1844	$ 60,000
1842	$ 0	$ 0.00	$ 0.00	$ 60,000	1845	$ 60,000
1843	$ 60,000	$ 51,000.00	$214,285.72	$ 60,000	1846	$ 30,000
1844	+	$?	$?	+	1847	$ 25,000
1845	+	$?	$?	+	1848	$ 25000
	$ 837,000	$801,779.51[11]	($2,673,772.40)	+ = not available		$1,458,534

With the possible exception of the foundation, construction of Pulaski was similar to that of any other seacoast fort in this period. The key characteristic for coastal forts was "permanence". It took four years to complete the grillage and foundation. The main work took another twelve years to finish. Every step of the project was designed and built to last. The concept for Pulaski, and other U.S. seacoast forts, originated from the lessons of history. Those lessons held that any threat to the U.S. would come from the sea, and that a permanent work was stronger

[10]RG 77, Box 107, M976.

[11]Total spent was over $1 million.

than a water-based attacker. A land based siege was not considered possible because the distance between Pulaski and Tybee Island was greater than the ranges needed by smoothbores to breach walls as thick as Pulaski's.[12] Congress must have thought that Pulaski would serve for decades if they were willing to invest an enormous amount of money into Pulaski's construction.

Yet Pulaski only lasted fifteen years and one battle. Until the mid-1850s the weapons available were not powerful enough to breach the walls of Pulaski from land emplacements at the range available to them. The builders' assumption was that if more powerful, accurate weapons with greater range were invented, forts would also have them. Therefore Pulaski would be able to destroy enemy batteries while they were under construction. The concept of Pulaski was well thought out and the principles applied were sound. However, as Pulaski's history during the Civil War indicates, the rate of change outstripped man's ability to fully comprehend the implications of such change. Rapid changes and the conditions of the war forced military engineers to experiment in response to the fluid conditions of the battlefield. Earthen forts were one response.

EARTHEN FORTS

The construction of an earthen fort was really quite simple. With a solid foundation an earthen battery or fort could be built just about anywhere. For hundreds of years military engineers had known the superiority of earth over stone

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[12]Pulaski's walls were 7 1/2 feet thick and 25 feet high.

and brick at absorbing solid shot. Other advantages of earthen forts included quick and easy construction, diversity of locations, low construction cost and availability of materials. Disadvantages included a relatively short life span, regular maintenance and susceptibility to land assault.

Methods used to reduce erosion included sod and brick revetments. But sod required constant cutting and trimming during the growing season and brick or stone revetments would lose support and crack as the dirt settled. Earthen forts could only be constructed as one tier barbette batteries, thus effectively limiting the offensive firepower and exposing the gun crews to enemy fire. Earthen forts looked small, dirty, and somehow unprofessional.[13]

Construction of an earthen fort began with staking the location the walls and assembling a wooden box. A ramp was built allowing workers to walk to the top of the box to easily fill it. At periodic intervals the dirt was packed tight using logs similar to short telephone poles. This continued until the box was packed solid, then the workers disassembled the frame. Buildings, or bombproofs, were built in the same manner. Heavy reinforced timbers supported a light shell (not unlike a mine shaft), and then workers packed dirt around the structure. The most important part of construction was the gun platforms. After erection of the walls a terreplein was built to elevate the weapons ten to twenty feet above the surrounding area. The platforms were much more susceptible to decay than their counterparts in masonry works

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[13]George R. Collins, ed., Military Considerations in City Planning: Fortifications, based on works by Horst de la Croix (George Braziller Press: New York, 1972) 40-44.

because they rested on the ground. Additional features could be built as time allowed, such as traverses between the guns, hot shot furnaces and bomb shelters. Protective measures against land assault included ditches, palisades, abatis, and howitzers.[14]

Records pertaining to the construction of Fort McAllister are few. Initially it was just one of a series of temporary batteries constructed around Savannah to protect the city from attack by land and sea. Work apparently began sometime in the spring of 1861, for in August of that year an advertisement in a Savannah newspaper called for bids on supplying beef to a garrison at Genesis Point.[15] The initial fort consisted of four guns protecting an obstruction across the Ogeechee river that prevented vessels from sailing upstream. The low threat level made construction of the fort a slow process. Impressed slaves used to build the fort were allowed to return to their masters periodically to work in the fields.[16] The official report of the first attack by a Union vessel in July 1863 described McAllister as an earthen battery. However, by November the captain of another Union vessel reported the earthen work as a fort.[17]

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[14]Department of the Army and Fort Stewart Museum, Roger S. Durham, curator, "Staff Ride for Forts Pulaski and McAllister, Georgia" (Ft. Stewart: Hinesville, Ga, 1994) 14-15.

[15]Savannah Daily Morning News, August 5, 1861.

[16]Miscellaneous military orders calling for the impressment of Negroes can be found in the Charles J. Beatty Collection, Box 60, Georgia Historical Society, Savannah GA.

[17]United States Government, Official Records of the Union and Confederate Navies in the War of the Rebellion, series 1, volume 9,

The chief engineer of the Savannah district was Captain John McCrady. He designed McAllister and supervised its construction and repairs after naval engagements. His assistant, Captain James McAlpin, was the actual engineer-in-charge on site during construction.[18] McAllister was raised in sections as time and money allowed. For many months it remained little more than an earthen battery. It had an open rear and thus no defenses against land assault. In fact, the garrison was housed a mile down the road because there was no room in the vicinity of the battery. Outside the perimeter a clearing served as the bivouac site for a small contingent of troops on guard. If the fort came under naval attack, these guards would man as many guns as they could until the arrival of the remaining garrison.[19]

The erection of magazines, supply rooms and the hospital started after completion of the battery. Construction of traverses approximately 10-15 feet high offered flank protection against ricocheting balls and dismounting guns.[20] Although there is no record when McCrady made the decision to enclose McAllister, the available information suggests it was after the fall of Pulaski in April of 1862. The Confederates dug a dry ditch around the fort after raising the last wall. The ditch leveled off with the river on both sides of the fort and contained palisades designed to slow down an assaulting force. The remaining land defenses consisted of three field

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[18]R. Jarvis Cooke, "Sand and Grit: The Story of Fort McAllister; A Confederate Earthwork on the Great Ogeechee River, Genesis Point, Georgia", student technician paper, Fort Pulaski, GA, 1938) 10.

[19]Oral interview with Kenny Roberts, Park Ranger, Fort McAllister, Georgia on February 3, 1994.

[20]Ft. Stewart Museum, "Staff Ride", 14-16.

pieces pointing toward the mainland and a cleared field of fire several hundred yards in depth.

In July of 1862, McAllister had an armament of one 42-pounder and five 32-pounder guns (all smoothbores). After the fall of Pulaski the Confederate military leadership re-invigorated McAllister's defenses by adding more weapons as they became available. McAllister became an important link in the ring of earthworks around Savannah by serving as the southern anchor for the city's defense. McAllister guarded one of two river routes to the city and would became the focus of several attacks by gunboats and monitors over the next year and a half.[21] The U.S. Navy attacked McAllister nine separate times before giving up its attempts to destroy the fort. McAllister was the primary target in six of the attacks. The primary targets of the other three attacks were blockade runners and a reconnaissance boat.[22] As one young defender wrote to his mother "The Yanks can never take it [McAllister] so long as they knock at the front door."[23]

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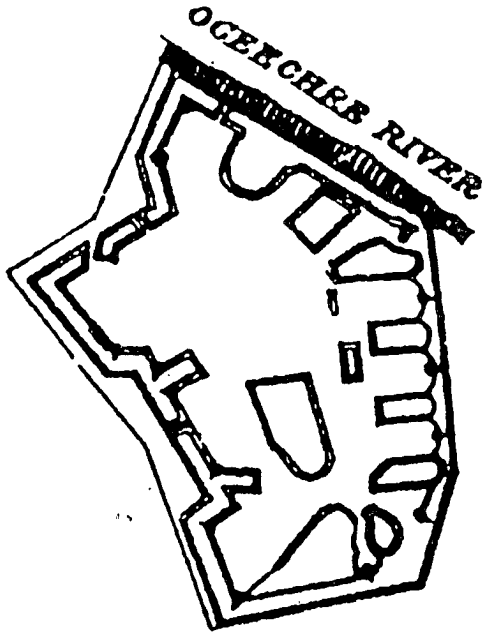
[21]Fort Jackson, a few miles above Pulaski, guarded the Savannah River channel.

[22]Two attacks focused on the blockade runner C.S.S. Nashville (re-named Rattlesnake), the third attack focused on a small reconnaissance boat.

[23]Goff Collection, Fort McAllister file (Bryan County), Georgia State Archives, Atlanta GA.

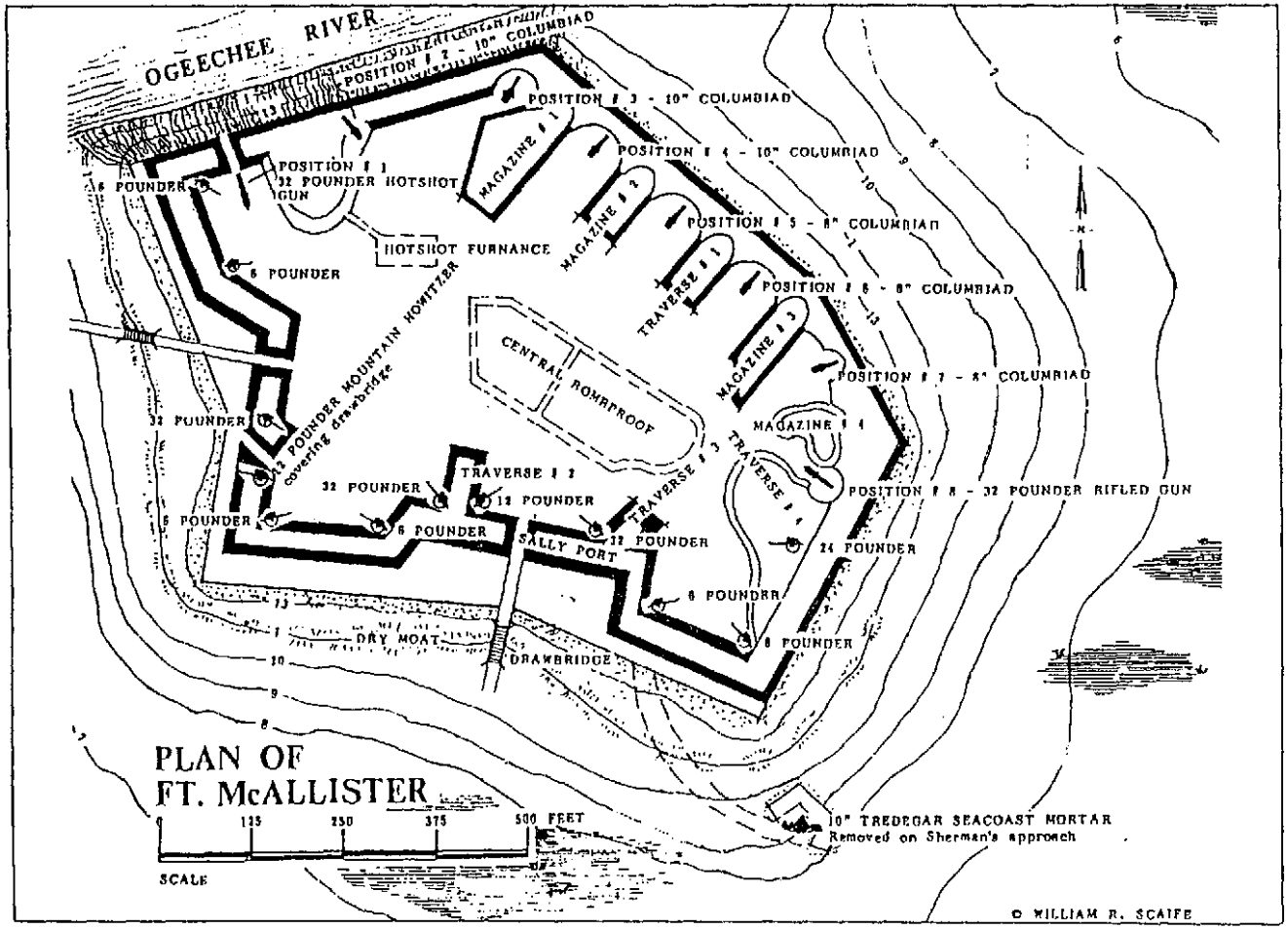
VA. Plan of Ft. McAllister (O.R.)



Fort McAllister

O.R. (Navy), Series I, Vol. 13

VB. Plan of Ft. McAllister (Scaife)



Scaife, March to the Sea

IV:
ALL FOR NAUGHT: THE REDUCTION OF FORTS PULASKI & McALLISTER

Fort Pulaski fell on 11 April 1862 due to the devastating effects of rifled fire. Pulaski's commanding officer, Colonel William Olmstead, believed the fort would be virtually impregnable to an attack by the United States. General Robert E. Lee, commander of Atlantic seacoast defenses for the Confederacy, agreed. The commanding officer of the attacking force, General Quincy A. Gillmore, also thought the reduction of Pulaski would be nearly impossible, and he spent almost three months preparing. Most of that time was used to emplace smoothbore cannons. Yet the weapons that were emplaced first and actually breached the fort were rifled guns. Few people recognized that rifled weapons had made traditional masonry forts obsolete, even the officers who used them. Earthen forts like McAllister survived repeated attacks by the same types of weapons that destroyed Pulaski.

PULASKI'S DEFENSE

Georgia's Governor Joseph E. Brown ordered Fort Pulaski seized on 2 January 1861. Although Georgia had not yet seceded from the Union, Brown did not want a "Fort Sumter experience"--that is, for the Union to have control of the state's primary harbor by occupying its most strategic fort. On 4 January, Olmstead arrived on

Cockspur Island with a force consisting of the Savannah Volunteer Guards, the Oglethorpe Light Infantry and the Chatham Artillery. When Confederate forces took possession of Pulaski it was a pleasant, yet anti-climactic experience for the home guard units. They found the drawbridge down, the portcullis up and the caretaker waiting. In a very civil exchange Georgia troops peaceably occupied the fort.[1]

Olmstead inventoried the fort's arsenal immediately upon occupation and started to strengthen its defenses. He found twenty naval 32-pounders with rusted cartridges, some powder and a few solid shots.[2] Olmstead believed the fort would only fall to a land-based assault and prepared it accordingly. Confederate troops dredged the moat and salvaged exposed parts of a sunken vessel in Wall's Cut (see illustration #1). The ship's spars were expected to be thrown against Federal troops if they scaled the walls. Ship chains were cut into small sections and wrapped in bags to make home-made grape shot.[3]

Activity along the coast was at an all time high as Lee ordered Confederate forces inland to better defensive positions. When Port Royal, South Carolina, fell to the Union on 7 November 1861, Confederate authorities and coastal southern states knew it would serve as a base of operations for the Union blockade and perhaps as a

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[1]Olmstead, Fort Pulaski, 98-99.

[2]Confederate forces added five 10" Columbiads, nine 8" Columbiads, three 43-pounder guns, two Blakely rifled guns, one 24-pounder howitzer, two 12-pounder howitzer, two 12" mortar, three 10" sea-coast mortar and one 6-pounder gun. Gillmore, Siege and Reduction, 67.

[3]Lilla Mills Hawes, ed., Collections of the Georgia Historical Society: The Memoirs of Charles H. Olmstead (The Georgia Historical Society: Savannah, 1964) 81, 91.

base for land operations. The two closest and most likely targets were Savannah and Charleston. Both ports were the largest and most important for their respective states. Lee visited the Savannah area from November 1861 to January 1862 to inspect its defenses.[4]

Lee recommended building traverses between the barbette guns, digging ditches in the parade ground to stop stray rounds, and building blindages[5] for the casemate doors. Tybee Island was one of the positions ordered evacuated by Lee, for Olmstead did not have sufficient troops to hold the island against an amphibious assault. As Lee pointed to Tybee Island 1,700 yards away, he remarked "Colonel, they will make it very warm for you with shells from that point but they cannot breach at that distance."[6] This comment showed that an engineer as experienced as Lee did not recognize the changes brought by the widespread use of rifled artillery.

Union General Quincy Gillmore received permission to attack Pulaski to gain experience before attacking the more formidable defenses of Charleston harbor. He made only a quick reconnaissance of the area because Pulaski had been a Federal fort less than a year earlier. He had no trouble getting blueprints for the structure, navigational maps for the Savannah River and Wassaw Sound, as well as first hand information about the area from runaway slaves. After reconnaissance Gillmore decided to isolate Pulaski from its supply base in Savannah, reduce it by siege guns

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[4]ibid., 100-101.

[5]Blindages were planks or poles emplaced at an angle to cover an opening. Dirt was then packed on top to absorb the impact of rounds.

[6]ibid., 102.

on Tybee Island and then take the fort by amphibious assault. This would be a textbook operation for reducing a permanent work with one exception: his guns were at or beyond their maximum effective range (see illustration #6, "Destruction of Fort Pulaski").

The investment started during the middle of January 1862. Gillmore erected two batteries above the work, one at Venus Point (Jones Island) named Battery Vulcan and the other on Bird Island, named Battery Hamilton. These batteries were placed to cut the main supply route from Savannah to Pulaski and not designed to attack the fort. Federal engineer troops removed the obstacle blocking Wall's Cut, which was part of an inland water route between Savannah and Charleston. A joint force of soldiers and sailors built a causeway approximately 1,300 yards in length across the marshlands on Jones Island to Venus Point. Actual construction of the causeway and battery took place between the 1st and 12th of February. The weapons were emplaced and ready for action by daybreak on the 12th of February.[7]

The process that built the battery at Venus Point would be mirrored by the batteries erected on Tybee Island. All materials were brought to the site. Work started at dusk and halted prior to dawn, with the progress covered with grass and wet sand to hide evidence of construction. The weapons were rolled on fifteen foot long

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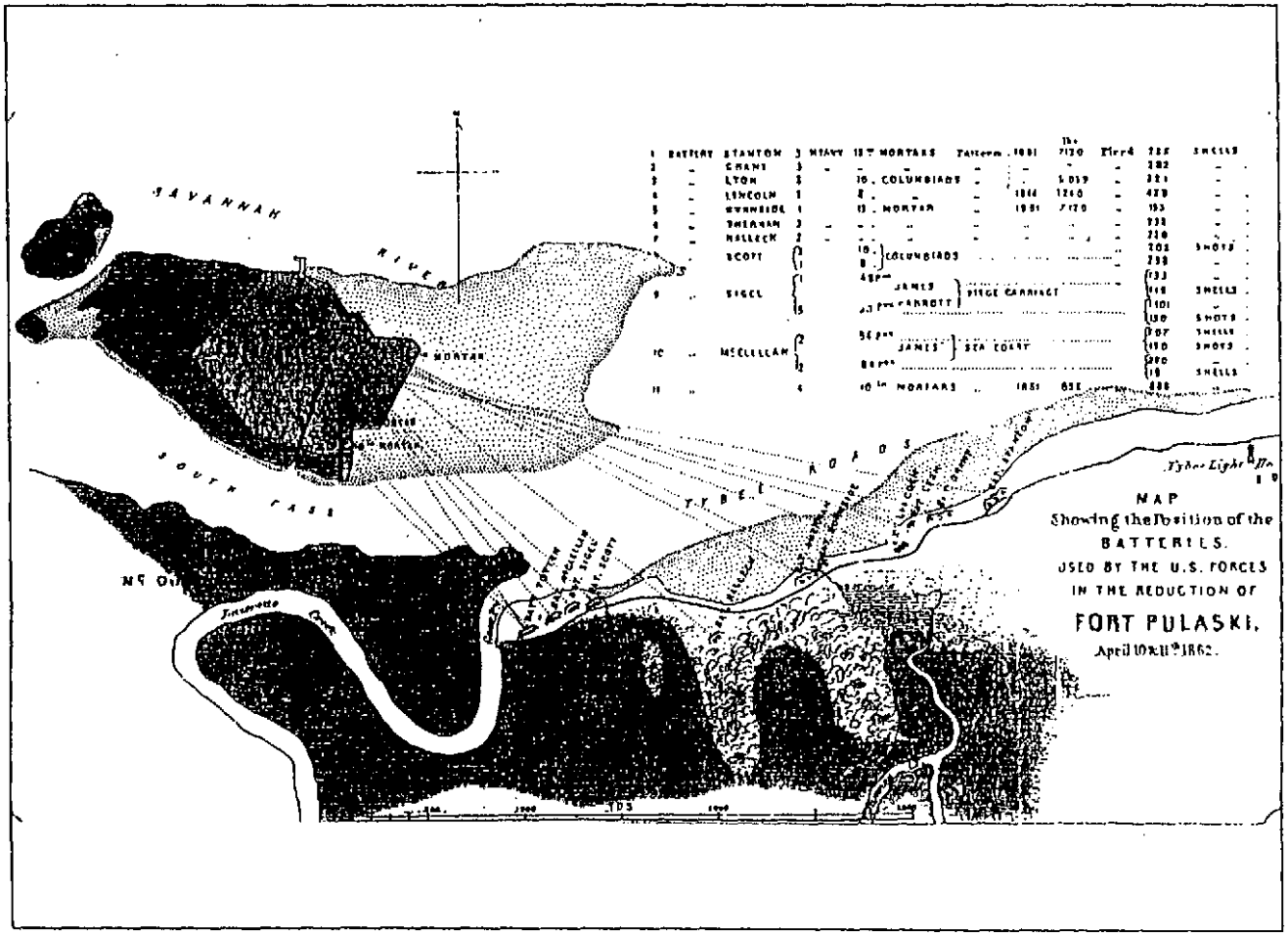
[7]Gillmore, Siege and Reduction, 15-20.

VI. Destruction of Fort Pulaski



Gillmore, Siege and Reduction

planks across the island. Pulleys and levers were constructed to raise the weapons that slid off the planks.[8]

The only solid land on which Union troops could build breaching batteries against Pulaski was Big Tybee Island. The first vessels with siege materials arrived on 21 February, 1862. The Federal armament was divided into eleven batteries for a total of thirty-six pieces, ten of which were rifled.[9] The range of the batteries from Pulaski was between 1,650 yards and 3,400 yards.[10] Seven of the eleven batteries were within range of Pulaski's guns and the five most advanced batteries had no natural cover or concealment. If guns emplaced on Tybee Island could hit Pulaski, then the guns in Pulaski could hit the batteries emplaced on Tybee Island. Gillmore therefore devised a plan to build his batteries without Pulaski's garrison detecting and destroying them. His men slowly built up the surrounding area during the night over a period of weeks until there was sufficient protection for work crews.[11] No sudden change in the outline of the landscape could occur lest it arouse suspicion. After the cover and concealment had been completed, some of the more routine mechanical

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[8]ibid., 19-20.

[9]Rifles: two 84 pounder James, two 64 pounder James, one 48 pounder James, five Parrotts. Smoothbores: four 10" siege mortars, twelve 13" mortars, six 10" Columbiads, four 8" Columbiads.

[10]For the name, weapons and approximate distance of each battery, see illustration 6, "The Destruction of Fort Pulaski".

[11]ibid., 19-20.

work in the battery areas, such as improving the platforms, could continue during the day[12].

The Confederates knew that Federal forces had occupied the island and could hear activities from their crews at night. Each morning Confederate sentries would scan the horizon in search for some evidence of where the Federals were working.[13] Olmstead never fired on Tybee Island during this time because he could never locate a target. He made the decision not to blindly expend rounds in the hope that he might hit a battery site. Instead, he decided to save his limited ammunition for the "big fight".[14]

During the following week Major General David Hunter, commander of Union forces for the Department of the South, and Brigadier General H. W. Benham, commander of Union forces for the Northern District, Department of the South, inspected the batteries around Pulaski. Both were pleased with what they saw. On 9 April Gillmore issued General Order #17, his operation order for the reduction of Fort Pulaski. As was traditional, Hunter dispatched a messenger under a flag of truce at daybreak on the 10th of April requesting the unconditional surrender of the fort. Also following tradition Olmstead declined the request, responding that he was

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[12]Gillmore, Siege and Reduction, 25-26.

[13]ibid., 26.

[14]Hawes, Memoirs, 95.

charged with defending the fort, not surrendering it. Approximately thirty minutes later Union batteries commenced firing.[15]

The first battery started at 0815 and by 0930 all weapons had joined the barrage. Gillmore was impressed with the performance of his rifled guns; through his telescope he saw that the areas hit were "deep and effective," particularly on the southeast wall. By the end of the day it was evident to him that Pulaski's walls would be breached within a day or two. However, he was very disappointed by the performance of the mortars. Gillmore estimated that only 1/10th of the mortar rounds were landing within the structure, and those created no damage of significance. "We may therefore assume, that mortars are unreliable for the reduction of a good casemated work of small area, like most of our sea-coast fortifications."[16] The same mortars would have to be used just prior to an assault, which he still believed would be necessary. Gillmore's training had instilled in him the traditional steps for reduction of a permanent work. He still planned to carry out those steps even though the rifled weapon's potential was unfolding in front of him.[17]

Olmstead directed Pulaski's weapons toward the closest Union batteries but was disadvantaged from the start. His men had little experience aiming and firing the heavy ordnance, and only twenty weapons could be trained on the Union batteries due to the divided locations on the northeast and southeast walls. Of the twenty weapons,

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[15]Gillmore, Siege and Reduction, 27, 32.

[16]ibid., 52.

[17]ibid., 33-35.

only fifteen were direct fire weapons including one Blakely rifle. Once the bombardment started there was no way to relocate the other weapons inside the fort. On the evening of the 10th Olmstead made an inspection of the southeast wall's breach and realized the fort would fall the next day.

Union forces continued harassment fire throughout the night with three mortars and a Parrott rifle. On the morning of the 11th all batteries resumed firing. Most of the Federal weapons specifically targeted the south-southeast angle of the fort with the goal of breaching the wall and striking the north magazine.[18] As the morning progressed the breach grew larger until shots slammed into the blindages and bounced around the parade field. Sometime after 1300 a round exploded in the passageway of the north magazine creating a great deal of fire and smoke. Miraculously the magazine did not explode, for had it done so the fort would have been effectively destroyed. Confederate troops were afraid to retrieve munitions for fear that another round might land in the magazine. Olmstead realized that continued resistance had no benefits and would only lead to unnecessary loss of life. Shortly after 1400 Fort Pulaski's commanding officer signaled for surrender.[19]

In his memoirs Olmstead noted that he feared his military career was over. He knew Pulaski's garrison did all they could to defend the fort, and also knew that

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[18]Gillmore, Siege and Reduction, 35-36.

[19]Olmstead, Fort Pulaski, 104.
Hawes, Memoirs, 98-99.

Pulaski was obsolete. His concern was that no one else would recognize the fact.[20] Olmstead's conclusions were the same as Gillmore's: rifled guns had far greater range, accuracy and power than smoothbores.[21] The key to defending Pulaski, or any fort, lay in distance. The defending work had to have weapons with equal or greater range than the enemy.[22] Although Federal ships were present during the bombardment, none participated. Land based weapons destroyed Pulaski. In retrospect, its fate was sealed with the fall of Tybee Island, an island Confederate authorities evacuated because they considered it of little threat.[23]

Using Pulaski as a case study primarily serves to illustrate the effectiveness of rifled artillery against masonry walls. Unfortunately, the battle does not adequately show how well earth performed against rifled weapons because Pulaski only had one rifled gun in use against the Federal batteries. Olmstead specifically mentioned using his Blakely against the Union battery closest to the Fort (either Battery McClellan or Sigel) in an attempt to silence it.[24] According to Gillmore, the only damage to his

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[20]Pulaski's garrison was sent to Governor's Island, New York, where the officers were kept in Fort Columbus and the men in Castle Williams. Olmstead was exchanged in the fall of 1862, after which he was assigned to military service in the Western theater and eventually transferred to Virginia. Olmstead, Fort Pulaski, 105.

[21]Hawes, Memoirs, 99.

[22]Pulaski only had one weapon, a Blakely, that was capable of effectively reaching Federal Batteries.

[23]Lieutenant Colonel Charles C. Jones Jr., A Historical Sketch of the Chatham Artillery during the Confederate Struggle for Independence (Albany, NY: Joel Munsell Company, 1867) 68, 82-83. Book found at the GA Historical Society.

[24]Hawes, Memoirs, 98.

artillery was to four Columbiads that were dismounted by their own recoil. Three were remounted and continued in the bombardment. Pulaski's weapons did no damage to Federal earthen batteries.

The destruction of Pulaski was hailed as a grand experiment by political and military leaders who later described Gillmore as a brilliant engineer. Although the method used was the standard taught at the U.S. Military Academy, what made the attack "a grand experiment" was the distance between the two sides. At an average range of 1,650 yards for the closest batteries, Gillmore should not have been able to breach Pulaski's walls, in theory. In his report Gillmore referenced two European experiments comparing the performance of rifles to smoothbores. But this was the first time the two types of weapons were used together in combat and at such distances.[25] Gillmore was quick to realize this and documented the results.

Gillmore proved the superiority of rifled guns by computing the number of pounds of metal required to breach a linear foot of masonry wall. Smoothbores needed approximately 2,544 pounds of iron per linear foot, whereas rifles needed 2,139 pounds per linear foot to breach Pulaski's wall.[26] Gillmore also documented the penetrating power of rifles and smoothbores, as shown in the following chart.

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[25]For more details, read Gillmore's Siege and Reduction, sections 121-127.

[26]Gillmore, Siege and Reduction, 47-49.

KIND OF GUN	DISTANCE	KIND & WT. PROJ	ELEV	CHRG	PENETR
OLD 42# RIFLE	1650 YDS	JAMES' 84# SOLID	4.25	8#	26"
" 32# "	" "	" 64# "	4.00	6#	20"
" 24# "	1670 "	" 48# "	4.50	5#	19"
PARROT RIFLE	" "	PARROTT 30# "	4.50	3.5#	18"
10" SMOOTHBORE COLUMBIAD	1740 "	128# SOLID, RD.	4.50	20#	13"
8" SMOOTHBORE COLUMBIAD	" "	68# " "	5.00	10#	11"

The above chart shows how much deeper rifled rounds penetrated than smoothbore rounds. In addition, rifle shells created a broader crater due to their bursting effect. Rifles were more accurate, caused more damage, used less powder, shot farther and were lighter than smoothbores. Gillmore's attack on Pulaski demonstrated not only the obsolescence of masonry forts but of smoothbore weapons as well.

> This success so fully demonstrates the power and effectiveness of rifled cannon, for breaching at long distances, -at distances indeed hitherto untried, and considered altogether impracticable, thus opening a new era in the use of this most valuable, and comparatively unknown arm of service.[27]

After bombardment began, Olmstead was in no position to send a report to his superiors. The only official report Confederate officials could have read was Gillmore's report after its publication several months later. Therefore Confederate engineers had no proof that masonry forts were obsolete when earthen forts like McAllister were started or expanded.

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[27]ibid., 7.

McALLISTER

McAllister's mission was to protect blockade runners and the pilings that blocked part of the Ogeechee River. Union ships targeted the forts on six separate occasions.[28] The number of ships attacking the fort varied between one and five. Federal vessels were armed with a mix of smoothbore and rifled weapons. Of particular importance are the attacks on 27 January, 1 February and 1 March 1863.

Five Union ships participated in the 27 January attack, one of which was armed with a 15" Dahlgren smoothbore, the largest gun in the Navy's arsenal. This attack was the first time a gun this size was used against an earthen fort. After four hours of firing the Federal force withdrew, having inflicted no permanent damage to the fort.[29] Rear Admiral Samuel F. DuPont, Commander of South Atlantic Blockading Squadron, learned from the captains of the attacking vessels that the fort was impervious to solid shot. He also learned that shells disrupted the earth parapets fairly well, but with the help of slaves the garrison repaired most of the damage overnight. The only hope of navigating up the Ogeechee River in pursuit of blockade runners would be to steam quickly past the fort, which was deemed impossible due to the pilings and torpedoes (sea mines).[30]

A six hour attack against the fort on 1 February showed a change in tactics used by the naval crews. They utilized smaller caliber weapons which caused more

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[28]For a synopsis of each naval attack on Fort McAllister, see Appendix C.

[29]OR (Navy), series I, vol. 13, 547-5488.

[30]ibid., 626-628.

damage and permitted a rapid rate of fire. Much damage was done to the earthen parapets and one gun was dismounted, but the garrison was able to repair the damage overnight.[31]

The navy thought they might be able to destroy the fort if only they could prevent the walls from being repaired during the night. Severe damage was inflicted upon the fort during the three hour attack on 1 March.[32] Mortar boats continued to fire periodically throughout the night, forcing Captain Anderson to use soldiers to repair the damage instead of slaves. The next morning when the Federal Navy closed in to resume its attack, it saw much of the damage repaired and the fort ready for action. The mission commander decided another attack would be useless and the Federal vessels withdrew to Ossabaw Sound.

The primary purpose of this attack, according to Admiral DuPont, was to test modifications on different monitors and gunboats for use against Charleston harbor defenses. DuPont also came to the conclusion that no more attacks should be made on McAllister unless the mines and obstructions could be removed. In a letter to U.S. Secretary of War Giddeon Welles, DuPont wrote that he was withdrawing his vessels from the Ogeechee River and maintaining a blockade at its mouth. Due to the numerous interconnected waterways leading to McAllister from the Atlantic Ocean, there was no way to impose a total blockade on Savannah without taking the fort.

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[31]ibid., 632-633, 730-733.

[32]The vessels were the USS Passaic, Patapsco, C.P. Williams, Para, and Norfolk Packet. The largest weapon aboard were 15" Dahlgren guns and a 150-pounder Parrot.

Unless the river harbored another blockade runner, DuPont wrote, there was no purpose in taking McAllister.[33] Until the end of the following year, most of the Federal action involved either probing along Savannah's rivers and exchanging fire with Confederate defenders, or chasing blockade runners.

McALLISTER'S CAPTURE

In December of 1864 Sherman's troops arrived from Atlanta. As Sherman approached the city of Savannah he decided to swing south to take the shorter distance to the sea. It was vital that he make contact with supply vessels, for the country around Savannah could not provide enough food and forage for Union forces. Sherman's plan called for using the Ogeechee River to receive supplies, but Fort McAllister prevented Union vessels from using the river.

Major George W. Anderson commanded the garrison of 230 troops at McAllister, which consisted of the Emmitt Rifles, Clinch's Georgia's Light Artillery Battery, and Companies D and E of the First Regiment of Georgia Reserves. Anderson received reports from Lieutenant General William J. Hardee, commander of Savannah's defenses, that Sherman's force was approaching the city. Hardee's superior in Charleston, General P.G.T. Beauregard, ordered him not to allow Confederate forces to be trapped within Savannah. Hardee made plans to slowly withdraw the main garrison toward South Carolina and in the process he withdrew the cavalry supporting McAllister, leaving the fort isolated. Hardee ordered Anderson to

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[33]OR (Navy), series I, vol. 13, 716.

delay the Union force as long as he could, buying time for the effective evacuation of Savannah. With 230 men Anderson to stiffened the resistance of McAllister.[34]

He felt confident of surviving an attack from the sea, for the fort had proved its worthiness many times in the past. A simultaneous land and sea attack would probably not occur because of the risk of Union gunboats hitting their own men by overshooting the fort. This left assault by land as the only practical alternative to Sherman. He ordered Major General Oliver O. Howard, his right wing commander, to take McAllister by force.[35]

Because McAllister was located on a peninsula there existed only one avenue of approach by land (see illustration #VII, "Assault on Fort McAllister). The surrounding terrain was small, covered with streams and swamps. The garrison felled trees to create abatis and further cleared the surrounding area. The palisades in the ditch were never extended into the water line, but stopped short of it at high tide; Anderson should have extended them well into the water, for during the assault the first Federal troops to enter the fort did so by outflanking the palisades on the river front. Anderson spiked the 10" mortar located outside of the fort. The most important improvement by Anderson was laying land mines around the fort's perimeter and along the main avenue of approach to Genesis Point.[36]

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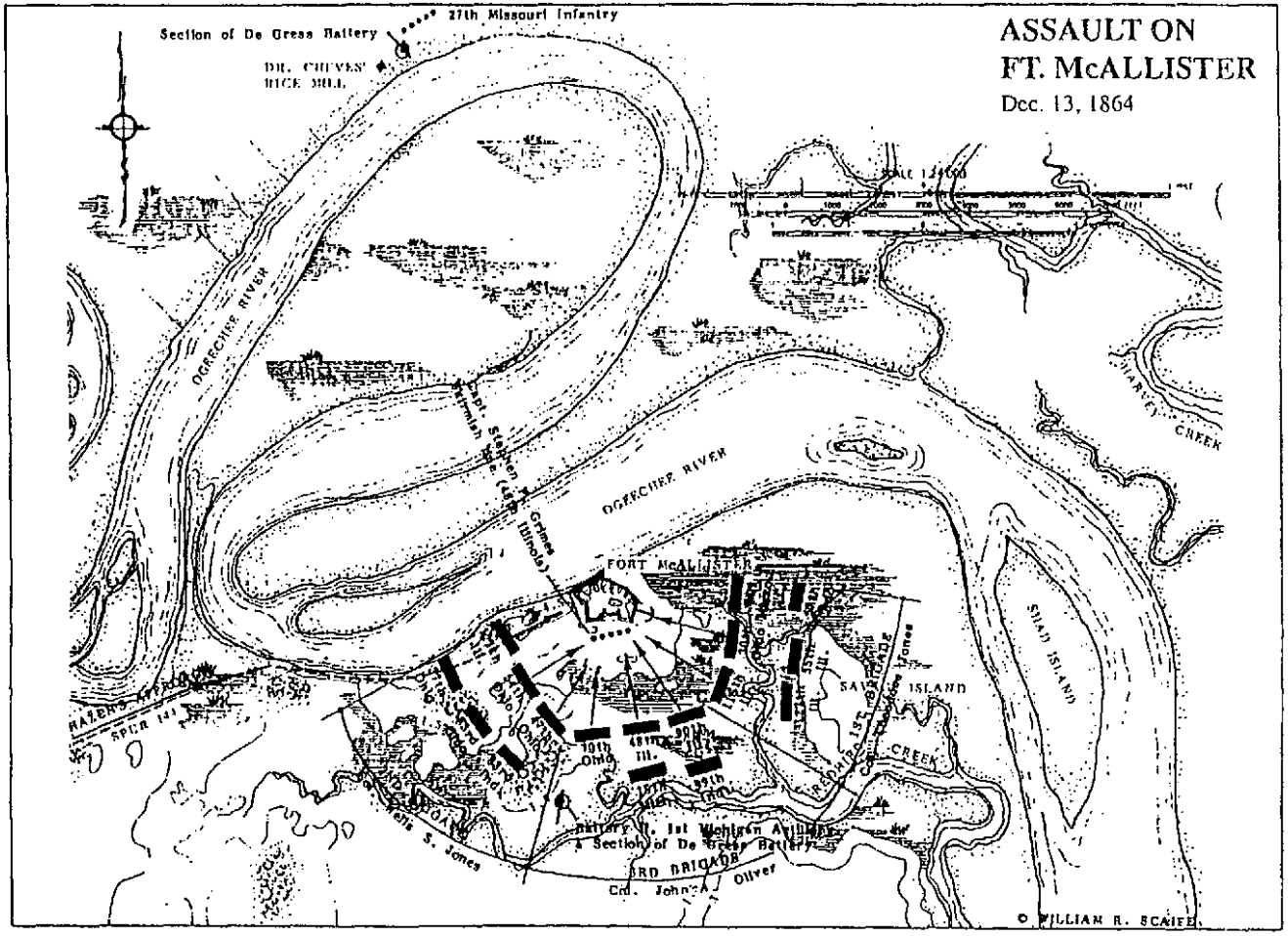
[34]Savannah Press, "Siege of Savannah" by George W. Anderson (commander of Fort McAllister), Friday, August 10, 1906.

[35]William R. Scaife, The March to the Sea (New York: Washington Printing Company, 1989) 75-76.

[36]OR (Army), series I, vol. 44, 109-113.

VII. Assault on Fort McAllister



Scaife, March to the Sea

On the afternoon of the 12th Federal forces numbering 3,500-4,000 troops under the command of Brigadier General William B. Hazen approached McAllister from the south and found King's bridge destroyed.[37] Engineer troops quickly rebuilt it and Federal forces pressed forward on the following morning. A Confederate picket named Thomas Mills was captured and revealed vital information concerning the fort's defenses. In addition to troop strength and armament, he informed Union forces of the land mines emplaced along the main avenues of approach.[38]

Removing the mines took most of the morning but soon afterwards Hazen deployed his men in a semi-circle from the river north of the fort to the same river south of the fort. Several hours were spent deploying Federal troops. During this time the overwhelming number of Federal skirmishers prevented the garrison from manning its guns. Six out of eight members of one crew were either killed or wounded by skirmishers. At approximately 1700 on the 13th of December Union forces stormed McAllister.[39] Most of the Union casualties were inflicted by land

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[37]The Federal force consisted of elements of the 2nd Division of the XV Corps. The assaulting force for 1st Brigade: 116th Illinois, 6th Missouri and 30th Ohio. Reserve force: 55th Illinois, 127th Illinois and the 57th Ohio. The assaulting force for 2nd Brigade: 111th Illinois, 47th Ohio and 54th Ohio. Reserve force: 83rd Indiana, 37th Ohio and 53rd Ohio. The assaulting force for 3rd Brigade: 48th Illinois, 90th Illinois and 70th Ohio. Reserve Regiments: 15th Michigan, 27th Missouri, Battery H of the 1st Illinois and Battery H of the 1st Missouri.

[38]Savannah Press, August 10, 1906.

[39]OR (Army), series I, vol. 44, 109-113. Savannah Press, August 10, 1906.

mines. Official Union casualties were 24 killed and 110 wounded. Confederate casualties were 17 killed, 31 wounded.[40]

The fight for McAllister was over before it began. The attack itself took about twenty minutes. The fort was surrounded by an overwhelming force which had the potential reinforcement of an entire army. The garrison had no hope of reinforcement or escape. Both Union and Confederate commanders noted in their reports that each of the garrison's defenders had to be physically overpowered and disarmed.[41] Hazen had made no elaborate plans for McAllister's demise, no long-range reconnaissance or prolonged siege. Hazen had no need for such actions because of his superiority in numbers. McAllister was a temporary fort with limited armament and garrison. The planning, reconnaissance and assault was made en route and was based on four years of fighting rather than on textbook or classroom instruction.

McAllister's mission was to prevent Union gunboats from approaching Savannah from the south and to protect blockade runners, a mission it accomplished. This petty little fort was supposed to be temporary, an ad-hoc structure built with the only materials available. Time and money were the driving factors in its construction. Yet McAllister survived the biggest and most powerful guns in the U.S. Navy's arsenal. The city of Savannah remained in Confederate hands until December 1864, even though Federal forces had lived in their back yard at Port Royal since November 1861 and at Pulaski since April 1862.

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[40]OR (Army), series I, vol. 44, 109-113.

[41]Savannah Press, August 10, 1906. OR (Army), series I, vol.

One reason Savannah did not fall earlier was the Union's preoccupation with Charleston. Another was the naval blockade imposed against it after the fall of Pulaski. Even though blockade runners still entered Savannah, they were limited in size due to the smaller waterways used. A third reason for Savannah's safety was its formidable defenses, both land and water. Two hundred twenty-nine cannons lined the roadways and waterways leading to Savannah.[42] Union forces could not take the city by water and did not have the manpower to spare to try to take it by land until the arrival of Sherman in the winter of 1864. Savannah remained symbolically important to the people of Georgia as long as it remained open.

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[42]Report dated 31 January 1865 from Admiral DuPont to Secretary Welles. OR (Navy), series one, vol. 16.

Chapter V:
What to Do?

By the end of the Civil War, ample evidence existed proving masonry forts and smoothbore weapons were obsolete. Congressional leaders ignored the evidence and the recommendations of senior military officers, and opted to retain masonry forts as the nation's primary means of defense. Congressional leaders believed some undiscovered technological improvement would allow them to salvage America's third system of coastal defense. They recognized the rapid pace of technological change created by the war, and were concerned with spending large sums of money on new permanent works only to have those works negated within a few years by improved weaponry. Once again, as in 1816, economy was a major factor in deciding whether to retain, modernize or replace existing forts.

The best place to start in trying to determine when people realized masonry works and smoothbores were obsolete is Gillmore's official report on the fall of Fort Pulaski, dated 30 April 1862. Congress also dealt with the state of America's water defenses and issued three reports dealing exclusively with the subject between the

years 1858-1873. These reports were dated 23 April 1862, 10 May 1862, and 7 May 1870.[1]

Gillmore wrote in his report:

> With heavy James or Parrott guns, the practicability of breaching the best-constructed brick scarp, at 2,300 to 2,500 yards with satisfactory rapidity, admits of very little doubt. Had we possessed our present knowledge of their power, previous to the bombardment of Fort Pulaski, the eight weeks of laborious preparation for its reduction, could have [been] curtailed to one week, as heavy mortars and columbiads would have been omitted from the armament of the batteries, as unsuitable for breaching at long ranges. It is also true beyond question, that the minimum distance, say from 900 to 1,000 yards, at which land batteries have heretofore been considered practically harmless against exposed masonry, must be at least trebled, now that rifled guns have to be provided against.[2]

Although he never specifically stated that masonry works were obsolete, the evidence Gillmore presented in his report indicated he knew Confederate (and Union) masonry forts had outlived their usefulness. Apparently he was one of very few who recognized the fact. The House of Representatives issued "Permanent Fortifications" two weeks after Pulaski's fall, which discussed the future defense of America's harbors and coast.[3]

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[1]The Second Session of the 37th Congress issued a report titled "Permanent Fortifications and Seacoast Defense" (referred to as "Permanent Fortifications). The Second Session also issued a second report titled "Changes of material and Construction of Forts" (referred to as "Construction of Forts" The Second Session of the 41st Congress printed "Seacoast Defenses". These were the only three reports dealing with the state of coastal defenses between the years 1858-1873, as listed by the Congressional Series and Congressional Globe.

[2]Gillmore, Siege and Reduction, 51-52.

[3]House of Representatives, "Permanent Fortifications and Seacoast Defense", 2nd session of the 37th Congress, 1862.

"Permanent Fortifications" first advised keeping permanent works and looking for some way to strengthen their defenses against improved weaponry and ships. As Representative Frank P. Blair Jr. of the Committee on Military Affairs stated, the U.S. only needed works capable of resisting a surprise attack by the greatest immediate threat. If an enemy took time to prepare a large scale invasion, America would have time to prepare. The report suggested increasing the quantity and size of armament in coastal forts. It recommended improving naval yards and weapons foundries to allow for the quick building of ships and weapons during crises, and expanding the military academies to create a larger officer corps. "Permanent Fortifications" pointed out that a sizable military of "quality would command respect from foreign nations, thus reducing the chance of war. The report recommended supplemental defenses for fortifications, such as floating batteries, land batteries and cables.[4]

The primary purpose of "Permanent Fortifications" appears to have been a recognition that America's coastal defense would have to be addressed in detail after the war. Blair stated unequivocally that since ironclad ships commanded by skilled captains could pass into protected harbors, improvements must be made to existing works. However, because the Confederacy posed no naval threat the U.S. had no need to change its defenses in the immediate future.

House Executive Report "Changes of Material and Construction of Forts," dated 10 May 1862 dealt exclusively with the materials used to build and destroy

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[4]"Permanent Fortifications".

masonry works. Brevet Brigadier-General Joseph Totten, Chief of Engineers, pointed out that the vessels present at Fort Pulaski's defeat were armed with the largest weapons available (15" smoothbore Columbiads) but did not participate in the attack. Totten reiterated the virtues of masonry forts: durability, economy and strength. He recommended keeping the current system of masonry forts, but either adding a dirt front or iron plating the casemates if they fell within range of potential land batteries. To quell worries about expense, Totten noted that a monitor class vessel armed with two 11" guns cost $285,000. A 15" Columbiad within an iron plated casemate only cost $20,000; therefore the U.S. could afford to buy and plate fourteen casemates for the price of one vessel of war.

To offset the improved performance of vessels using armor and steam, Totten suggested adding a second tier of casemate guns to replace the barbette guns. Improved weaponry still benefitted forts more than ships, he claimed, and works could be plated with thicker armor than warships. Permanent works not only cost less to maintain, they did not wear out after twenty years of service as did naval vessels. Totten listed a few other reason for maintaining permanent works, but one can easily see that his reasons were the same as those given in the Bernard report. As of May 1862, America's top military engineer still recommended the retention of permanent works made of masonry.[5]

With the fall of the Confederacy in 1865, the Corps of Engineers resumed its search for a practical, cost-effective coastal defense. During the House discussion on

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[5]"Construction of Forts."

"Permanent Forts" in May of 1862, the formation of a board of engineers to study America's water defenses was approved. Congress charged the board to improve permanent works and find new ways to defend America's coast.[6] The board's findings were incorporated into House Executive Document titled "Seacoast Defenses."

The report echoed House Report "Permanent Fortifications," arguing that the United States should keep permanent works and look for ways to enhance their defense against improved weaponry. As of 1870, military and political leaders still did not believe that masonry forts were obsolete. They recognized that permanent works had problems, but thought those problems could be corrected. The report detailed two experiments in 1869, one at Fort Monroe and the other at Fort Delaware, that tested improvements in the defensive quality of forts. The engineers of the Monroe experiment applied the concept of ironclad ships to their target. If ships could be plated with iron, why not fort casemates? The outside walls of a casemate were lined with plates of metal in an attempt to deflect projectiles. The engineers of the Delaware experiment located plates of metal inside the walls to prevent projectiles from penetrating. Of the two experiments the Delaware fared better, but neither set of results was satisfactory.[7] Nevertheless, the board believed that American ingenuity would find a way to salvage permanent works and that research should continue until

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[6]This board was to consist of two army engineer officers, 1 ordnance officer, one artillery officer, 2 naval officers and two eminent civilians. Congressional Globe, set 1145, serial 2107, page 2431, 29 May 1862.

[7]House Executive Document #271, "Seacoast Defenses", 2nd session of the 41st Congress, 1870.

a lasting solution was found. To add weight to this recommendation the board pointed out that European nations had taken the same course of action. Austria, France, Great Britain, Italy and Russia all had important harbors to protect. None showed any signs of building iron forts or abandoning their coastal forts even though, in the opinion of U.S. political and military leaders, Europe was on the verge of war.[8]

"Seacoast Defenses" pointed out that European armies had already implemented improvements and changes based on Civil War experience. Smoothbores were eliminated from their arsenals and rifles were being made equivalent to 200 and 300-pounder Parrotts[9]. One measure suggested by the report was to replace all seacoast smoothbores with the largest caliber weapons available. Supplemental measures recommended in the report for harbor and channel defenses included building floating batteries, floating obstructions, harbor defense vessels, entanglements and torpedoes (sea mines). The latter three were effective yet inexpensive. Confederate forces were credited with having improved the quality and use of the sea mine. The report mentioned that the only vessels lost during the attacks on Mobile Bay and Fort Fisher were due to mines.[10]

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[8]"Seacoast Defenses."

[9]Lieutenant Colonel Charles C. Jones Jr., "Military Lessons Inculcated on the Coast of Georgia During the Confederate War" (Augusta, GA: Chronicle Printing Establishment, 1883) 10.

[10]"Seacoast Defenses."

The board advised using barbette batteries with a carriage designed to allow guns to depress while loading. This would protect guns and their crews during their most vulnerable moments.[11] Even though Gillmore discouraged the use of mortars except against large targets, the board recommended creating a system of mortars to prevent the concentration of enemy troops which occurred during a landing. This would partially address the issue of vulnerability to land assault. Finally, the board suggested continuing the use of mines and non-permanent obstacles guarded by shore batteries of the heaviest artillery.[12]

General William T. Sherman, Commanding General of the U.S. Army, drew upon his years of field experience and placed his recommendations in the report. He advised the use of scattered earthen batteries with traverses between them. This "scattered battery" system was inexpensive to construct, was a proven method of defense against heavy weapons (both smoothbores and rifles) and would prevent the enemy from concentrating its firepower on one target. Earthen batteries' primary weakness lay in defense against land assault. Sherman's remedy was to protect them by one or more central works. Each fort would have an earthen glacis covering all masonry walls facing outward. He did agree on using mines to supplement a work's

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[11]This idea was achieved during the Endicott period of defense. Carriages were manufactured that used the recoil of the gun to lower itself behind a wall. Lewis, Seacoast Fortifications, 76,

[12]"Seacoast Defenses."

defense.[13] Sherman's proposals were measures proven by the performances of McAllister and other earthen forts.

However, Congress chose to disregard Sherman's recommendations and keep permanent works as America's first line of defense. Congress' decision to reject Sherman's recommendations should not come as a surprise, for several factors contributed to it. Despite the prestige he earned during the Civil War, Sherman was only one of several prominent men to make recommendations. His suggestions barely filled two pages. Although Sherman was the Commanding General of the Army, due to the nature of the army's organization he controlled only combat troops, and then only via their commanding generals. The bureau chiefs, such as the head of the Quartermaster and Ordnance department, controlled a sizable portion of U.S. Army in terms of men and materials, and reported directly to the Secretary of War. In short, Sherman's position was one of influence, not power. In addition, men with more expertise concerning coastal forts, like the Chief of Engineers, disagreed with Sherman. More than likely they would have carried more weight with Congressmen than Sherman, whose primary concerns were patrolling the Western frontier and maintaining pay and benefits for his soldiers and Civil War veterans.[14]

One might argue that Congress kept masonry forts for economic reasons. But the cost of research, development and implementation of improvements, not to mention the cost of maintenance, could not have been much less than implementing

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[13]ibid.

[14]J.D. Hittle, The Military Staff: Its History and Development (Harrisburg: Military Service Publishing Company, 1949) 178-179.

Sherman's ideas. How much did dirt cost? How much did wood to build frame boxes cost? Troops could have been used to dig and maintain batteries instead of performing fatigue duty. The army could have been kept at the same levels instead of being reduced in 1869 from 54,000 to 35,000, and reduced even further to 25,000 shortly thereafter.[15] A proven solution, earthen forts, was available but not adopted. One might argue that the reason for the reduction in troops was caused by factors discussed in chapter one, such as a fear of large standing armies. However, an army of 54,000 troops out of a population of 38.56 million (.14%) can hardly be called large.[16]

From a military point of view keeping masonry forts was a potential disaster. If Pulaski could be reduced by an enemy, so could any other American masonry fort. Improved weaponry that was placed in forts could also be placed aboard ships. Steam powered warships with shallow drafts, like monitors, had more control over their movements and steadier gun platforms than traditional sailing vessels, thus narrowing the advantage forts traditionally held over vessels in the areas of fire control and fire efficiency.

If the U.S. went to war with any advanced nation American forts might well have been destroyed along with their garrisons. If the navy was used to supplement the firepower of forts, the U.S. would have to maintain a home fleet large enough to

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[15]John F. Marszalek, Sherman: A Soldier's Passion for Order (New York: Vintage Books, 1994) 379.

[16]United States Government, A Compendium of the Ninth Census: June 1, 1870 (Washington D.C.: Government Printing Office) 1872.

dock ironclads in every port with a fort. This would have been an expense greater than Congress was willing to authorize. Congress was gambling by keeping masonry forts as the primary means of defense for the nation. The most valuable lesson learned from McAllister was that the heaviest guns in existence, both smoothbores and rifles, could not destroy a fort made with properly constructed earth parapets.[17]

But this lesson was not learned until many years after the Civil War. "Seacoast Defenses" specifically recommended keeping permanent works and searching for ways to improve their defenses by using what would today be called reactive armor. The proof of earth's superiority over masonry was clear to anyone who read about the experiences of Fort McAllister, or Fort Fisher, or any other earthen fort. It was clear to Gillmore and it was clear to Sherman. These forts withstood attack after attack from both large smoothbores and rifled weapons, only falling when assaulted from land. So formidable were the earthen defenses of Wilmington that the port remained open until shortly before the Confederacy fell.

All forts built by Southern engineers prior to the fall of Pulaski, prior to the proof of the superiority of rifled weapons over permanent works, were earthen forts. Masonry's obsolescence was not a factor in the decision; the Confederates were forced to build earthen forts because they did not have the time or the resources to construct permanent structures. The Confederacy faced an enemy that had invaded its soil and established a base on its shores. Port Royal was the largest, albeit the most undeveloped, harbor in the South. The Confederacy needed forts immediately to

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[17]Jones, "Military Lessons", 11-12.

prevent the loss of additional ports and harbors. The South needed its ports to maintain contact with Europe and to import war materials.

Confederate engineers oversaw the construction of earthen coastal forts capable of withstanding the power of rifled guns. In their case, the change in construction material from masonry to earth was not in response to the recognition of a new threat, the rifled weapon, but because they lacked the resources and time to build forts like Pulaski. Although the lessons provided by earthen forts did not change the immediate future of coastal defense, it did have an impact later in the nineteenth century.

The Endicott report of 1886 (named after Secretary of War, William C. Endicott) recommended construction of new coastal forts as one-tier works with dispersed batteries, built with reinforced concrete and padded with earth. The new forts utilized new technologies such as the "disappearing" gun carriage,[18] improved metals for casting weapons, smokeless powder, perfection of breech loading and indirect gun sights. The forts constructed under the Endicott system were far superior to the Totten system in firepower and survivability. Even after the release of the Endicott's report, masonry works continued to play a role as a second line of defense or in times of emergency. A good example would be the remodeling of Fort Sumter during the Spanish-American War. However, by the turn of the century masonry works were abandoned by the military to become playthings for the curious and the novice historian.

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[18]The carriage utilized the recoil of the gun to lower it into the battery. This provided protection to the crew while loading.

APPENDIX A
GLOSSARY OF TERMS

ABATIS= Makeshift defense, usually made of felled trees or piled debris, designed to slow an assaulting force. Not intended as a permanent barrier to provide cover and/or concealment.

AVENUE OF APPROACH= Route used by military forces to approach and assault an objective.

BARBETTE GUN= Weapon whose barrel fired over a parapet.

BAR SHOT= Solid shot made of two solid hemispheres connected by a bar. Used primarily against ship sails and riggings.

BATTERY= Tactical unit comprised of artillery. Usually assigned four weapons. Equivalent to a company.

BOYAUX= Deep and narrow trenches used to communicate and move troops. Used extensively in sieges.

BREVET RANK= Used to acknowledge the highest temporary rank held. In effect, the reduction to a lower rank was administrative. The reductions usually followed a major conflict when the military was reduced. It was also assigned to foreigners commensurate to the rank held in their native country.

CANISTER SHOT= Type of shot consisting of a tin cylinder capped at both ends and packed with musket balls and sawdust.

CARCASS= Type of shell filled with incendiary matter.

CASEMATE GUN= Weapon that fired through an opening in a wall, called an embrasure. Weapon with overhead protection.

CAVALIERS= Mounds of earth built for protection against direct fire weapons. Used in sieges near the objective to allow plunging fire into the work.

CHAIN SHOT= Type of solid shot that consisted of two hollowed or solid hemispheres connected by a chain. Used primarily against ship masts.

CHAMBER= Area in the bore of a weapon smaller than the diameter of the barrel. Designed to trap gases created when the weapon fired and to increase the velocity of the projectile.

COPING= The top part of a wall, usually slanted to allow for drainage.

COUNTER SCARP= Slope located on the outer side of a ditch in relation to a fortification.

COVERED WAY= Outer rim of a demilune used as a defensive position that ran parallel to the counter scarp. Used mainly by infantrymen for protection.

DEAD ANGLE= Area within one's field of fire that can not be reached by direct fire. Requires use of a weapon capable of plunging fire, such as a mortar.

DEMILUNE= Outer defensive work attached to the main fortification, usually shaped like a triangle. Designed to protect the entrance of a fort from an assault.
EMBRASURE= Opening in a wall that allowed weapons to fire through it.

ENCEINTE= Main wall of a fortification.

ENFILADE= To fire along the longest length of a target.

FASCINE= Bundle of branches tied together as a means of providing some protection, or as a foundation for a parapet. Used extensively in sieges due to the cost effectiveness and the ease with which they could be built.

FIELDS OF FIRE= Pre-determined areas for the firing of weapons. Divided into primary fields and secondary fields. Used to ensure all areas of the battlefield are covered.

FORTIFICATION= An area strengthened to better withstand an attack.

GABION= Basket made of wood and filled with earth. Designed to provide protection against rifle fire. Used extensively in sieges due to the cost effectiveness and the ease with which they could be built.

GLACIS= Slope between the surrounding area and the covered way.

GORGE= Opening or side of an area of the fort (attached or detached) that faced the center of the fortification.

GRAPE SHOT= Type of solid shot comprised of nine balls held between two iron plates connected in the center with an iron rod.

HOLLOW SHOT= A hollowed projectile filled with powder. Designed to break apart upon impact or when a fuse ignited the internal powder. Covered a large area due to its bursting effect.

LINE OF CIRCUMVALLATION= Encirclement of a permanent work by sentries, fortified positions or trenches. Used to isolate a garrison prior to a siege or assault.

LINE OF COUNTER-CIRCUMVALLATION= Encirclement of one's encampment by sentries, fortified positions or trenches. Used to protect one's main encampment.

MORTELLO TOWER- A small, circular tower built of stone or brick used to defend harbors and seacoasts.

PALISADE= Pointed wooden stakes, approximately six feet long. Planted close together at an angle to slow attacking forces.

PARALLEL= Trench used by besieging armies dug parallel to the wall of a fortification, forming an arc to the point of attack.

PARAPET= Part of a masonry or earthen wall located closest to the outside, designed to protect the defenders from gunfire.

PLUNGING FIRE= Indirect fire. Used to attack targets behind protected works. Mortars use plunging fire.

RAMPART= Top part of the main wall of a fortification, built of earth, masonry or a combination of both. Provided the main protection to defenders.

REVETMENT= Retaining wall used in fortifications.

SALIENT= Any angle of a fortified position that pointed toward the attacking force.

SALLY PORT= Largest gate within a fortification used to bring supplies and heavy weapons inside. Also used as a quick egress for raiding parties.

SAP= Narrow trench used in sieges that connected the main trenches, or parallels.

SAP ROLLER= Gabion rolled in front of the sap, or trench, to provide protection in the front from small arms fire.

SCARP= Outer slope of a rampart.

SHRAPNEL= See "SPHERICAL CASE"

SHELL= See "HOLLOW SHOT."

SPHERICAL CASE= Thin sided hollow shot containing numerous musket balls. Designed to explode upon impact or at a specific time after leaving the weapon, spraying the area with dozens of small, lead balls.

TERREPLEIN= Open area of a rampart on which the guns and crews operated.

TRAVERSE= Large mound of dirt built between guns to provide flank protection. Especially used when guns were in close proximity to one another to prevent the dismounting of other guns.

Appendix B "Ranges of Heavy Artillery"

Ranges of Field Guns and Howitzers

KIND OF ORDNANCE	Powder	Ball	Elevation	Range	REMARKS
	LBS.		° '	YARDS	
6-PDR. FIELD GUN	1.25	Shot	0 00	318	
		"	1 00	674	
		"	2 00	867	
		"	3 00	1138	
		"	4 00	1256	
		"	5 00	1523	
	1.00	Sph. case	2 00	650	Time of flight 2 secs.
		shot	2 30	840	" " 3 "
		"	3 00	1050	" " 4 "
12-PDR. FIELD GUN	2.50	Shot	0 00	347	
		"	1 00	662	
		"	1 30	785	
		"	2 00	909	
		"	3 00	1269	
		"	4 00	1455	
		"	5 00	1663	
	1.50	Sph. case	1 00	670	Time 2 seconds
		"	1 45	950	" 3 "
		"	2 30	1250	" 4 "
NEW 12-PDR. GUN	2.50	Shot	0 00	325	
		"	1 00	615	
		"	1 30	784	
		"	2 00	876	
		"	3 00	1201	
		"	4 00	1322	
		"	5 00	1619	
	2.00	Shell	2 00	787	
		"	2 30	926	
		"	3 00	1079	
		"	3 75	1300	
	2.50	Sph. case	0 30	304	
		"	1 00	574	
		"	1 30	633	
		"	2 00	731	
		"	3 00	960	
		"	3 30	1080	
		"	3 75	1135	

Appendix B

Ranges of Field Guns and Howitzers - Continued

KIND OF ORDNANCE	Powder	Ball	Elevation	Range	REMARKS
	LBS.		° ′	YARDS	
12-PDR. FIELD HOWITZER	1.00	Shell	0 00	195	
		"	1 00	539	
		"	2 00	640	
		"	3 00	847	
		"	4 00	975	
		"	5 00	1072	
	0.75	Sph. case	2 15	485	Time 2 seconds
		"	3 15	715	" 3 "
		"	3 45	1050	" 4 "
24-PDR. FIELD HOWITZER	2.00	Shell	0 00	295	
		"	1 00	516	
		"	2 00	793	
		"	3 00	976	
		"	4 00	1272	
		"	5 00	1322	
	1.75	Sph. case	2 00	600	Time 2 seconds
		"	3 00	800	" 3 "
		"	5 30	1250	" 4 "
	2.00	"	3 30	880	" 3 "
32-PDR. FIELD HOWITZER	2.50	Shell	0 00	290	
		"	1 00	531	
		"	2 00	779	
		"	3 00	1029	
		"	4 00	1203	
		"	5 00	1504	
	2.50	Sph. case	3 00	800	Time 2.75 seconds

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Appendix B

Ranges of Heavy Ordnance

KIND OF ORDNANCE	Powder	Ball	Elevation	Range	REMARKS
	LBS.		° '	YARDS	
18-PDR. SIEGE AND GARRISON GUN On barbette carriage	4.50	Shot	1 00	641	
		"	2 00	950	
		"	3 00	1256	
		"	4 00	1450	
		"	5 00	1592	
24-PDR. SIEGE AND GARRISON GUN On siege carriage	6.00	Shot	0 00	412	
		"	1 00	842	
		"	1 30	953	
		"	2 00	1147	
		"	3 00	1417	
		"	4 00	1666	
		"	5 00	1901	
	8.00	"	1 00	883	
		"	2 00	1170	
		"	3 00	1454	
		"	4 00	1639	
		"	5 00	1834	
32-PDR. SEA-COAST GUN On Barbette carriage	6.00	Shot	1 45	900	
	8.00	"	1 00	713	
		"	1 30	800	
			1 35	900	
		"	2 00	1100	
		"	3 00	1433	
		"	4 00	1684	
		"	5 00	1922	
	10.67	"	1 00	780	
		"	2 00	1155	
		"	3 00	1517	
42-PDR. SEA-COAST GUN On barbette carriage	10.50	Shot	1 00	775	
		"	2 00	1010	
		"	3 00	1300	
		"	4 00	1600	
		"	5 00	1955	
	14.00	"	1 00	770	
		"	2 00	1128	
		"	3 00	1380	
		"	4 00	1687	
		"	5 00	1915	

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Carried over

Appendix B

Ranges of Heavy Ordnance - Continued

KIND OF ORDNANCE	Powder	Ball	Elevation	Range	REMARKS
	LBS.		° '	YARDS	
		Shell			
8-INCH SIEGE HOWITZER	4.00	45 lbs.	0 00	251	
GARRISON GUN		"	1 00	435	
On siege carriage		"	2 00	618	
		"	3 00	720	
		"	4 00	992	
		"	5 00	1241	
		"	12 30	2280	
		Shell			
8-INCH SEA-COAST	4.00	45 lbs.	1 00	405	
HOWITZER		"	2 00	652	
On barbette carriage		"	3 00	875	
		"	4 00	1110	
		"	5 00	1300	
	6.00	"	1 00	572	
		"	2 00	828	
		"	3 00	947	
		"	4 00	1168	
		"	5 00	1463	
	8.00	"	1 00	646	
		"	2 00	909	
		"	3 00	1190	
		"	4 00	1532	
		"	5 00	1800	
		Shell			
10-INCH SEA-COAST	12.00	90 lbs.	1 00	580	
HOWITZER		"	2 00	891	Time, flight 3.00 sec.
On barbette carriage		"	3 00	1185	" " 4.00 "
			3 30	1300	
		"	4 00	1426	" " 5.25 "
		"	5 00	1650	" " 6.00 "
		Shot			
8-INCH COLUMBIAD	10.00	65 lbs.	1 00	932	Axis of gun 16 feet
On barbette carriage		"	2 00	1116	above the water.
		"	3 00	1402	
		"	4 00	1608	
		"	5 00	1847	
		"	6 00	2010	
		"	8 00	2397	Shot ceased to
		"	10 00	2834	ricochet on the water.

Appendix B

Ranges of Heavy Ordnance - Continued

KIND OF ORDNANCE	Powder	Ball	Elevation	Range	REMARKS
	LBS.		° '	YARDS	
		Shot			
8-INCH COLUMBIAD	10.00	65 lbs.	15 00	3583	
Continued		"	20 00	4322	
On barbette carriage		"	25 00	4875	
		"	27 00	4481	
	15.00	"	27 30	4812	
		Shell			
	10.00	50 lbs.	1 00	919	
		"	2 00	1209	
		"	3 00	1409	
		"	4 00	1697	
		"	5 00	1813	
		"	6 00	1985	
		"	8 00	2203	
		"	10 00	2657	
		"	15 00	3556	
		"	20 00	3716	
		"	25 00	4387	
		"	27 00	4171	
		"	27 30	4468	
		Shot			
10-INCH COLUMBIAD	18.00	128 lbs.	0 00	394	Axis of gun 16 feet
On barbette carriage		"	1 00	752	above the water.
		"	2 00	1002	
			3 00	1230	
		"	4 00	1570	
		"	5 00	1814	
		"	6 00	2037	Shot ceased to
		"	8 00	2519	ricochet on water.
		"	10 00	2777	
		"	15 00	3525	
		"	20 00	4020	
		"	25 00	4304	
		"	30 00	4761	
		"	35 00	5433	
	20.00	"	39 15	5654	

Appendix B

Ranges of Heavy Ordnance - Continued

KIND OF ORDNANCE	Powder	Ball	Elevation	Range	REMARKS
	LBS.		° '	YARDS	
		Shell			
10-INCH COLUMBIAD	12.00	100 lbs.	1 00	800	
Continued		"	2 00	1012	
On barbette carriage		"	3 00	1184	
		"	4 00	1443	
		"	5 00	1604	
	18.00	"	0 00	448	
		"	1 00	747	
		"	2 00	1100	
		"	3 00	1239	
		"	4 00	1611	
		"	5 00	1865	
		"	6 00	2209	
		"	8 00	2489	
		"	10 00	2848	
		"	15 00	3200	
		"	20 00	3885	
		"	25 00	4150	
		"	30 00	4651	
		"	35 00	4828	Time of flight 35 sec.
		Shell			
12-INCH COLUMBIAD	20.00	172 lbs.	10 00	2770	Time of flight 11 sec.
		"	15 00	3731	" " 16 "
		"	22 00	4280	" " 20 "
		"	25 00	4718	" " 26 "
		"	30 00	5004	
		"	35 00	5339	" " 32 "
		"	37 00	5266	" " 31 "
		"	39 00	5064	
	25.00	"	10 00	2881	" " 11.5 "
		"	15 00	3542	" " 15 "
		"	30 00	5102	
		"	35 00	5409	" " 32 "
		"	37 00	5373	" " 32 "
		"	39 00	5506	" " 36 "
		Shell	35 00	5644	
		180 lbs.	39 00	5615	
	28.00	"	35 00	5671	
		"	39 00	5761	3¼ miles. Time 36 sec.

Appendix B

Ranges of Heavy Ordnance - Continued

KIND OF ORDNANCE	Powder	Ball	Elevation	Range	REMARKS
	LBS.		° '	YARDS	
13-INCH SEA-COAST MORTAR	20.00	Shell 200 lbs.	45	4325	
12-INCH SEA-COAST MORTAR	20.00	Shell 200 lbs.	45	4625	Experimental
10-INCH SEA-COAST MORTAR	10.00	Shell 98 lbs.	45	4250	Time of flight 36 sec.
10-INCH SIEGE MORTAR	1.00	Shell 90 lbs.	45	300	Time of flight 6.5 sec.
	1.50	"	45	700	" " 12 "
	2.00	"	45	1000	" " 14 "
	2.50	"	45	1300	" " 16 "
	3.00	"	45	1600	" " 18 "
	3.50	"	45	1800	" " 19 "
	4.00	"	45	2100	" " 21 "
	lbs. oz.	Shell			
8-INCH SIEGE MORTAR From Griffith's Artillerist's Manual	0 10¾	46 lbs.	45	500	Time of flight 10 sec.
	13¾	"	45	600	" " 11 "
	1 00	"	45	750	" " 12¼ "
	1 02	"	45	900	" " 13 "
	1 03½	"	45	1000	" " 13½ "
	1 04¾	"	45	1100	" " 14 "
	1 06	"	45	1200	" " 14½ "
	oz.	Shell			
24-POUNDER COEHORN MORTAR	0.50	17 lbs.	45	25	
	1.00	"	45	68	
	1.50	"	45	104	
	1.75	"	45	143	
	2.00	"	45	165	
	2.75	"	45	260	
	4.00	"	45	422	
	6.00	"	45	900	
	8.00	"	45	1200	

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APPENDIX C
NAVAL ATTACKS ON FORT McALLISTER

On 1 July 1862.[1] The USS Potomska's captain reported the existence of McAllister, which he described as an earthen battery with six mounted heavy guns. The Potomska briefly engaged the battery with four 32-pounder guns and a 24-pounder Parrott with no effect.[2]

On 29 July, the gunboats USS Paul Jones, Unadilla, Huron and Madgie navigated the Ogeechee River in an attempt to destroy the Rattlesnake (which they did) and reconnoiter the earthen fort. The commander of the Union force reported seven to eight heavy guns, confirmed the pilings in advance of the fort, and described his two-and-a-half hour duel with the fort as ineffective.[3]

On 19 November 1862 the U.S. Navy attacked McAllister with the mission of trying to remove the pilings and destroy the fort. The task force consisted of two gunboats and a mortar schooner.[4] The engagement lasted a little over six hours and resulted in Federal withdrawal after the flagship received damage at the water line.

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[1]For information regarding Union vessels and their armament, see appendix D.

[2]OR (Navy), series I, vol. 13, 161-162.

[3]OR (Navy), series I, vol. 13, 162 & 221. The largest weapons aboard were one 100 and one 30-pounder Parrott and three 11" Dahlgren guns (sb).

[4]The gunboats were the USS Wissahickson and Dawn.

Approximately two hundred rounds were expended by the vessels and only a dozen by the fort. Only minor damage occurred to McAllister.[5]

On 27 January 1863, two monitors, two gunboats and a mortar schooner attempted again to disarm the fort and remove the obstacles.[6] This attack included a 15" Dahlgren smoothbore, the largest gun in the Navy's arsenal. This was the first time a gun this size was used against an earthen fort. After four hours and twenty minutes of firing the Union force withdrew, having inflicted no permanent damage to the fort. Over three hundred rounds were expended by the vessels.[7] Rear Admiral Samuel F. DuPont, Commander of South Atlantic Blockading Squadron, learned from the captains of the attacking vessels that the fort was impervious to solid shot. He also learned that shells disrupted the earth parapets fairly well, but with the help of slaves the garrison repaired most of the damage overnight. The only hope of navigating up the Ogeechee River in pursuit of blockade runners would be to steam quickly past the fort, which was deemed impossible due to the pilings and torpedoes (sea mines).[8]

On 1 February 1863, a six hour attack came from a force consisting of the USS Seneca, USS Wissahickson and USS C.P. Williams. Learning some lessons from the previous attack, the crews used smaller caliber shells which caused more

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[5]Jones, Chatham Artillery, 115, OR (Navy), series I, vol. 13, 454.

[6]The vessels were the USS Montauk, Seneca, Wissahickson, Dawn and C. P. Williams.

[7]OR (Navy), series I, vol. 13, 547-5488.

[8]ibid., 626-628.

damage and allowed their vessels to maintain a rapid rate of fire. Much damage was done to the earthen parapets, one gun was dismounted and one fatality occurred: the fort's commanding officer, Major John B. Gallie.[9]

The last naval attack against McAllister occurred on 1 March 1863.[10] Severe damage was inflicted upon the fort during the three hour attack. The mortar boats continued to fire periodically throughout the night, forcing the garrison to use soldiers to repair the damage instead of slaves. The next morning when the Federal Navy arrived it saw much of the damage repaired and the fort ready for action. The mission commander decided another attack would be useless and the Federal vessels withdrew to Ossabaw Sound.

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[9]ibid., 632-633, 730-733.

[10]The vessels were the USS Passaic, Patapsco, C.P. Williams, Para, and Norfolk Packet. The largest weapon aboard were 15" Dahlgren guns and a 150-pounder Parrot.

APPENDIX D
ARMAMENT OF UNION VESSELS ATTACKING McALLISTER[1]

MONITORS

USS Montuk
description: screw steamer; wood and iron; single turret, 750 tons
battery: one 15" Dahlgren (sb), one 9" Dahlgren (sb)

USS Nahant
description: screw steamer; iron; single turret; 1,875 tons
battery: one 15" Dahlgren (sb), one 11" Dahlgren (sb)

USS Passaic
description: screw steamer; wood and iron; single turret; 1,875 tons
battery: one 15" Dahlgren (sb), one 150-pounder Parrott

USS Patapsco
description: screw steamer; wood and iron; single turret, 844 tons
battery: one 15" Dahlgren (sb), one 150-pounder Parrott

GUNBOATS

USS Dawn
description: screw steamer, wood, 399 tons, schooner
battery: two 32-pounder (sb), one 20-pounder Parrott

USS Huron
description: screw steamer, wood, 507 tons, two-masted schooner
battery: one 11" Dahlgren (sb), one 20-pounder Parrott, two 24-pounder howitzers

USS Madgie
description: screw steamer, wood, 220 tons
battery: one 30-pounder Parrott, one 20-pounder Parrott

USS Potomski
description: screw steamer, wood, three masted schooner, 287 tons
battery: four 32-pounders (sb), one 20-pounder Parrott

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USS Paul Jones
description: side-wheel steamer, gunboat, 863 tons
battery: one 100-pounder Parrott, two 9" Dahlgren (sb), one 11" Dahlgren (sb), two 50-pounder Parrotts, two 24-pounder howitzers

USS Seneca
description: screw steamer, wood, 507 tons, gunboat, two masted schooner
battery: 11" Dahlgren (sb), one 20-pounder Parrott, two 24-pounder howitzers; after 23 October 1863 an additional one light 12-pounder (sb) was added

USS Wissahickson
description: screw steamer, wood, two masted schooner, gunboat, 507 tons
battery: one 11" Dahlgren (sb), 1 20-pounder Parrott, two 24-pounder howitzer; after February 1863, the 11" Dahlgren was replaced by a 150-pounder Parrott

USS Unadilla
description: screw steamer, wood, two masted schooner, 507 tons
battery: one 20-pounder Parrott, one 11 " Dahlgren (sb), two 24-pounder howitzers

MORTAR BOATS
USS C.P. Williams
description: sails, wood, schooner, 210 tons
battery: one 13" mortar, two 32-pounders (sb), two heavy 12-pounders (sb)

USS Norfold Packet
description: sails, wood, schooner, 349 tons,
battery: one 13" mortar, two 32-pounders (sb), two 12-pounder howitzers

USS Para
description: sails, wood, schooner, 200 tons
battery: one 13" mortar, two 32-ponders (sb)

APPENDIX E
UNION DEMAND FOR THE SURRENDER OF FORT PULASKI

HEADQUARTERS, DEPARTMENT OF THE SOUTH,
TYBEE ISLAND, GA., APRIL 10, 1862

To the COMMANDING OFFICER, Fort Pulaski:

SIR: I hereby demand of you the immediate surrender and restoration of Fort Pulaski to the authority and possession of the United States. This demand is made with a view to avoiding, if possible, the effusion of blood which must result from the bombardment and attack now in readiness to be opened.

The number, caliber and completeness of the batteries surrounding you leave no doubt as to what must result in case of your refusal; and as the defense, however obstinate, must eventually succumb to the assailing force at my disposal, it is hoped you may see fit to avert the useless waste of life.

The communication will be carried to you under a flag of truce by Lieut. J. H. Wilson, U.S. Army, who is authorized to wait any period not exceeding thirty minutes from delivery for your answer.

I have the honor to be, sir, very respectfully, your most obedient servant,

DAVID HUNTER
Major-General, Commanding

APPENDIX F
TERMS OF SURRENDER

FORT PULASKI, Ga., April 11, 1862.

Sir:

I have the honor to transmit herewith the terms of capitulation for the surrender to the United States of Fort Pulaski, Ga., signed by approval, they being substantially those authorized by you as commander of the district.

The fort hoisted the white flag at a quarter before 2 o'clock this afternoon, after a resistance since 8 o'clock yesterday morning to the continuous fire of our batteries. A practicable breach in the walls was made in eighteen and a half hours' firing by daylight.

I have the honor to be, very respectfully, your obedient servant,

Q. A. GILLMORE
Brig. Gen. Vols., Comdg.
U.S. Forces at Tybee Island, GA.

Brig. Gen. H. W. Benham,
Comdg. N. Dist. Dept. of the South, Tybee Island, Ga.

Terms of capitulation agreed upon for the surrender to the forces of the United States of Fort Pulaski, Cockspur Island, Ga.

ARTICLE 1. The fort, armament, and garrison to be surrendered at once to the forces of the United States.

ART 2. The officers and men of the garrison to be allowed to take with them all their private effects, such as clothing, bedding, books, &c; this not to include private weapons.

Art 3. The sick and wounded, under charge of the hospital steward of the garrison, to be sent up under a flag of truce to the Confederate lines, and at the same time the men to be allowed to send up any letters they may desire, subject to the inspection of a Federal Officer.

Signed this the 11th day of April, 1862, at Fort Pulaski, Cockspur Island, GA.

CHAS. H. OLMSTEAD,
Colonel First Vol. Regt. of Georgia, Comdg.
Fort Pulaski

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David Eldridge was born at on .

His family settled in Orange Park, Florida, after David's father retired from the U.S. Air Force at Charleston Air Force Base in 1980. He attended Orange Park High School and upon graduating in 1984 started a swimming pool service company with his best friend and fellow trumpeter, Douglas Pike. The following year David established Orange Park Pool Service while attending college. He received his Bachelor of Arts in history from the University of North Florida in 1991.

While working toward his BA, David earned a reserve commission in the U.S. Army, and after a short absence from home returned to the University of North Florida in the fall of 1992 to begin work on his master's degree. He continued to manage at OPPS and joined the Florida Army National Guard. He married the lovely Heather Lee MaDan of Sumter, South Carolina, in May 1993. David moved to Starkville, Mississippi, in the fall of 1995 to work toward his doctorate in American history at Mississippi State University.